UNIVERSAL DESTINATIONS & EXPERIENCES UK PROJECT

Former Kempston Hardwick Brickworks and adjoining land, Bedford

Environmental Statement Volume 1

Chapter 15 - Climate Resilience

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UNIVERSAL DESTINATIONS & EXPERIENCES

CONTENTS

TABLES

15. CLIMATE RESILIENCE

15.1. INTRODUCTION

15.1.1. This chapter addresses the vulnerability of the Proposed Development to climate change. It reports the outcome of the assessment of the likely significant effects arising from climate change on the Proposed Development.

SUPPORTING DOCUMENTATION

15.1.2. This chapter is intended to be read in conjunction with the following chapters (ES Volume 1) and appendices (ES Volume 3):

- **Chapter 12: Water Resources (Volume 1)**;
- **Chapter 14: Greenhouse Gases (Volume 1)**;
- **Appendix 3.1: Legislation, Policy, and Guidance (Volume 3**); and
- **Appendix 3.2: Significance Criteria (Volume 3).**

LEGISLATIVE FRAMEWORK, POLICY, AND GUIDANCE

15.1.3. The legislation, policy, and guidance relevant to the assessment of climate change resilience associated with the Proposed Development are detailed in **Appendix 3.1: Legislation, Policy, and Guidance (Volume 3)**.

15.2. ASSUMPTIONS USED TO INFORM TOPIC ASSESSMENT

15.2.1. The following assumptions have been used to inform the assessment.

- There is currently no agreed industry methodology that should be applied for assessing the significance of potentials effects of climate change. Therefore, an approach has been developed and applied in this assessment based on existing best practice and professional experience;
- The UK Met Office's UK Climate Projections 18 (UKCP18) have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Development to climate change. UKCP18 is a set of tools and data that provide probabilistic projections of climate variables for different emissions scenarios and time periods to help understand how the UK's climate may change in the future. At the time of writing, these represent the most up-to-date representation of local future climate in the UK;
- A 'high' emissions scenario (Representative Concentration Pathways (RCP) 8.5) using the 2080s time slice (2070 – 2099 - the longest temporal scale available through UKCP18) has been used to develop the baseline against which resilience has been assessed. This is consistent with the precautionary principle (i.e., 'cautious worst case' scenario);
- All structures will adhere to relevant building and design standards;
- All operational and assessment management policies will be followed;
- Any significant changes to design or operations will require reconsideration of climate resilience; and

- Any beneficial impacts of climate change on the Proposed Development are beyond the scope of this assessment and have not been included in this chapter.

15.3. ENGAGEMENT, SCOPE, AND STUDY AREA

ENGAGEMENT

15.3.1. As stated in **Chapter 1: Introduction and Site Description (Volume 1)**, this technical assessment has been undertaken in accordance with best practice guidance, engagement and using professional judgement.

SCOPE OF THE ASSESSMENT

15.3.2. The assessment of climate change resilience has considered the potential for impacts resulting in likely significant effects on the Proposed Development due to climate change during the Operational Phase.

15.3.3. The Construction Phase has been scoped out of the assessment as **Appendix 2.3: Outline Construction Environmental Management Plan (OCEMP) (Volume 3)** has included mitigation measures which reduce the vulnerability of the Proposed Development to weather and climate events.

15.3.4. The elements shown in **Table 15-1** are considered to have the potential to give rise to likely significant effects during operation of the Proposed Development and have therefore been considered within this assessment.

Table 15-1 - Elements scoped into the climate change resilience assessment

Entertainment Resort Complex (including outdoor rides) ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Changes in annual and seasonal average precipitation; ▪ Extreme temperatures/heatwaves; ▪ Changes in annual and seasonal average temperature; ▪ Gales, gusts, high winds; and ▪ Storms.
Buildings ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Extreme temperatures/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.
Hard landscaping and street furniture ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Extreme temperatures/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.

Soft landscaping ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Changes in annual and seasonal average precipitation; ▪ Extreme temperatures/heatwaves; ▪ Changes in annual and seasonal average temperature; ▪ Gales, gusts, high winds; and ▪ Storms.
Utilities and services ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Extreme temperatures/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.
Road Network ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Extreme temperatures/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.
Rail Network ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Extreme temperatures/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.
People ▪ Extreme precipitation events; ▪ Extreme temperature/heatwaves; ▪ Gales, gusts, high winds; and ▪ Storms.

Elements Scoped out of the Assessment.

15.3.5. The elements shown in **Table 15-2** are not considered to give rise to likely significant effects as a result of the Proposed Development and have therefore not been considered within this assessment.

Table 15-2 - Elements scoped out of the climate change resilience assessment

Element Scoped Out	Justification
Construction workers, construction site and materials ▪ Extreme precipitation events; ▪ Drought/drier periods; ▪ Changes in annual and seasonal average; ▪ Snow/ice; ▪ Extreme temperatures/heatwaves; ▪ Changes in annual and seasonal average; ▪ Gales, gusts, high winds; and ▪ Storms.	The OCEMP considers weather and climate risk mitigants which reduce the vulnerability of the Proposed Development to weather and climate events.
Entertainment Resort Complex (including outdoor rides) ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'moderate sensitivity and 'low' exposure rating.
Buildings ▪ Snow/ice; ▪ Changes in annual and seasonal average precipitation; and ▪ Changes in annual and seasonal average temperature.	Low vulnerability following the vulnerability assessment due to 'low' sensitivity and 'low/medium' exposure ratings.
Hard landscaping and street furniture ▪ Changes in annual and seasonal average precipitation; ▪ Changes in annual and seasonal average temperature; and ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'low/moderate' sensitivity and 'low/medium' exposure ratings.
Soft landscaping ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'moderate' sensitivity and 'low' exposure rating.
Utilities and services ▪ Changes in annual and seasonal average precipitation; ▪ Changes in annual and seasonal average temperature; and ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'low/moderate' sensitivity and 'low/medium' exposure ratings.

Element Scoped Out	Justification
Road Network ▪ Changes in annual and seasonal average precipitation; ▪ Changes in annual and seasonal average temperature; and ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'low/moderate' sensitivity and 'low/medium' exposure ratings.
Rail Network ▪ Changes in annual and seasonal average precipitation; ▪ Changes in annual and seasonal average temperature; and ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'low/moderate' sensitivity and 'low/medium' exposure ratings.
People ▪ Drought/drier periods; ▪ Changes in annual and seasonal average precipitation; ▪ Changes in annual and seasonal average temperature; ▪ Drought/drier periods; and ▪ Snow/ice.	Low vulnerability following the vulnerability assessment due to 'low' sensitivity and 'low/medium' exposure ratings.

EXTENT OF THE STUDY AREA

15.3.6. The scope for the climate change resilience assessment relates to the impact of climate on the Proposed Development (rather than the impact of the Proposed Development on climate which has been assessed in **Chapter 14: Greenhouse Gases (Volume 1)**). As such the Study Area for the Proposed Development is defined as the Site boundary of the Proposed Development as shown in **Site Location Plan (Document Reference 1.6.0)**.

15.3.7. In the context of a climate change resilience assessment, all elements of the Proposed Development are located within a relatively close proximity of each other. Therefore, the same baseline conditions and future baseline (projections) apply for the Proposed Development.

15.4. METHODOLOGY

METHOD OF BASELINE DATA COLLATION

Desk Study

15.4.1. The climate change resilience assessment is a desk-based assessment undertaken using climate data for current and future baselines.

15.4.2. The current baseline for the climate change resilience assessment is based on historic climate data obtained from the Met Office records for Bedford, the closest meteorological weather station to the Proposed Development **(Ref.15.2)**, and the Met Office Regional Climate Profile for East England **(Ref. 15.3)**.

15.4.3. For the future baseline, the UKCP18 **(Ref. 15.4)** projections have been used to analyse future changes in a range of climate variables that may affect the resilience of the Proposed Development to climate change. The Climate Risk Indicators (CRI) **(Ref. 15.5)**, developed as part of the UK Climate Resilience Programme, have been used to inform this assessment. The CRI utilises the UKCP18 projections and allows for a range of climate related indicators to be assessed. The CRI data for the Bedford Local Authority Area (analogous to Bedford Borough Council) has been used to inform this assessment.

Site Visit and Surveys

15.4.4. As the historic and future climate data has been gathered from publicly accessible portals, no site survey was required in relation to the climate change resilience assessment for the Proposed Development. All data has been collected through desk-based study.

ASSESSMENT METHODOLOGY

15.4.5. The climate change resilience assessment has been undertaken using an approach based on the IEMA guidance **(Ref. 15.6)** and professional judgement.

15.4.6. The assessment looks at the potential impacts of environmental change on the Proposed Development, rather than impacts of the Proposed Development on the environment: the receptor for the resilience assessment is the Proposed Development. As such, no assessment of intra-project combined effects is undertaken, as there are no receptors in common with other assessments.

SIGNIFICANCE CRITERIA

Sensitive Receptors

15.4.7. In the context of climate resilience, sensitive receptors are elements of the Proposed Development that are likely to be affected by future changes in climate, the extent of which has been assessed in this chapter.

15.4.8. The identified sensitive receptors for the Operational Phase (commencing Opening Year) are as follows:

- Entertainment Resort Complex: outdoor rides and attractions (not enclosed within a building) and associated safety-critical features, mechanical and electrical equipment;
- Buildings: retail, dining and entertainment venues, visitor accommodation, theatres, cinema, residential and lodging, visitor centres, offices, 'back of house' buildings and storage, safety-critical features, mechanical and electrical equipment;
- Hard Landscaping and street furniture: pedestrian walkways, roads, car park, resort transportation facilities, EV charging, fencing, drainage, retaining walls and signage;
- Soft Landscaping: water features, ecological enhancements, and habitat creation;
- Utilities and services: substations, electrical and communication equipment, water and wastewater facilities, Highway Service Area, waste and recycling, underground storage and pipes, and safety critical features;
- Road Network: slip roads, local roadway improvements, safety-critical features, mechanical and electrical equipment, and active travel (foot and cycle) connections;

- Rail Network: Wixams Rail Station, safety-critical features, mechanical and electrical equipment; and
- People: operational staff and visitors.

Likelihood-consequence of Impact

15.4.9. For each of the receptors, potential impacts associated with the projected changes in climate variables during the Operational Phase have been identified and listed in **Table 15-10**. The 'likelihoodconsequence' approach adopted to measure the significance of these impacts on the Proposed
Development is explained in **Appendix 3.2: Legislation, Policy, and Guidance (Volume 3)**.

Significance of Effect

15.4.10. The significance of effects is determined by considering the consequence and the likelihood of potential impacts associated with changes in climate variables on Proposed Development components occurring. The likelihood and consequence have been combined to assess the significance of effects on receptors, as shown in **Table 15-3**. The assessment is qualitative and based on expert judgment from knowledge of similar developments, engagement with the wider project team and a review of relevant literature.

Table 15-3 - Significance rating matrix

Likelihood / consequence	Negligible consequence	Minor adverse consequence	Moderate adverse consequence	Large adverse consequence	Very large adverse consequence
Very High Likelihood	Not significant	Significant	Significant	Significant	Significant
High Likelihood	Not significant	Significant	Significant	Significant	Significant
Medium Likelihood	Not significant	Not significant	Significant	Significant	Significant
Low Likelihood	Not significant	Not significant	Not significant	Significant	Significant
Very Low Likelihood	Not significant	Not significant	Not significant	Not significant	Significant

15.4.11. Further details on the significance criteria for the assessment of climate change resilience are presented in **Appendix 3.2: Legislation, Policy, and Guidance (Volume 3)**.

15.5. BASELINE CONDITIONS

15.5.1. The IEMA EIA Guide to *Climate Change Resilience and Adaptation* **(Ref. 15.6)** identifies the need for the baseline to consider:

- The current climate baseline (defined by historic climate conditions) to provide an indication of past vulnerability; and
- The future climate baseline (short term extremes and long-term variation) to assess a project's vulnerability to climate change.

CURRENT BASELINE

15.5.2. The current baseline describes the climate trends over the past three decades (1991-2020) for temperature, precipitation, and wind. The 1991-2020 baseline period provides the most recent baseline climate information and a standard reference to compare variations in climate variables to the 30-year average. Climate trend data is provided for the local climate as represented by the nearest weather station to the Site. A selection of extreme weather events of note that have affected Bedford in the past 10 years have also been included.

Temperature

15.5.3. **Table 15-4** shows the long-term average, maximum and minimum temperature for Bedford for the baseline period 1991-2020. The average annual maximum and minimum temperature values for Bedford are 14.3°C and 6.3°C, respectively.

Table 15-4 - Long-term average monthly mean, maximum and minimum temperatures for Bedford weather station over the baseline period 1991-2020

Season	Average temperature (°C)	Maximum temperature (°C)	Minimum temperature (°C)
Winter	4.6	7.6	1.6
Summer	16.5	21.4	11.6
Annual	10.3	14.3	6.3

15.5.4. Some of the extreme temperature events that have affected Bedford in recent years include:

- September 2023: Temperatures reached over 30°C in September in Bedford. During the heatwave, Bedford Borough Council asked residents to check on vulnerable individuals for their well-being, thereby creating awareness on the importance of community support **(Ref. 15.8)**; and
- July 2019: The heatwave of 2019 set a very large number of temperature records at individual stations across the UK. For Bedfordshire, the temperatures reached 37.1°C, the highest recorded temperature in 102 years **(Ref. 15.9)**.

Precipitation

Rainfall

15.5.5. Rainfall tends to be higher across the autumn and winter periods (October to January) in Bedford. The late spring and summer months (April to September) are relatively drier. **Table 15-5** provides the long-term average seasonal rainfall for Bedford weather station and the average number of days when rain was greater than 1mm over the baseline period.

Table 15-5 - Bedford weather station long-term average cumulative rainfall (mm) and days of rainfall > 1mm over the baseline period 1991-2020

Season	Average cumulative rainfall (mm)	Days of rainfall ≥ 1mm (Days)
Winter	147.6	31.4
Summer	160.2	26.9
Annual	608.6	114.8

15.5.6. Some of the extreme rainfall events that have affected Bedford in recent years include:

- September-October 2024: A series of low pressure systems led to ten days of exceptional rain fall within Bedfordshire, with September being the wettest month recorded in the area. This period of inclement weather led to a multi-week closure of the A421 as the carriageway was submerged by water **(Ref. 15.31);**
- February 2024: As river levels remained high following heavy rainfall, there were three flood alerts in Bedford. Low lying areas and agricultural fields, in particular, were flooded by the River Great Ouse Kempston, the area where the Site is located was one of the worst affected **(Ref. 15.10)**; and
- December 2020: Widespread flooding occurred across the Borough from 23 to 26 December 2020. 20 to 30mm rain fell in 24 hours, and it was the second wettest December across East Anglia since records began in 1981 **(Ref. 15.11)**.

Wind

15.5.7. Eastern England, where Bedford lies, is one of the more sheltered parts of the UK, since the windiest areas are to the north and west, closer to the track of Atlantic storms. The strongest winds are associated with the passage of deep depressions across or close to the UK. The frequency of depressions is greatest during the winter months, so this is when the strongest winds normally occur **(Ref. 15.3)**.

15.5.8. **Table 15-6** presents the long-term average monthly mean wind speed for Bedford weather station over the baseline period.

Table 15-6 - Long-term average monthly mean wind speed at 1m (knots) for Bedford weather station over the baseline period 1991-2020

Season	Monthly mean wind speed at 10m (Knots)
Winter	9.9
Summer	7.7
Annual	8.8

15.5.9. Some of the storm events that have affected Bedford include:

- January 2024: Very strong winds with gusts up to 60 mph were experienced as Storm Henk hit Eastern England in January. An amber weather warning for wind was issued for Bedfordshire **(Ref. 15.14)**; and

- February 2022: High winds caused rail and road disruption as Storm Eunice hit Bedford. The Met Office declared an amber warning for wind on 18 February 2022, suggesting there may be significant disruption and danger **(Ref. 15.15)**.

FUTURE BASELINE

Future Baseline

15.5.10. The UKCP18 **(Ref. 15.4)** probabilistic projections for RCP8.5[1,2] (high emission scenario) have been used to establish a pessimistic, but plausible future for which to assess climatic conditions in a range of climate variables that may affect the vulnerability of the Proposed Development to climate change. The Climate Risk Indicators (CRI) **(Ref. 15.5)**, developed as part of the UK Climate Resilience Programme have been used to determine the future baseline in this assessment. The CRI utilizes the UKCP18 projections and allows for a range of climate related indicators (including but not limited to, Met Office Heatwaves and heat stress). The CRI data for the LAU1 (Local Authority Unit 1) of "Bedford Local Authority Area (analogous to Bedford Borough Council) has been used to inform this assessment.[3]

15.5.11. The future climate has been presented for the 2030s (2020-2049), the 2050s (2040-2069) and 2080s (2070-2099) to identify the anticipated climate conditions covering the lifespan of the Proposed Development. These projections are provided against the baseline period of 1981-2010 (based on model data), and 1991-2020 (current climate) as an indication of change from the baseline period.

15.5.12. **Table 15-7** provides an overview of current and projected summer and winter temperature and rainfall for the Proposed Development.

Table 15-7 - Temperature and rainfall data for the model reference (1981-2010), current (1991-2020) and future climate projections (anomalies) for the 2030s, 2050s and 2080s under RCP8.5, presented as the 50th (10th-90th) percentile values.

Climate variable	Model reference (1981-2010)	Existing baseline (1991-2020)	RCP8.5			Trend
			2030s	2050s	2080s	
Average summer temperature (°C)	16.2	16.5	+1.5 (0.6 to 2.4)	+2.7 (1.3 to 4.0)	+5.1 (2.8 to 7.5)	↑
Average winter temperature (°C)	4.1	4.6	+1 (0.3 to 1.8)	+1.7 (0.6 to 2.9)	+3.1 (1.3 to 5)	↑
Min winter temperature (°C)	1.2	1.6	+0.9 (0.2 to 1.9)	+1.8 (0.5 to 3.2)	+3.2 (1.2 to 5.5)	↑

[1] Representative Concentration Pathways (RCPs) specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Radiative forcing targets for 2100 have been set at 2.6, 4.5, 6.0 and 8.5 W m-2 named RCP2.6, RCP4.5, RCP6.0 and RCP8.5, respectively.

[2] RCP8.5 (high emission scenarios) is used in line with IEMA guidance.

[3] There are inherited limitations and uncertainties within the data. Further information on the methodology used to produce this data can be found in https://www.sciencedirect.com/science/article/pii/S2212096320300553

Climate variable	Model reference (1981-2010)	Existing baseline (1991-2020)	RCP8.5			Trend
			2030s	2050s	2080s	
Max summer temperature (°C)	21.1	21.4	+1.7 (0.5 to 2.8)	+3 (1.3 to 4.7)	+5.7 (2.7 to 8.1)	↑
Average summer Rainfall (mm, %)[4]	155.0	160.2	-7.8 (-23.6 to +6.7)	-17.2 (-37.3 to -1.9)	-33.1 (-57.0 to -6.8)	↓
Average winter rainfall (mm, %)	135.4	147.6	+6.4 (-2.2 to +16.3)	+10.5 (-1.9 to +25.7)	+21.7 (+1.3 to +27.1)	↑

15.5.13. **Table 15-8** provide indicators of climate risk for sector specific thresholds which are projected to change in the future. The indicators are provided against the model reference period of 1981-2010. These indicators are unavailable for the current baseline period (1991-2020).

Table 15-8 - Future projections (absolute) of climate risk indicators for the 2030s, 2050s and 2080s for RCP8.5, the table shows the 50th percentile (10th percentile to 90th percentile) values.

Climate variable	Model reference (1981-2010)	RCP8.5			Trend
		2030s	2050s	2080s	
Met office heatwave[5] (events per year)	0.9	2.1 (1.3 to 3.2)	3.6 (1.8 to 5.2)	4.9 (3.3 to 6.4)	↑
Met office cold weather alert[6] (events per year)	3.5	2.5 (1.9 to 3.2)	1.9 (1.3 to 2.7)	1.2 (0.5 to 2.2)	↓
Road melt risk (days per year)[7]	17.6	32.7 (22.5 to 45.2)	49 (29.9 to 71.2)	81.9 (48.3 to 111.5)	↑
Road accident risk (days per year)[8]	51.2	37.7 (28.9 to 46.7)	28.9 (18.9 to 41.2)	17.4 (8 to 32.6)	↓
Heat stress[9] (days per year)	0.18	1.1 (0.4 to 2.4)	3.4 (1.2 to 7.6)	13.7 (4.3 to 32)	↑

[4] For rainfall, the unit for model reference and existing baseline is mm, while the projected changes for the 2030s, 2050s, and 2080s are in percentage.

[5] A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold for the local area is 25 °C.

[6] The occurrence of a public health cold weather alert

[7] Days with maximum temperature above 25 °C

[8] Days with minimum temperature below 0°C

[9] Days with shade Wet Bulb Globe Temperature (WBGT) above 25°C

Climate variable	Model reference (1981-2010)	RCP8.5			Trend
		2030s	2050s	2080s	
Wildfire events[10] (days per year)	31.7	47 (31.8 to 64.8)	61.1 (37.1 to 87.9)	89.4 (51.4 to 123.3)	↑
Heating degree days[11]	2246	1956 (1807 to 2102)	1767 (1554 to 1975)	1417 (1123 to 1727)	↓
Cooling degree days[12]	136	223 (169 to 285)	312 (213 to 442)	550 (328 to 835)	↑

Wind

15.5.14. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes to much of this uncertainty. It is therefore difficult to represent regional extreme winds and gusts within regional climate models. Seasonal changes at individual locations across the UK lie within the range of -15% to +10%.

15.5.15. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 27m/s or 60mph) **(Ref. 15.16)**. Studies relating to future projections of storms **(Ref. 15.17)** suggest that climate driven storm changes are less distinct in the northern hemisphere, when compared with the southern hemisphere. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

SENSITIVE RECEPTORS

15.5.16. The identified sensitive receptors for the Operational Phase of the Proposed Development have been listed in Paragraph 15.4.8.

EMBEDDED MITIGATION

15.5.17. **Table 15-9** sets out the embedded mitigation measures corresponding to the potential effects of climate change for the identified sensitive receptors during the Operational Phase of the Proposed Development.

[10] Days with Met Office Wildfire Index at the Very High Fire Severity level or above

[11] Average annual number of heating degree days. Heating degree days are a measure of how much (in degrees), and for how long (in days), the outside temperature sits below 15.5°C.

[12] Average annual number of cooling degree days. Cooling degree days are a measure of how much (in degrees), and for how long (in days), the outside temperature sits above 18°C.

Table 15-9 - Embedded design mitigation measures in the context of climate resilience for the Proposed Development

Sensitive receptor	Embedded mitigation	Evidence of commitment
Entertainment Resort Complex (including outdoor rides)	Designs will include strategies for managing stormwater runoff and preserving the natural hydrology of the Site.	Section 5.3 of **Appendix 12.3: Drainage Strategy (Volume 3)**.
	When undertaking design review of the applicable Entertainment Resort Complex components as required to satisfy the law as set out in HSE Fairgrounds and amusement parks: Guidance on safe practice (2017) UDX must also include in its (i) design calculations consideration of wind speeds and temperatures for the local area as projected in UKCP18, (ii) design risk assessment consideration of materials that are suitably resilient to high temperatures and high winds of the type projected for the local area in UKCP18, and (iii) operating instructions to be used during operations of the particular component consideration of component fatigue life and weather restrictions suitable for the local area climate projections in UKCP18.	Design Standard [CZ4.1] **(Document Reference 6.3.0)**.
	Structures to be raised above the base flood elevation to reduce the risk of inundation.	The evidence of commitment is set out in the mitigation described in **Appendix 12.1 Flood Risk Assessment (Volume 3)**.
Buildings	During the design of buildings, due regard must be given to the temperatures, heavy rain fall events, and wind speeds projected for the local area by UKCP18.	Design Standard [SW4.4] **(Document Reference 6.3.0)**.
	Buildings should include water efficient fittings and appliances to reduce water consumption from the guests and the workforce.	The evidence of commitment is set out in the mitigation described in **Appendix 12.2 Water Strategy (Volume 3)**.
	Designs will include strategies for managing stormwater runoff and preserving the natural hydrology of the Site.	The evidence of commitment is set out in the mitigation described in **Appendix 12.3: Drainage Strategy (Volume 3)**.
	Structures to be raised above the base flood elevation to reduce the risk of inundation	The evidence of commitment is set out in the mitigation described in **Appendix 12.1 Flood Risk Assessment (Volume 3)**.

Sensitive receptor	Embedded mitigation	Evidence of commitment
Hard landscaping and street furniture	The design of these receptors will be compliant with British Standards, the Design Manual for Roads & Bridges (DMRB), National Planning Policy Framework, and with the local highway authority specifications relevant to managing climate-related hazards and impacts. This includes: ▪ Roads and hard paved areas include surface profiles to discharge surface water, with drainage facilities provided to store surface water at design storm conditions, inclusive of increased storm rainfall criteria arising from climate change; ▪ Paved highway surfaces and highway structures include drainage provisions to discharge surface water. Discharge routes for surface water during storms are designed to avoid causing flooding of building thresholds. Where appropriate, edge of road pavement foundation drainage will be provided to make sure ground water conditions do not rise and threaten to weaken the road foundation; ▪ The design process will identify a suitable maintenance regime for the highway infrastructure, inclusive of drainage system; ▪ The design of the drainage system takes into consideration extreme rainfall events up to the 1 in 100-year plus a climate change uplift. In addition to the designed network current standards set out in the National Planning Policy Framework require understanding of flow routing, therefore, where possible, the design of the landform shall aim to divert extreme events to safe locations. The maintenance regime recommends inspections for all extreme events to identify any early signs of failure; ▪ Design standards for elevated infrastructure, including lighting columns/lanterns, road sign plates/posts and highway structures require wind loading design to include allowances for climate change and local environment wind conditions to make sure	Evidence of commitment comes from multiple standards and manuals relevant to these receptors including: ▪ *Bedford Borough Council Highway Design Standards* **(Ref. 15.20)**; ▪ *Design Manual for Roads and Bridges* (DMRB) **(Ref. 15.21)**/Manual of Contract *Documents for Highway Works* (MCHW) **(Ref. 15.22)**; ▪ *British Standards applicable to highway materials, including selection, testing, monitoring* **(Ref. 15.23)**; ▪ *National Planning Policy Framework* **(Ref. 15.25)**; and ▪ *Bedford Borough Council - Supplementary Planning Document for Sustainable Drainage Systems* **(Ref. 15.28)**.

Sensitive receptor	Embedded mitigation	Evidence of commitment
	foundations and products are specified and designed to accommodate expected increased future wind loads; ▪ The surface water design analysis includes up to the 1 in 100-year return period plus 40% climate change applied to rainfall intensity based on Environment Agency guidance. Considering future climate change, river levels and any proposed ground levels near to, or over the Elstow Brook would have a +600mm clearance if river flood levels abnormally rise; and ▪ For proposed drainage systems becoming overwhelmed due to flash storms and return periods greater than 1:100-year event, finished ground levels shall be designed so that surface water exceedance routes allow excessive runoff to route away from buildings, infrastructure and toward conveyance features (ditches/rivers). Clay Pits will be used to strategically store runoff from rainwater for 35 days collection period and used for process water (washdown and irrigation).	
	Parking and hardscape materials shall be specified with a high solar reflectance index (SRI) to help reduce the heat island effect	Design Standards [SW4.2] **(Document Reference 6.3.0)**.
Soft landscaping	A regular and monitored watering programme for survival of planting through periods of drought.	Section 5 of the Outline Landscape and Ecology Management Plan (**Appendix 6.5, Volume 3**).
	All earthwork surfaces will be finished with topsoil and planted, to provide a resilient surface.	Section 3.5 of **Appendix 2.3: Outline Construction and Environmental Management Plan** (**Volume 3**).
	Planting a diverse mix of species which can tolerate varying weather conditions and provide a level of biosecurity. Tree cover and wetland habitat will be maximised where practicable, to encourage localised cooling in hot weather.	Section 3 of **Appendix 6.4: Outline Habitat Creation and Enhancement Plan** (**Volume 3**).

Sensitive receptor	Embedded mitigation	Evidence of commitment
	Topographical mounds, and tree and buffer planting around the edge of the Site, and at suitable points within it, will help to reduce wind velocity around the Site.	Design Standards [SW6.23.] **(Document Reference 6.3.0)**.
Utilities and services	Backup power sources shall be installed in case of power failure during extreme weather events.	Design Standard [LZ4.1] **(Document Reference 6.3.0)**.
	All new power and telecommunications cables within the site will be installed below ground.	Design Standard [SW4.3] **(Document Reference 6.3.0)**.
	During the design of buildings and structures, including utilities and services (with the exception of the elements covered by CZ4.1), due regard will be given to the temperatures, heavy rain fall events, and wind speeds projected for the local area by UK Climate Projections (UKCP) 18.	Design Standard [SW4.4] **(Document Reference 6.3.0)**.
	Designs will include strategies for managing stormwater runoff and preserving the natural hydrology of the Site.	Section 5.3 of **Appendix 12.3: Drainage Strategy (Volume 3)**.
Road Network	The design of these receptors will be compliant with British Standards, the Design Manual for Roads & Bridges (DMRB) and with the highway authority specifications relevant to managing climate-related hazards and impacts. This includes: ▪ Roads and hard paved areas include surface profiles to discharge surface water, with drainage facilities provided to store surface water at design storm conditions, inclusive of increased storm rainfall criteria arising from climate change; ▪ Paved highway surfaces and highway structures include drainage provisions to discharge surface water. Discharge routes for surface water during storms are designed to avoid causing flooding of building thresholds. Where appropriate, edge of road pavement foundation drainage will be provided to make	Evidence of commitment comes from multiple standards and manuals relevant to these receptors including: ▪ *Bedford BC Highway Design Standards* **(Ref. 15.20)**; ▪ *Design Manual for Roads and Bridges (DMRB)* **(Ref. 15.21)***/Manual of Contract Documents for Highway Works (MCHW)* **(Ref. 15.22)**; ▪ British Standards applicable to highway materials, including selection, testing, monitoring (**Ref. 15.23)**; and ▪ *National Planning Policy Framework* **(Ref. 15.25)**.

Sensitive receptor	Embedded mitigation	Evidence of commitment
	sure make sure ground water conditions do not rise and threaten to weaken the road foundation; ▪ Highway supporting embankments will be designed with a slope suitable to remain stable in adverse weather conditions; ▪ Highway pavements and earthwork materials will be fit for purpose and installed to a high level of specification. The highway specification will require compacted densities of cohesive fill materials to be within an acceptable range of optimal density, removing voids and avoiding pore water pressures occurring. The drainage network can be designed, where possible, to provide minimum recommended gradients to achieve self-cleansing. Where this is not achievable, access and an enhanced maintenance regime is prescribed to long term performance; and ▪ Design standards for elevated infrastructure, including lighting columns/lanterns, road sign plates/posts and highway structures require wind loading design to include allowances for climate change and local environment wind conditions to make sure foundations and products are specified and designed to accommodate expected increased future wind loads.	
Rail Network	Projects should consider current and future vulnerability of the station to weather impacts, such as susceptibility to site flooding, or extreme weather including high winds, extreme temperatures, and heavy rainfall. These vulnerabilities may be exacerbated by the effects of climate change which may alter the severity, frequency, and impact of weather events. Climate Change Projections Guidance and Route Plans can help provide predictions of future climate changes at each location.	Evidence of commitment comes from multiple standards and manuals relevant to these receptors including: ▪ *Station Design Guidance [NR/GN/CIV/100/02]* **(Ref 15.1)**; and ▪ *Environment & Social Minimum Requirements – Design and Construction [NR/L2/ENV/015]* **(Ref. 15.30)**. And: ▪ Design Standard [SW4.4] **(Document Reference 6.3.0)**.
	The Designer will undertake a climate change impact assessment using relevant data sources and develop a WRCCA Risk Report	▪ Evidence of commitment comes from multiple standards and manuals relevant to these receptors including: *Station Design Guidance [NR/GN/CIV/100/02]* **(Ref 15.1)**; and

Sensitive receptor	Embedded mitigation	Evidence of commitment
	using the WRCCA Impact Assessment and Climate Change Projections guidance notes.	▪ *Environment & Social Minimum Requirements – Design and Construction [NR/L2/ENV/015]* **(Ref. 15.30)**. And: ▪ Design Standard [EG4.2] **(Document Reference 6.3.0)**.
People	UDX will develop emergency response plans for extreme weather events, including communication and information sharing with workers on Site and those planning to visit Site.	**Security and Emergency Management Plan (Document Reference 6.4.2.0)**.
	Engineering controls for heat including: air-conditioning, dehumidification, increased general ventilation, cooling fans with or without misters, water fountains, cooling attachments for heat-producing equipment, shield radiant sources, shade for outdoor work sites and air-conditioned break spaces. The design of these measures will include consideration for heat-vulnerable user groups, including mobility-impaired, neurodiverse, pregnant, very young and elderly users.	These measures are regulated under The Workplace (Health, Safety and Welfare) Regulations 1992 **(Ref. 15.32)**. Further guidance for compliance with regulatory requirements on issues such as ventilation, temperature, and workstations is set out in the Workplace (Health, Safety and Welfare) Regulations 1992 Approved Code of Practice and guidance.
	The UDX Environmental Health and Safety team shall establish safety thresholds relating to weather conditions of extreme heat, cold or high winds during which would necessitate operational changes or temporary closure of the Theme Park to the public.	**Security and Emergency Management Plan (Document Reference 6.4.2.0)**.
	UDX will implement operational controls including: variation of work load, monitoring temperatures, limiting physiological strain, changing wardrobe, enforced rest breaks in cool, shaded areas, communication, and training.	These measures are regulated under The Workplace (Health, Safety and Welfare) Regulations 1992 **(Ref. 15.32)**. Further guidance for compliance with regulatory requirements on issues such as ventilation, temperature, and workstations is set out in the Workplace (Health, Safety and Welfare) Regulations 1992 Approved Code of Practice and guidance.

15.6. ASSESSMENT OF POTENTIAL EFFECTS, MITIGATION AND RESIDUAL EFFECTS

15.6.1. **Table 15-10** presents the assessment of significance of effects by considering the consequence and the likelihood of the potential impacts of climate change during the Operational Phase of the Proposed Development, taking into account the embedded mitigation measures detailed in **Table 15-9**. As stated in **Table 15-2**, Construction Phase has been scoped out of the climate change resilience assessment.

15.6.2. As a reminder, and as set out in Section 10.4 of **Appendix 3.2: Significance Criteria (Volume 3)** the significance of effects is determined by considering the likelihood of the climate event to occur and the consequence of its potential impacts associated with changes in climate variables, on the Proposed Development components as depicted in **Table 15-3.** The assessment of consequence and likelihood (and therefore significance) take embedded mitigation into account as an assumed part of the design.

Table 15-10 - Assessment of significance of potential effects of climate change for the Proposed Development

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
Entertainment Resort Complex (including outdoor rides)	Precipitation	▪ Extreme precipitation events; ▪ Drought/drier periods; and ▪ Changes in annual and seasonal average precipitation.	Flooding of assets resulting in loss or disruption of function and associated risks.	Medium	Minor adverse	**Not Significant**
			Deterioration of material structure and fabric.	Low	Minor adverse	**Not Significant**
			Drying out and cracking of materials which has the potential to affect structural and foundation stability.	Low	Moderate adverse	**Not Significant**
			Subsidence resulting in damage to outdoor rides and structures (from drought or increased precipitation/flooding).	Low	Moderate adverse	**Not Significant**
	Temperature	▪ Extreme temperatures/heatwaves; and ▪ Changes in annual and seasonal average temperature.	More rapid deterioration of materials from UV radiation (e.g., fading and brittleness).	Medium	Negligible	**Not Significant**
			Increase in frequency and severity of faults in machinery and equipment may occur (due to design life of equipment).	Medium	Minor adverse	**Not Significant**
			Overheating of machinery and equipment.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
			Deformation and/or melting of surfaces resulting in damage and increased maintenance.	Medium	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Damage from wind-driven rain infiltration into materials and surfaces.	Low	Negligible	**Not Significant**
			Reduction of stability of above-ground infrastructure.	Low	Moderate adverse	**Not Significant**
Buildings	Precipitation	▪ Extreme precipitation events; and ▪ Drought/drier periods.	Subsidence resulting in damage to structures (from drought or increased precipitation/flooding).	Low	Moderate adverse	**Not Significant**
			Deterioration of material structure and fabric.	Low	Minor adverse	**Not Significant**
			Drying out and cracking of materials which has the potential to affect structural and foundation stability.	Low	Moderate adverse	**Not Significant**
			Undermining of foundations and infrastructure through the washout of soil particles by flowing water (derived from both fluvial and pluvial processes).	Low	Moderate adverse	**Not Significant**
	Temperature		More rapid deterioration of materials from UV radiation (e.g., fading and brittleness).	Medium	Negligible	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
		▪ Extreme temperatures/heatwaves.	Expansion of materials resulting in damage or increased fatigue, structural integrity loss and increased maintenance.	Low	Moderate adverse	**Not Significant**
			Deformation and/or melting of external surfaces resulting in damage and increased maintenance.	Medium	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Increased wind loading on structures.	Medium	Minor adverse	**Not Significant**
			Structural damage to buildings due to high winds and flying debris.	Medium	Minor adverse	**Not Significant**
Hard landscaping and street furniture	Precipitation	▪ Extreme precipitation events; and ▪ Drought/drier periods.	Flooding resulting in damage to hard landscaping and street furniture.	Medium	Minor adverse	**Not Significant**
			Subsidence resulting in damage to hard landscaping and street furniture (from drought or increased precipitation/flooding).	Medium	Minor adverse	**Not Significant**
			Reduction in earthwork stability, hastening the deterioration of materials.	Medium	Minor adverse	**Not Significant**
			Deterioration and formation of cracks in roads and paved surfaces.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
			Prolonged dry periods may lead to drying out and cracking of earthworks and soils, subsidence and greater amounts of dust which can have an impact on drainage infrastructure.	Medium	Minor adverse	**Not Significant**
			Changes in pore pressure due to prolonged wet or dry periods can lead to a loss of stability and failure of structure.	Medium	Minor adverse	**Not Significant**
			Lifespan reduction of concrete drainage pipes due to increased runoff flow.	Medium	Minor adverse	**Not Significant**
			Increased erosion due to extreme weather can cause surface water drainage pipes to become clogged with debris.	Medium	Minor adverse	**Not Significant**
			Overwhelming of drainage during extreme precipitation events.	Medium	Minor adverse	**Not Significant**
	Temperature	▪ Extreme temperatures/heatwaves.				
			Melting and deformation of roads from extreme temperatures resulting in damage.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
			Damage to lighting equipment from extreme heat.	High	Negligible	**Not Significant**
			Expansion of materials resulting in damage or increased fatigue and structural integrity loss.	Low	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	High winds may damage furniture and lighting.	High	Negligible	**Not Significant**
			Windborne dust and debris clogging drainage systems and requiring clearing.	High	Negligible	**Not Significant**
Soft landscaping	Precipitation	▪ Extreme precipitation events; ▪ Drought/drier periods; and ▪ Changes in annual and seasonal average precipitation.	Wetter winters and extreme rain events may destabilise exposed soils, impact slope stability and increased soil erosion or subsidence of exposed earthworks/slopes.	Medium	Minor adverse	**Not Significant**
			Changes in soil moisture can lead to increase or decrease in the water requirement of plants, resulting in changes in maintenance regimes.	High	Negligible	**Not Significant**
			Damage to/loss of planted landscaping and habitat (from flooding or from drought conditions).	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
	Temperature	▪ Extreme temperatures/heatwaves; and ▪ Changes in annual and seasonal average temperature.				
			Loss of vegetation cover due to scorching leading to destabilisation.	Medium	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Vegetation damage/uprooting of trees.	Medium	Minor adverse	**Not Significant**
Utilities and services	Precipitation	▪ Extreme precipitation events; and ▪ Drought/drier periods.	Damage to electrical equipment from water ingress resulting in failure.	Medium	Minor adverse	**Not Significant**
			Deformation and/or melting of surfaces resulting in damage and increased maintenance.	Medium	Minor adverse	**Not Significant**
			Power outages and disruption of functioning of utilities from water ingress.	Medium	Minor adverse	**Not Significant**
			Water scarcity posing water supply challenges.	Medium	Minor adverse	**Not Significant**
	Temperature		Failure or disruption of plant and equipment.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
		▪ Extreme temperatures/heatwaves.	Overheating of electronic equipment resulting in potential fire risks.	Medium	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Damage from high winds and rain infiltration into components resulting in power outages.	Medium	Minor adverse	**Not Significant**
			Lightning strike during storms can cause fire as well as power surges and shock waves which can destabilise energy systems, as well as cause damage to electronical equipment.	Low	Minor adverse	**Not Significant**
			Disruption of critical infrastructure such as power lines, water supply systems and communication networks.	Medium	Minor adverse	**Not Significant**
Road Network	Precipitation	▪ Extreme precipitation events; and ▪ Drought/drier periods.	Flood related damage to roads and structures.	Medium	Minor adverse	**Not Significant**
			Overwhelmed drainage leading to surface water flooding.	Medium	Minor adverse	**Not Significant**
			Subsidence resulting in damage to roads and structures.	Medium	Minor adverse	**Not Significant**
			Damage to electrical equipment from water ingress resulting in failure.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
			Shrinking and cracking of soils resulting in damage to infrastructure and increased maintenance.	Medium	Minor adverse	**Not Significant**
	Temperature	▪ Extreme temperatures/heatwaves.	Deformation and/or melting of surfaces resulting in damage and increased maintenance.	Medium	Minor adverse	**Not Significant**
			Increase in thermal expansion of structure and joints compromising structural integrity.	High	Minor adverse	**Not Significant**
			Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading) causing damage and requiring early replacement.	Medium	Minor adverse	**Not Significant**
			Risk of fire resulting in power outage, disruption, and increased maintenance.	Low	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Windborne dust and debris causing clogging drainage and requiring clearing.	Medium	Negligible	**Not Significant**
			Damage from high winds and rain infiltration into components resulting in power outages.	Medium	Minor adverse	**Not Significant**
			Lightning strikes causing fires.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
Rail Network	Precipitation	▪ Extreme precipitation events; and ▪ Drought/drier periods.	Flooding resulting in damage or deterioration of materials.	Medium	Minor adverse	**Not Significant**
			Water ingress to equipment (externally located) resulting in power/services failure.	Medium	Minor adverse	**Not Significant**
			Destabilisation of exposed soils, slope stability and increased soil erosion or subsidence of exposed earthworks/slopes affecting station infrastructure.	Medium	Minor adverse	**Not Significant**
			Drying out and cracking of earthworks and soils, subsidence, and greater amounts of dust.	Medium	Minor adverse	**Not Significant**
	Temperature	▪ Extreme temperatures/heatwaves.	Deformation and/or melting of surfaces resulting in damage and increased maintenance	Medium	Minor adverse	**Not Significant**
			Increase in thermal expansion of structure and joints compromising structural integrity.	High	Minor adverse	**Not Significant**
			Overheating of electrical equipment resulting in failure.	High	Minor adverse	**Not Significant**
			Faster rate of deterioration of materials from increase in UV radiation (for example, brittleness and fading) causing damage and requiring early replacement.	Medium	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
			Risk of fire resulting in power outage, disruption, and increased maintenance.	Low	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Damage and destabilisation of vegetation, damaging overhead lines or platform structures, blocking rail track or car park/walkways, risk of injury to passengers.	High	Minor adverse	**Not Significant**
			Lightning strikes causing fires and causing disruption.	Medium	Minor adverse	**Not Significant**
			Stability impacts on structure from strong winds resulting in damage or increased maintenance, and risk of injury to passengers.	Medium	Minor adverse	**Not Significant**
			Windborne dust and debris clogging drainage, resulting in flooding, or blocking tracks, causing network disruption.	Medium	Negligible	**Not Significant**
People	Precipitation	▪ Extreme precipitation events.	Safety risks to operational staff and visitors.	Low	Minor adverse	**Not Significant**
			Access routes for end users may be impeded by flooding.	Low	Minor adverse	**Not Significant**
	Temperature		Increase risk of fire and associated safety risks (for staff working in non-air-conditioned workspaces).	Low	Minor adverse	**Not Significant**

Sensitive Receptors	Climate Variable		Potential Effects	Likelihood	Consequence	Significance Rating
		▪ Extreme temperature/ heatwaves.	Risk of heat exhaustion/heat stroke to end users.	Medium	Minor adverse	**Not Significant**
	Wind	▪ Gales, gusts, high winds; and ▪ Storms.	Potential safety risk should structures become weakened.	Low	Moderate adverse	**Not Significant**
			Uprooted trees from high wind and storms pose a risk to end users and can cause access issues.	Medium	Minor adverse	**Not Significant**

15.7. ADDITIONAL MITIGATION AND RESIDUAL EFFECTS

15.7.1. For the Proposed Development, additional mitigation should be considered to address the potential effects from future climate change that are found to be 'significant'. From **Table 15-10**, the assessment results show that no effects were identified as significant.

15.8. OPPORTUNITIES FOR ENVIRONMENTAL ENHANCEMENT

15.8.1. Climate change can be mitigated through Nature-based Solutions (NbS). In the Proposed Development, NbS is likely to have a positive impact on the local environment while also reducing climate risk. For example, green infrastructure and landscaping will have a cooling effect on the Site which will help reduce the local temperature during heatwaves. Similarly, implementing a sitewide surface water drainage strategy that has been designed in accordance with the most recent Environment Agency Climate Change Guidance (see **Chapter 12: Water Resources (Volume 1)**; and providing enhancements to water bodies in alignment with the natural drainage of the Site will mitigate flooding from extreme precipitation events.

15.9. DIFFICULTIES AND UNCERTAINTIES

15.9.1. The following uncertainties have been identified for the assessment which have primarily affected the climate resilience assessment for the Proposed Development; however, it is considered that the broad scale of climate variables and effects on the receptors have been identified and there is sufficient information to determine significance (see **Table 15-11**):

- Given the current stage of the design, information was not available on specific design details on individual components of the receptor groupings. Therefore, the assessment was based on assumptions as identified in **Section 15.2** of this report;
- Qualitative assessment has been used to determine the potential impact and consequence of the effects on receptors from climate variables;
- There are inherent uncertainties associated with climate projections, given they are not predictions of the future. It is possible that future climate will differ from the future baseline climate against which the resilience of the Proposed Development has been assessed, depending on global emissions over the next century;
- There are inherited limitations and uncertainties within the UK Climate Risk Indicators (CRI) data. Further information on the methodology used to produce this data can be found in Changing climate risk in the UK: a multi-sectoral analysis using policy-relevant indicators **(Ref. 15.29)**; and
- Any further research, analysis or decision-making should take account of the accuracies and uncertainties associated with climate projections. It is also important to note that the projections are based on selected observational data, the results of climate model ensembles and a selected range of existing climate change research and literature available at the time of assessment. Any future decision-making based on this assessment should consider the range of literature, evidence, and research available at that time and any changes to this.

15.10. SUMMARY OF LIKELY SIGNIFICANT EFFECTS AND PROPOSED MITIGATION

15.10.1. According to our assessment, there are no significant residual effects from climate change after consideration of embedded mitigation measures. Possible effects from climate change are expected to be managed through design standards and operational policies as noted in the embedded mitigation table (**Table 15-9**).

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WSP House
70 Chancery Lane
London
WC2A 1AF

wsp.com

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