

Climate change risk assessment

Project
Timeframes

Data from climate predictions

Examples in Grey

Risk ID	Climate hazard	Trend or Likelihood of Climate Hazard	Potential Climate Change Impact	Potential Climate Change Risk to Scheme	Construction/Operation Stage	Asset type	Existing or embedded mitigation measure	Result of mitigation measure on resilience	Hazard Impact		Risk rating
									Likelihood	Consequence	
1	High temperatures	Mean daily summer temperatures are expected to increase from 16.0°C to 18.1°C in the 2050s and to 19.4°C in the 2070s. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline of 8.3 days to 27.6 days in the 2050s and 45.9 in the 2070s.	Rising temperatures effecting road surface	Extreme heat events lead to damage to road surface through deformation of asphalt	Operation	Traffic and transport	Road construction to current standards, monitored as per standard maintenance procedures.	A level of resilience reached through maintenance of asset	Unlikely	Minor	Very Low
2	High temperatures	Mean daily summer temperatures are expected to increase from 16.0°C to 18.1°C in the 2050s and to 19.4°C in the 2070s. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline of 8.3 days to 27.6 days in the 2050s and 45.9 in the 2070s.	Rising temperatures impact building usage	Opportunity: Increased temperatures lead to increased outdoor recreation opportunities for development occupants	Operation	Public realm					
3	High temperatures	Mean daily summer temperatures are expected to increase from 16.0°C to 18.1°C in the 2050s and to 19.4°C in the 2070s. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline of 8.3 days to 27.6 days in the 2050s and 45.9 in the 2070s.	Rising temperatures impact materials performance	Increased temperatures lead to accelerated degradation of materials in outdoor facilities and pavements	Operation	Public realm	Facilities and pavement construction to current standards, monitored as per standard maintenance procedures.	A level of resilience reached through maintenance of asset	Unlikely	Minor	Very Low
4	High temperatures	Mean daily summer temperatures are expected to increase from 16.0°C to 18.1°C in the 2050s and to 19.4°C in the 2070s. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline of 8.3 days to 27.6 days in the 2050s and 45.9 in the 2070s.	Rising temperatures impact equipment performance	Extreme heat events lead to overheating of overhead electricity transmission lines	Operation	Utilities	Expected temperature increase is within operational range of transmission lines.	Resilience already accounted for.	Unlikely	Minor	Very Low
5	High temperatures	Mean daily summer temperatures are expected to increase from 16.0°C to 18.1°C in the 2050s and to 19.4°C in the 2070s. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline of 8.3 days to 27.6 days in the 2050s and 45.9 in the 2070s.	Increased number of hot days may lead to shrinkage of soil and drying out of vegetation	Extended periods of hot days may lead to a risk of spontaneous grassland fires, affecting safety to public.	Operation	Public realm			Very unlikely	Major	Low
6	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may cause flooding risk from river and groundwater sources	Extreme rainfall events lead to localised flooding of roads and transport infrastructure, causing disruption to services and traffic	Operation	Traffic and transport	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Resilience achieved through design decisions.	As likely as not	Minor	Low
7	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may damage road surface	Extreme rainfall events causing damage to road surface (increased stripping rate, likelihood of potholing from moisture entering cracks in surface)	Operation	Traffic and transport	Road construction to current standards, monitored and maintained as per standard procedures. Resurfacing to occur within 10 - 20 years.	Resilience achieved through monitoring and maintenance of asset	As likely as not	Minor	Low
8	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may cause flooding risk from river and groundwater sources	Extreme rainfall events lead to localised flooding in public realm, causing disruption to users	Operation	Public realm	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Resilience achieved through design decisions.	As likely as not	Minor	Low
9	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may cause flooding risk from river and groundwater sources	Extreme rainfall events lead to localised flooding of infrastructure, causing disruption to services	Construction and Operation	Utilities	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Resilience achieved through design decisions.	Unlikely	Moderate	Low
10	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may cause flooding risk from river and groundwater sources	Extreme rainfall events lead to sewer flooding and resulting effects	Construction and Operation	Utilities	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Resilience achieved through design decisions.	Unlikely	Moderate	Low

11	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall effecting soil moisture levels	Increased average rainfall and extreme rainfall events lead to increased soil moisture levels, causing landslip and damage to utilities	Operation	Utilities	Design and construction of utilities to current standards, monitored as per standard maintenance procedures.	A level of resilience reached through maintenance of asset	Unlikely	Moderate	Low
12	High precipitation	Mean precipitation is expected to increase in winter from 4.4mm a day to 5.0mm in the 2050s and 5.4mm in the 2070s. Number of days with extreme precipitation (>25mm) to increase from 9.7 days to 12.7 days in 2050s and 14.3 days in the 2070s.	Increased rainfall may cause debris and sediment run-off	Extreme rainfall events leading to debris and sediment runoff, causing blockage to drainage systems. Blockage may result in flooding and resulting effects.	Construction and Operation	Utilities	Masterplan design is based on detailed flood risk assessment which incorporates projected climate change.	Resilience achieved through design decisions.	Unlikely	Moderate	Low
13	Low precipitation	Mean precipitation is expected to decrease in summer from 2.9mm a day to 2.34mm in the 2050s and 1.21mm in the 2070s. Dry spells (10 days or more with no precipitation) are expected to increase from 4.1 days in the baseline to 4.8 days in the 2050s and 5.4 days in the 2070s.	Decreased rainfall can reduce water supply to building	Decreased average rainfall leads to increased reliance on mains water for landscape irrigation during summer	Operation	Public realm	Landscape Management Plan includes procedures for irrigation during establishment and ongoing maintenance.	A level of resilience reached through maintenance of asset	As likely as not	Minor	Low
14	Low precipitation	Mean precipitation is expected to decrease in summer from 2.9mm a day to 2.34mm in the 2050s and 1.21mm in the 2070s. Dry spells (10 days or more with no precipitation) are expected to increase from 4.1 days in the baseline to 4.8 days in the 2050s and 5.4 days in the 2070s.	Decreased rainfall can reduce water supply to building	Decreased average rainfall leads to loss of vegetation during summer	Operation	Public realm	Landscape Management Plan includes procedures for irrigation during establishment and ongoing maintenance.	A level of resilience reached through maintenance of asset	As likely as not	Minor	Low
15	Low precipitation	Mean precipitation is expected to decrease in summer from 2.9mm a day to 2.34mm in the 2050s and 1.21mm in the 2070s. Dry spells (10 days or more with no precipitation) are expected to increase from 4.1 days in the baseline to 4.8 days in the 2050s and 5.4 days in the 2070s.	Decreased rainfall may increase soil shrinkage	Decreased average rainfall leads to drier soil conditions and soil shrinkage, causing damage to underground service infrastructure	Operation	Utilities	Shrinkage and dessication considered in service infrastructure and foundation design however risk is low due to granular soils in local area.	Resilience achieved through design decisions.	Very unlikely	Moderate	Low
16	Low precipitation	Mean precipitation is expected to decrease in summer from 2.9mm a day to 2.34mm in the 2050s and 1.21mm in the 2070s. Dry spells (10 days or more with no precipitation) are expected to increase from 4.1 days in the baseline to 4.8 days in the 2050s and 5.4 days in the 2070s.	Increased number of dry days may lead to shrinkage of soil and drying out of vegetation	Extended periods of dry days may lead to a risk of spontaneous grassland fires, affecting safety to public.	Operation	Public realm			Very unlikely	Major	Low
17	Extreme winds	N/A	Increased stress due to extreme wind	High winds lead to increased stress and damage to above ground utility infrastructure	Operation	Utilities	Current standards include sufficient allowance for changes in wind patterns.	Resilience already accounted for in design standards	Very unlikely	Moderate	Low
18	Lightning	N/A	Lightning effects can cause damage to vegetation	Increased lightning strikes lead to more frequent damage to trees	Operation	Public realm			Unlikely	Minor	Very Low
19	Lightning	N/A	Lightning effects can cause damage to utilities	Increased lightning strikes lead to more frequent damage to above ground utility infrastructure, including overhead electricity transmission lines	Operation	Utilities	Considered in standard design of above ground utilities.	Resilience achieved through design decisions.	Very unlikely	Moderate	Low

Likelihood Rating

Level	Descriptor	Description
A	Very unlikely	Event only occurs in exceptional circumstances and would not be expected to occur in the lifetime of the development
B	Unlikely	Based on the current design, engineering and maintenance standards, the event is not expected to occur more than once during the lifetime of the development
C	As likely as not	Event may occur at least once during the lifetime of the development
D	Likely	Event is expected to occur several times during the lifetime of the development
E	Very likely	Event is expected to occur many times during the lifetime of the development

Consequence Rating

Level	Descriptor	Disruption	Public Perception	Financial	Safety	Damage	
1	Minimal	Minpr service disruption within a single day <30 mins	Short-term adverse local stakeholder reaction	Insignificant financial loss.	Minor harm or near miss -no adverse human health effects or complaints.	No damage to assets	Take highest
2	Minor	Minor service disruption for multiple days or delays up to 2h on a single day.	Adverse local media reports over sustained period; localised stakeholder concern.	Additional operational costs. Minor financial loss.	Lost time injury or medical treatment, short term impact on persons affected	No permanent damage. Some minor restoration work required.	
3	Moderate	Service delays of up to 2h for multiple days or major delays (>2h) in a single day	Significant local and /or regional reports including social media. National media interest creating public concern	Moderate financial loss.	Long-term injury or illness, porlonged hospitalisation or inability to work	Widespread damage and loss of service. Damage recoverable by maintenance and minor repair. Partial loss of local infrastructure.	
4	Major	Service closed for 1 day or major delays for multiple days	Negative national reporting and public disputes with key stakeholders, utility companies or other government agencies such as the Environment Agency.	Major financial loss.	Single fatality/ multiple long-term injuries-emergency response	Extensive damage requiring extensive repair.	
5	Catastrophic	Service closed for multiple days	Extensive and prolonged negative reporting nationally and or public disputes with key stakeholders.	Significantly high financial loss.	Multiple fatalities - emergency response	Permanent damage and/or loss of service Retreat and translocation of development.	

Risk Rating

Consequence				
1	2	3	4	5

		Minimal	Minor	Moderate	Major	Catastrophic
Likelihood	A Very Likely	Medium	Medium	High	Very High	Very High
	B Likely	Low	Medium	Medium	Very High	Very High
	C As Likely as Not	Low	Low	Medium	High	High
	D Unlikely	Very Low	Very Low	Low	Medium	Medium
	E Very unlikely	Very Low	Very Low	Low	Low	Medium

Level of Uncertainty

Uncertainty Level - Climate Change Prediction

Level	Descriptor	Consequence
A	Low	>66% probability of climate change hazard occurring
B	Medium	33-66% probability of climate change hazard occurring
C	High	<33% probability of climate change hazard occurring

Uncertainty Level - Effect of Climate Change on Asset

Level	Descriptor	Consequence
1	Low	Climate Change event expected to impact scheme as described.
2	Medium	Climate Change event may impact scheme as described.
3	High	Climate Change event not expected to impact scheme as described.

		Uncertainty Level - Effects of Climate Change on Asset		
		1	2	3
Uncertainty Level - Climate Change Prediction	Low			
	A Low	Low	Low	Medium
	B Medium	Low	Medium	High
	C High	Medium	High	High