APPENDIX 7.5
CLIMATE CHANGE RESILIENCE ASSESSMENT RESULTS

This appendix outlines the climate change resilience assessment of the proposed development. Here, the combined effects of the Proposed Development and potential climate change impacts on the receiving environment and other environmental topics are addressed.

Table 7.1: Climate change resilience assessment

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Increased temperatures lead to increased heating, ventilation and air conditioning (HVAC) system power demand and increased energy consumption to cool buildings.	The project is targeting BREEAM outstanding for S6, S7 and S4. Mitigation has been implemented to improve the thermal performance of the building envelope to reduce heat gain and maximise U values. This includes adjusting façade depths and window orientation. Expected temperature increase is within operational range of systems designed to current standards for design life of HVAC system. It is assumed that this will also be applied to S08 and S09 as part of the outline planning application.	A level of resilience reached through maintenance of system and regular replacement	Low	Minor adverse	Low	None required

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			Likelihood	Magnitude of impact		
Increased temperatures and extreme heat events lead to reduced thermal performance of buildings and reduce thermal comfort of occupants		A level of resilience reached through maintenance of system and regular replacement	Low	Minor adverse	Low	None required
Increased temperatures lead to accelerated degradation of building facade materials	Robust long-standing materials have been selected for use in the buildings. Design of external building materials to current standards, monitored and maintained as per standard maintenance procedures. This has also been required in the design guide for the outline phases of the design. Extensive tree planting will provide shade on some aspects of lower floors. Greening of the eastern façade of S6 and S7 further added shade and cooling transpiration to the building surfaces.	A level of resilience reached through maintenance of asset	Low	Minor adverse	Low	None required

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			Likelihood	Magnitude of impact		
Extreme heat events could lead to failure of sensitive equipment at high temperatures	Sensitive equipment will be kept in temperature-controlled rooms. Louvres are being provided in the façade to help regulate temperature in other rooms where plant will be put in by the tenants.	Resilience achieved through design decisions.	Low	Moderate	Low	None required
Extreme heat events lead to damage to road surface through deformation of asphalt	Road construction is to current standards, monitored as per standard maintenance procedures. All materials used in the design are robust enough to withstand higher temperatures. The quantity of asphalt is also reduced across the site through the use of block paving at intervals.	A level of resilience reached through maintenance of asset	Medium	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Increased temperatures lead to increased outdoor recreation opportunities for development occupants	Opportunity - no mitigation required	n/a	High	Negligible	Low	None required
Increased temperatures lead to accelerated degradation of materials in outdoor facilities and pavements	Road and building construction to current standards, monitored as per standard maintenance procedures. All materials used in the design are robust enough to withstand higher temperatures. Light coloured materials (variations on buff and silver grey) are used throughout the site. Extensive tree planting is employed across the site, which will provide shade, both concentrated and filtered, over hard materials. There remain flexible areas of hard landscape, but these are also shaded by buildings for part of the day.	A level of resilience reached through maintenance of asset	Medium	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Extended periods of hot and dry days may lead to a risk of soil shrinkage, drying of vegetation and spontaneous grassland fires, causing building damage.	Area of most risk is the open mosaic habitat to north of the site with dried grassland. Site will be managed and cut in late summer. This 'wild' area is not sited near buildings. Planting on the buildings would have irrigation systems in place. Planting on the ground to be watered using funnelled water through planting beds. Ground substrate is naturally dry and vegetation is adapted to this. Soil shrinkage is less likely on gravelly and sandy soils, which are present on site. Much of the understory planting is herbaceous and it will respond to drought by limiting its vegetative growth. In extreme situations the vegetation could be cut without severe detriment to the planting.	Risk of grassland fires is reduced by management plan and mitigation however there still a risk from heatwaves in open mosaic habitat to north of the site.	Low	Moderate adverse	Medium	The management plan should Include the following measure: the timing of the grassland cut may be increased if there are extended droughts/heatwaves anticipated.
Extended periods of hot days and dry may lead to a risk of soil shrinkage, drying of vegetation and spontaneous grassland fires,		Risk of grassland fires is reduced by management plan and mitigation however there still a risk from	Low	Minor adverse	Medium	The management plan should Include the following measure: the timing of the grassland cut may be increased

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
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affecting public safety.		heatwaves in open mosaic habitat to north of the site.				if there are extended droughts/heatwaves anticipated.
Fewer frost days leads to decreased energy consumption to heat buildings	Opportunity - no mitigation required	n/a	Medium	Negligible	Low	None required
Fewer frost days leads to improved thermal comfort of building occupants	Opportunity - no mitigation required	n/a	Medium	Negligible	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Extreme rainfall events lead to opportunity for rainwater harvesting and water supply to building	Opportunity - no mitigation required	n/a	Medium	Negligible	Low	None required
Extreme rainfall events lead to localised flooding of roads and transport infrastructure, causing disruption to services and traffic	Masterplan design is based on detailed drainage strategy which incorporates projected climate change. Sustainable Drainage and surface water attenuation is sized to accommodate 1 in 100-year return period events with climate change allowance.	Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
Extreme rainfall events causing damage to road surface	Road construction to current standards, monitored and maintained as per standard procedures. Resurfacing to occur within 10 - 20 years.	Resilience achieved through monitoring and	Low	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
		maintenance of asset				
Extreme rainfall events lead to localised flooding in public realm, causing disruption to users	Masterplan design is based on detailed drainage strategy which incorporates projected climate change. Safe refuges will be available within the proposed structures including canopies, colonnades, overhangs and overhanging aspects of buildings.	Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
Extreme rainfall events lead to localised flooding, causing damage to building structure, internal fit-out, and equipment and pumps	Masterplan design is based on detailed drainage strategy which incorporates projected climate change.	Resilience achieved through design decisions.	Low	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Increased rainfall and flooding effects can damage internal building contents.		Resilience achieved through design decisions.	Low	Minor adverse	Medium	None required
Extreme rainfall events lead to localised flooding of infrastructure, causing disruption to services		Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
Extreme rainfall events lead to sewer flooding and resulting effects		Resilience achieved through design decisions.	Low	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Extreme rainfall events leading to debris and sediment runoff, causing blockage to drainage systems. Blockage may result in flooding and resulting effects.		Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
Decreased average rainfall leads to drier soil conditions and soil shrinkage, causing damage to building foundation and possible ground movement.	Shrinkage and desiccation considered in foundation design	Resilience achieved through design decisions.	Low	Moderate adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
Decreased average rainfall and dry spells lead to disruption to water supply to building	Buildings connected to mains water supply. Capacity checks have been undertaken with utilities to confirm capacity within network.	Resilience already accounted for	Low	Minor adverse	Medium	None required
Decreased average rainfall leads to increased reliance on mains water for landscape irrigation during summer	Drought resistant plants have been planted across the site. Plants will be planted at the right time of year to ensure good root growth during the winter. Irrigation included in the design. Rainwater harvesting for watering plants on buildings and green roofs. Management Plan includes procedures for irrigation during establishment and ongoing maintenance. This includes irrigation during the first 2 years to ensure plants become established and will be drought tolerant. Mulch is used to reduce water loss from soil. Watering will be scheduled early or late in the day to reduce transpiration.	A level of resilience reached through maintenance of asset	Low	Minor adverse	Medium	None required
Decreased average rainfall leads to loss		A level of resilience reached through	Low	Minor adverse	Low	None required

Potential Climate Change Risk to Scheme	Existing or embedded mitigation measures	Result of mitigation measure on resilience	Hazard Impact (likelihood and magnitude of impact given existing mitigation measures)		Uncertainty level (CC projection and effect on asset)	Proposed additional resilience measure (if required)
			Likelihood	Magnitude of impact		
of vegetation during summer		maintenance of asset				
Decreased average rainfall leads to drier soil conditions and soil shrinkage, causing damage to underground service infrastructure	Shrinkage and desiccation accounted for in service infrastructure design, including materials selection for utilities and the form of trench sections and also within the foundation design.	Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
High winds lead to increased stress and damage to buildings, especially material fixtures, claddings and fasteners	Design appropriate for the current windiness. Significant uncertainty exists regarding future projections of windiness and therefore, no significant impacts have been identified.	Resilience achieved through design decisions.	Low	Minor adverse	High	None required

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			Likelihood	Magnitude of impact		
High winds lead to damage to vegetation and trees		Resilience achieved through design decisions.	Low	Minor adverse	High	None required
High winds lead to increased stress and damage to above ground utility infrastructure		Resilience achieved through design decisions.	Low	Minor adverse	High	None required
High winds lead to movement of dust from construction, which can harm the health of construction workers and the public.		Resilience achieved through design decisions.	Low	Minor adverse	High	None required

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Increased lighting strikes lead to more frequent damage to trees	Trees in the residential area are grouped so that no larger tree stands prominently taller than the others, reducing the risk to lightning strike. Single large tree standing alone in the public square may be fitted with a copper conducting ground rod.	Resilience achieved through design decisions.	Low	Minor adverse	Low	Include consideration in the landscape management plan
Increased lighting strikes lead to more damage, especially roofs, guttering and windows.	Lighting mitigation measures such as lighting stanchions will be incorporated in the building design as needed.	Resilience achieved through design decisions.	Low	Minor adverse	Low	None required
Increased humidity through warmer air causes mould, condensation and decreased thermal performance of buildings.	Aiming for BREEAM outstanding rating which involves robust detailing and appropriate material choices to minimise this impact	Resilience achieved through design decisions.	Low	Minor adverse	High	None required