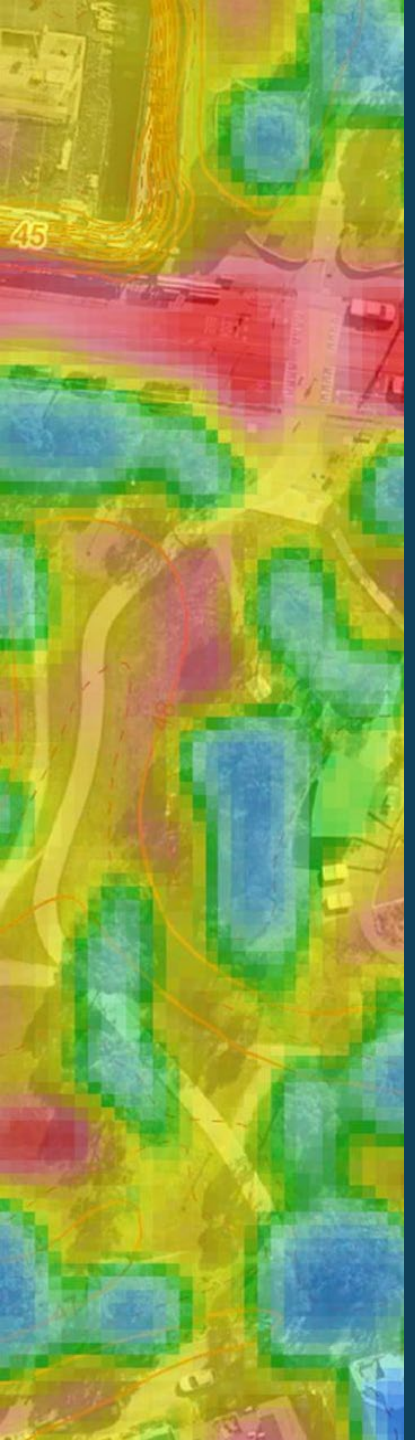


Merri-bek City Council

Merri-bek City Council

Climate Risk Strategy & Climate Resilience Assessment case study

Adaptation in Action – April 2024

Acknowledgement of Country

Merri-bek City Council

We would like to acknowledge the Traditional Owners and Custodians of the lands and waterways on which we are gathered today, the Wurundjeri Woi-wurrung (wu-rund-jeri woy-wur-rung people) people, and pay my respects to their Elders, past, present and emerging, as well as to all First Nations communities who significantly contribute to the life of the area.

Agenda

Item
Introduction
Climate Risk Strategy
Case Study: Climate Resilience Assessment at Brunswick Early Years Hub • Context • Method • Implementation • Next steps..
Q&A

Climate Risk Strategy and Foundational Action Plan

Merri-bek City Council

Our Vision is that, by 2030

Council competently, accountably, and responsively manages climate risks.

Merri-bek is climate resilient, leafy, and liveable

Merri-bek has a climate-ready and resilient community with no one left behind.

5 Goals

36 Actions

Involving almost all Business Units

FY 23/24 and 24/25

$2.4 billion in assets

Numerous community services and operational areas

1. Managing climate risk

By 2025, Council has iterative risk management, reporting and decision-making processes in place to manage climate-related risk to assets, service delivery, finances, and liabilities.

2. Built and natural environments

By 2030, Council has improved the ability of its infrastructure, open spaces and natural environments to avoid, withstand and recover from climate impacts, while continuing to provide for community wellbeing, amenity and ecosystem services.

3. Community Services

By 2030, Council services are resilient to climate impacts such that we can support our community through the shocks and stressors associated with climate change.

4. Community and business

By 2030, Merri-bek residents and businesses have access to relevant and appropriate information and support from Council to take meaningful action to adapt and build resilience to climate change.

5. Partnership approaches

By 2030, Council collaborates with and influences a range of private, community and public sector partners to drive adaptation and build climate resilience in Merri-bek.

https://conversations.merri-bek.vic.gov.au/climate-risk-strategy

Case Study: Climate Resilience Assessment at Brunswick Early Years Hub

Context

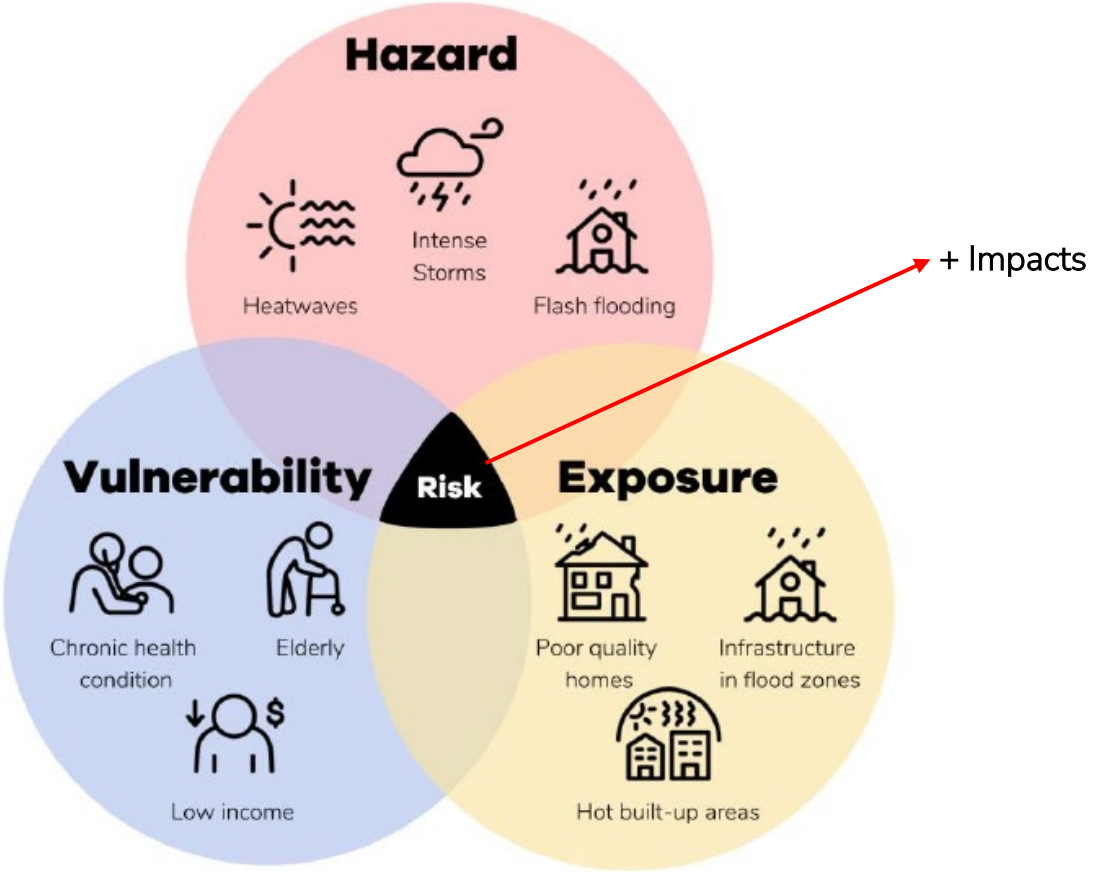
- Climate Risk Strategy, action 2.1.3
- Sustainable Buildings Policy and ESD Matrix
- Sustainable Buildings Officer

Method

Method

- Step 1 – Historical Data
- Step 2 – Existing Site Conditions
- Step 3 – Anticipated Climate Hazards
- Step 4 – Climate Impacts
- Step 5 – Risk Assessment
- Step 6 – Adaptation Action Plan
- Implement and review!

In line with *AS-5534:2013 Climate Change Adaptation for Settlements and Infrastructure*



Step 1 – Historical Data

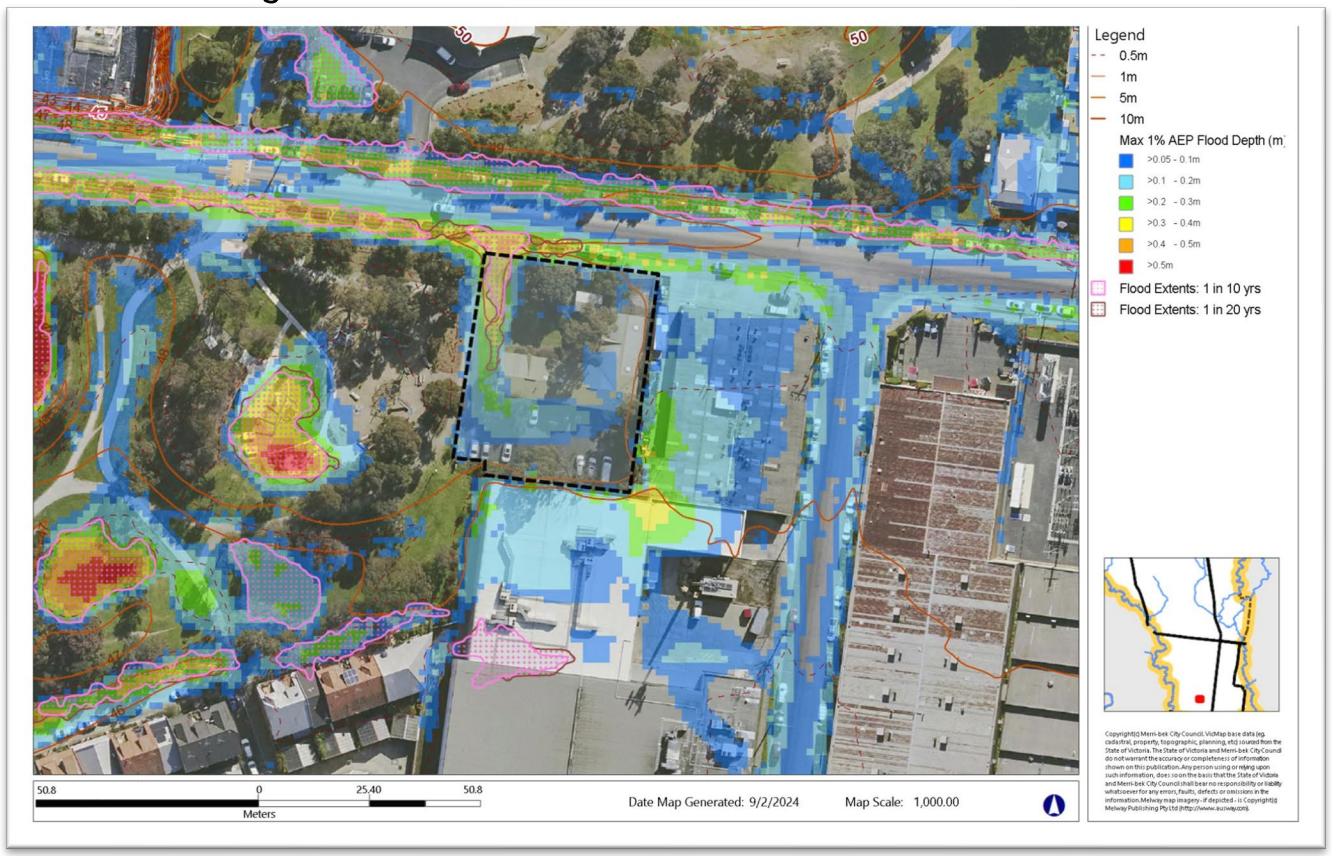
Merri-bek City Council

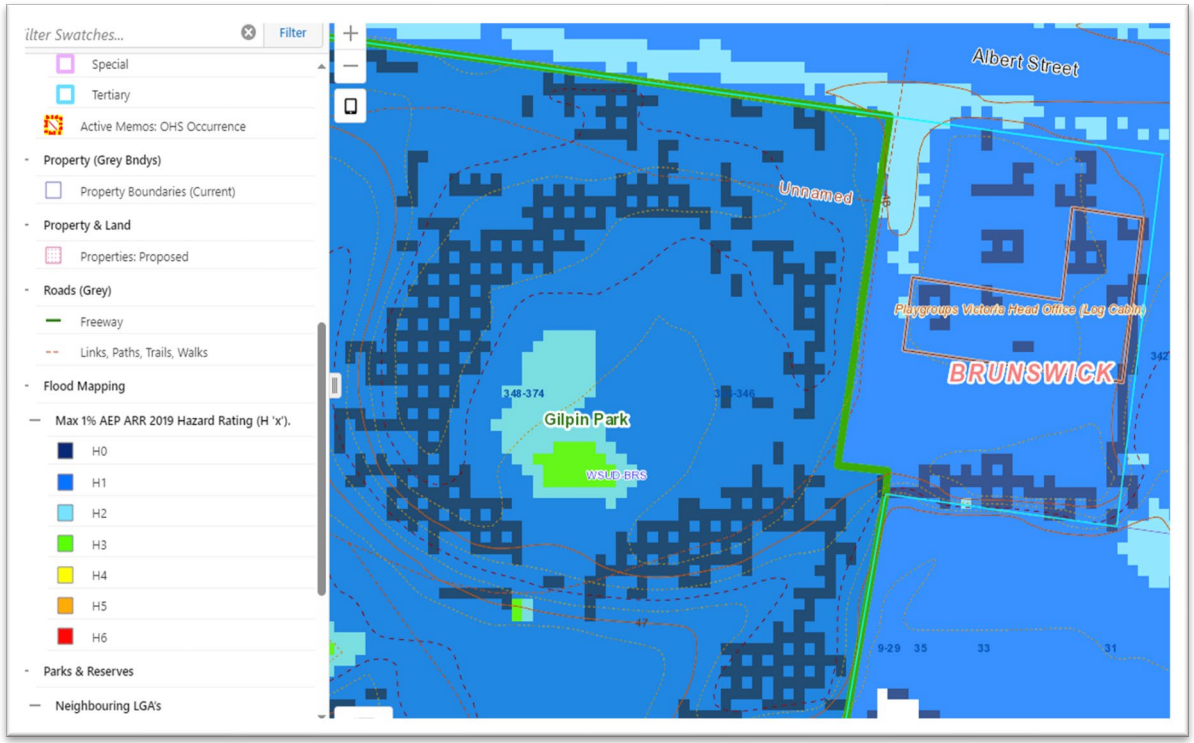
	Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Noc	Dec	Annual
Temperature	Mean maximum temperature (Degrees C) for years 1939 to 2023	26.7	25.9	24.1	20.2	16.4	13.8	13.2	14.4	16.9	19.5	21.9	24.6	19.8
	Highest temperature (Degrees C) for years 1939 to 2023	45.8	47.3	40.7	35.2	26.7	22.6	21.9	24.4	30.3	36.4	41.5	44.4	**34.8**
	Date of Highest temperature for years 1939 to 2023	19-Mar-05	7-Feb-09	4-Mar-42	10-Apr-05	4-May-67	8-Jun-05	18-Jul-13	27-Aug-07	12-Sep-09	12-Oct-06	21-Nov-19	20-Dec-19	7-Feb-09
	Mean number of days >= 35 Degrees C for years 1939 to 2023	4	2.3	1	0	0	0	0	0	0	0.1	0.5	2.3	10.2
	Mean number of days >= 40 Degrees C for years 1939 to 2023	0.9	0.3	0.1	0	0	0	0	0	0	0	0	0.4	1.7
	Mean minimum temperature (Degrees C) for years 1939 to 2023	13.8	14.1	12.7	10.1	7.9	6.1	5.4	5.8	6.9	8.4	10.2	12	9.5
	Lowest temperature (Degrees C) for years 1939 to 2023	5.7	5.3	3.7	0.6	0.1	-3.3	-2.6	-2.4	-1.6	-0.3	2.2	4	-3.3
	Date of Lowest temperature for years 1939 to 2023	22-Jan-40	20-Feb-63	26-Mar-05	30-Apr-09	24-May-08	17-Jun-69	4-Jul-63	29-Aug-18	17-Sep-49	9-Oct-39	4-Nov-70	3-Dec-55	17-Jun-69
Rainfall	Mean rainfall (mm) for years 1929 to 2023	43.7	43.6	39.5	54.6	48.7	40.4	42.7	48.4	50.9	60.4	58.8	51.5	583.2
	Highest Daily Rainfall (mm)	112.8	118	67.6	100	58.4	68.6	42.7	34.4	54	89.4	89.4	52.6	118
	Date of Highest rainfall for years 1929 to 2023	1963	1973	1970	1935	1974	2013	1936	1975	1960	1934	1954	1933	1974
	Lowest rainfall (mm) for years 1929 to 2023	0.4	0.5	1.9	6.6	3.3	8	12.8	14.8	11	6.8	7	1.3	350.4
	Date of Lowest rainfall for years 1929 to 2023	2009	1965	1948	2019	1934	1974	1979	2011	2008	2006	1937	1972	1938
Other	Mean 3PM wind speed (km/h)	23.6	21.6	20.4	20.1	19.8	19.9	22	23.1	23.8	23.3	23.1	23.5	22
	Mean daily solar exposure (MJ/(m*m)) for years 1990 to 2023	24.1	20.9	16.3	11.2	7.7	6.3	7.1	9.9	13.4	17.8	21.2	23.9	15

Step 2 – Existing Site Conditions

Merri-bek City Council

Flood modelling





A separate meeting between key stakeholders (including capital works and drainage) was held to discuss flooding solutions (Gilpin Park, Drainage, or building-scale solution).

Step 2 – Existing Site Conditions

Merri-bek City Council

Urban Heat modelling

Step 3 – Anticipated Climate Hazards

Merri-bek City Council

Data source: https://www.climatechangeinaustralia.gov.au/en/projects/victorian-climate-projections-2019/vcp19-accessing-data											
		Historic Baseline	2050				2070				Notes
			RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		
Temperature	Annual Mean Maximum (c)	19.8	**1.56**	21.4	**1.93**	21.73	**1.97**	21.77	**2.94**	22.74	*Projections are degrees celcius*
	Annual Mean Minimum (c)	9.5	**1.11**	10.6	**1.37**	10.87	**1.4**	10.9	**2.19**	11.69	*Projections are degrees celcius*
	Days over 35c	10.2	**14**	N/A	**16.4**	N/A					*No clear data for 2070 period*
	1-in-20 year hottest day (c)	N/A	**2.11**	N/A	**2.71**	N/A	**1.83**	N/A	**3.47**	N/A	*Projections are degrees celcius*
Rainfall	Annual Mean (mm)	583.2	**-6.48%**	545.4	**-7.71%**	538.2	**-9.20%**	529.5	**-11.08%**	518.5814	*Projections are %*
	Summer Mean (mm)	138.8	**1.42%**	140.8	**-2.44%**	135.4	**4.07%**	144.4	**-0.52%**	138.0782	*Projections are %*
	Autumn Mean (mm)	142.8	**-6.03%**	134.2	**-4.17%**	136.8	**-8.18%**	131.1	**-14.78%**	121.6942	*Projections are %*
	Winter Mean (mm)	131.5	**-8.16%**	120.8	**-7.48%**	121.7	**-10.64%**	117.5	**-14.24%**	112.7744	*Projections are %*
	Spring Mean (mm)	170.1	**-14.39%**	145.6	**-19.55%**	136.8	**-15.29%**	144.1	**-17.94%**	139.5841	*Projections are %*
	1-in-20 year wettest day	N/A	**1.35%**	N/A	**-5.87%**	N/A	**9.76%**	N/A	**6.88%**	N/A	*Projections are %*
Other	Mean daily Solar Radiation (MJ/sqm)	15	**2.66%**	15.4	**3.71%**	15.56	**3.30%**	15.5	**4.51%**	15.68	*Projections are %*
	Wind Speed (km)	22	**-1.59%**	21.7	**-2.44%**	21.46	**-1.47%**	21.7	**-2.18%**	21.52	*Projections are %*

Step 4 – Climate Impacts

Merri-bek City Council

Capital / Hazard	Increased Temp	Heatwaves	Decreased Rainfall	Extreme Weather
Physical	Damage to building and landscaping elements from excessive dry periods	Stress, reduced performance, and potential failure of HVAC equipment	Reduced ability to re-use stormwater for toilet flushing	Storm damage to cladding, glazing and landscaping and associated maintenance costs
Social	Decreased outdoor play and socialization	Increased reliance on building as 'safe space' or refuge during heatwaves	Reduced socialisation due to outdoor areas becoming less habitable	Reduced access of service due to flooding or damage to asset
Financial	Increased OPEX to mitigate climate impacts (e.g., insurance and repairs)	Increased OPEX to maintain thermal comfort	Reduced non-potable water and associated water bills	Loss of business due to extreme storm events
Human	Danger to clients and staff from malfunctioning equipment	Increase respiratory health issues associated with regional bushfires and air pollution.	Risk of injury from playing on hard surfaces (with dieback of grass)	Disruption to education or reduced access due to damage to the asset and service delivery.
Natural	Stress to flora and fauna	Vegetation dieback from extreme heat events	Thinning of canopy cover due to drought conditions	Uprooting of trees and associated safety and damage risks

Step 5 – Risk Assessment

Merri-bek City Council

	CONSEQUENCE RATING				
	Insignificant	Minor	Moderate	Major	Catastrophic
Physical	Negligible damage to physical infrastructure, services and building elements.	Minor damage to physical infrastructure, services and building elements with no disruptions to service and operations.	Moderate damage and stress to physical infrastructure, services and building elements with potential disruptions to service and operations.	Major damage to physical infrastructure, services and building elements with major disruptions to service and operations.	Catastrophic damage and failure of key physical infrastructure, services and building elements with further impacts on social, human and financial capital.
Social	No impact on service delivery or social networks.	Minor disruptions to service and operations.	Moderate short-term disruptions to service and operations.	Major stress and reduced capacity to deliver key services and operations.	Catastrophic, long-term impacts in delivering services and supporting social networks.
Financial	Negligible costs or financial impacts.	Minor costs for building repairs or maintenance of 10%	Moderate financial burden and increased operational costs of 10-50%.	Major financial stress and operating costs of 50-90%.	Catastrophic financial losses and impact to operating costs >90%.
Human	Negligible impacts on humans / building users.	Minor stress and reduced capacity of humans / building users.	Moderate short-term stress on the health and wellbeing of humans / building users.	Major and prolonged stress and impacts on health and wellbeing of humans / building users.	Catastrophic impacts on the health and wellbeing, leading to illness or loss of skills, for humans / building users.
Natural	Negligible environmental damage.	Minor impacts to environmental assets.	Moderate short-term stress and impacts on environmental assets and ecosystem services.	Major impacts and damage to environmental assets and ecosystem services.	Catastrophic and long-term damage to environmental assets and ecosystem services.

Rating	Rare	Unlikely	Possible	Likely	Almost Certain
Insignificant	1	2	3	4	5
Minor	2	4	6	8	10
Moderate	3	6	9	12	15
Major	4	8	12	16	20
Catastrophic	5	10	15	20	25

MEASURE OF LIKELIHOOD			
Rating	**Descriptor**	**Recurrent Risk**	**Long-term Risks**
Almost Certain	Could occur server times a year	Has happened several times in the past year and in each of the previous 5 years OR Could occur several times per year	Has a greater than 90% chance of occuring in the identified time period if the risk is not mitigated
Likely	May arise about once per year	Has happened at least once in the past year and in each of the previous 5 years OR May arise once per year	Has 60-90% chance of occuring in the identified time period if the risk is not mitigated
Possible	May occur a couple of times a generation	Has happened at least once in the past year and in each of the previous 5 years OR May arise once in 25 years	Has a 40-60% chance of occuring in the identified time period if the risk is not mitigated
Unlikely	May occur once in a generation	May have occurred once in the last 5 years OR May arise once in 25-50 years	Has 10-30% chance of occuring in the future if the risk is not mitigated
Rare	May occur once in a lifetime	Has not occurred in the past 5 years OR Unlikely during the next 50 years	May occur in exceptional circumstances (i.e. less than 10% chance in the identified period if risk not mitigated)

Step 5 – Risk Assessment

Merri-bek City Council

RISK ASSESSMENT MATRIX			Current - 2024			2050 - RCP 4.5			2050 - RCP 8.5			2070 - RCP 4.5			2070 - RCP 8.5		
Risk area	**Risks**	**Consequence**	**Likelihood**	**Risk Rating**		**Likelihood**	**Risk Rating**		**Likelihood**	**Risk Rating**		**Likelihood**	**Risk Rating**		**Likelihood**	**Risk Rating**	
Physical [capital] Risks (transport, infrastructure, energy, communication)	*Increased energy demand associated with higher AC usage.*	Minor	Possible	6	Low	Rare	2	Low	Possible	6	Low	Possible	6	Low	Likely	8	Medium
	Decreased durability of certain building elements (i.e. renders, soft timber products, and window seals) due to increased heat and radiation.	Moderate	Unlikely	6	Low	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Likely	12	High
	Damage to building and landscaping elements from excessive dry periods (such as concrete footpaths)	Minor	Rare	2	Low	Unlikely	4	Low	Possible	6	Low	Likely	8	Medium	Likely	8	Medium
	Increased risk of black-outs during peak heat events.	Moderate	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Possible	9	Medium	Likely	12	High
	Stress, reduced performance and potential failure of HVAC equipment during peak heat events.	Major	Unlikely	8	Medium	Possible	12	High	Possible	12	High	Likely	16	High	Likely	16	High
	Reduced usability of outdoor play spaces.	Moderate	Unlikely	6	Low	Possible	9	Medium	Likely	12	High	Likely	12	High	Almost Certain	15	High
	Potential failure of other electrical elements impacting function of building/service	Moderate	Rare	3	Low	Rare	3	Low	Unlikely	6	Low	Unlikely	6	Low	Possible	9	Medium
	Reduced ability to re-use stormwater for toilet flushing.	Moderate	Unlikely	6	Low	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Likely	12	High
	Increased maintenance of rainwater tanks and pump infrastructure during particularly dry periods.	Minor	Possible	6	Low	Possible	6	Low	Likely	8	Medium	Likely	8	Medium	Almost Certain	10	Medium
	Drying soil erosion and reduced structural support (for footings and footpaths).	Moderate	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Likely	12	High	Likely	12	High
	Storm damage (cladding, glazing, landscaping) and maintenance requirements and costs.	Moderate	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Likely	12	High	Likely	12	High
	Building inundation and damage due to stormwater flooding.	Major	Rare	4	Low	Rare	4	Low	Unlikely	8	Medium	Possible	12	High	Likely	16	High
	Reduced access and usability of asset due to damage and/or inundation.	Moderate	Rare	3	Low	Rare	3	Low	Unlikely	6	Low	Possible	9	Medium	Likely	12	High
	Stormwater overflow and drain blockages.	Minor	Rare	2	Low	Unlikely	4	Low	Unlikely	4	Low	Possible	6	Low	Likely	8	Medium
	Damage to shade sails from strong winds.	Minor	Possible	6	Low	Unlikely	4	Low	Possible	6	Low	Possible	6	Low	Likely	8	Medium
	Reduced performance / capacity of gutters to cope with additional rainfall. Damage to roof and ceiling, resulting in leaks and associated damage.	Moderate	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium	Possible	9	Medium	Likely	12	High
	Increased humidity during and imediately after storm events leading to failure of electrical equipment, and damage to building elements such as timber or formation of mould.	Moderate	Rare	3	Low	Unlikely	6	Low	Unlikely	6	Low	Possible	9	Medium	Possible	9	Medium
	Increased asset maintenance requirements / costs.	Minor	Possible	6	Low	Likely	8	Medium	Likely	8	Medium	Almost Certain	10	Medium	Almost Certain	10	Medium

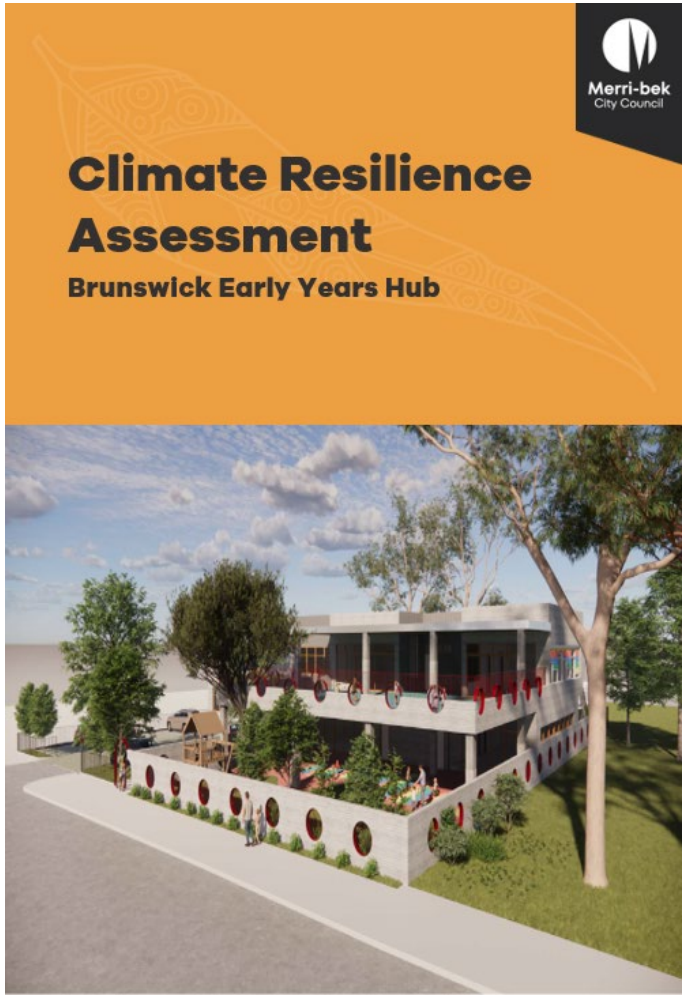
Step 6 – Adaptation Action Plan

Merri-bek City Council

Risk area	Risks	Consequence	2024		2050 - RCP 8.5		Description	Co-benefits	Cost Implications	Key Stakeholders	Delivery Mechanism	Timeline for Delivery	Delivery Risk	Expected Risk Likelihood (following adaptation)		
Natural [capital] Risks (Land, water, wildlife, biodiversoty and ecosystems)	***12 - Vegetation dieback from extreme heat events.***	Moderate	Unlikely	Low	Almost Certain	High	> See H59 > See H60 > See H63	Water efficiency, ecological and cultural benefits	$$$	PM, SBO, Landscape Architect and maintenance contractor	landscape Plan / strategy and landscape maintenance specifications	Include in design brief to the landscape architect	N/A	Possible	9	Medium
	Increased risk of plant loss and canopy thinning due to extreme heat and/or water restrictions.	Moderate	Rare	Low	Likely	High	> See H60 > See H63 > Include requirement in maintenance schedule to check on plants following heatwave events (multiple days over 35 degrees)	Water efficiency, cultural, amenity benefits	$$$	PM, SBO, Landscape Architect and maintenance contractor	landscape Plan / strategy and landscape maintenance specifications	Include in design brief to the landscape architect	N/A	Possible	9	Medium
	Increased risk of plants dying during establishment.	Moderate	Possible	Medium	Likely	High	> See H60 (for soil preparation actions) > Include significant establishment period to ensure plant health into maturity > Time plant establishment period for Autumn or Spring to avoid periods of additional stress	Water efficiency, ecology, amenity, and cost savings	$$	PM, SBO, Landscape Architect and maintenance contractor	landscape Plan / strategy and landscape maintenance specifications	Include in design brief to the landscape architect	Implications to timeline if construction and landscaping fall outside Spring and Autumn	Possible	9	Medium
	Plant and vegetation damage from strong wind and storm events.	Moderate	Possible	Medium	Almost Certain	High	> Species selection to prioritise large trunk / robust species > Protect trees from storms by: regularly pruning dead or high-risk branches, installing lightening protection system on large canopy trees, potential cabling and bracing > Stake and secure plants and shrubs during establishment to avoid damage from storms	Urban cooling, biodiversity, cultural and amenity benefits	$$	PM, SBO, Landscape Architect and maintenance contractor	landscape Plan / strategy and landscape maintenance specifications	Include in design brief to the landscape architect	Need to balance locally native species selection with those that are robust	Possible	9	Medium

Implementation

- Following the assessment, a summary report (right) was drafted
- It included 15 up front actions, and 4 operational actions (for tenant to deliver), including:
  - *Ground level and accessway 100mm freeboard above 1% AEP*
  - *Increased rainwater tank storage to minimize discharge and survive toilets and irrigation*
  - *Maximised site permeability (via landscaping and permeable pavement)*
  - *Dual-aspect play spaces and adequate canopy and man-made shading to provide cool outdoor areas*
- It was presented to the project sponsor (Early years and childcare) for comment
- It was then provided to the project manager to include with project specifications to be sent to the appointed architect



Next Steps..

- Architect has just been appointed
- Following an inception meeting, a workshop will be held with the architect, PM, SBE and project sponsor to discuss the 15 actions to be included into the building and landscape design
- We are now looking to run a similar assessment for a precinct we are working on, and for infrastructure in the future (a much smaller version)

Contact

Victoria Hart, Manager Sustainability and Climate

vhart@merri-bek.vic.gov.au

Shaun Tompkins, Sustainable Buildings Officer

stompkins@merri-bek.vic.gov.au