How the Victorian Flood and Planning Frameworks consider flood and climate impacts for land use planning

A Melbourne Water perspective - March 2026

VICTORIA State Government

Melbourne Water

Introduction

Climate change will increase flood risk in Melbourne as a result of increased rainfall intensity and sea level rise.

These processes will increase the number of properties at risk and the severity of flooding affecting these properties. At the same time, Victoria's population is growing at more than 100,000 people a year and there is increasing demand for new housing supply[1].

Plan for Victoria outlines the Governments vision for the state's growth and development. It aims for 70% of housing growth within existing urban areas[2]. The Government's Housing Statement has set a target to build 800,000 homes in Victoria over the next decade including to deliver additional homes around the existing activity centres across Melbourne. This also includes planning for more homes in and around 60 train and tram zone activity centres, encouraging more than 300,000 homes to be built close to public transport.

Land use planning has a critical role to ensure that housing growth does not put more people at risk of extreme flooding. Without appropriate flood risk planning, a range of social and economic impacts could result, including loss of life and livelihood. Past analysis estimated that losses from sea level rise and storm surge alone in Victoria were likely to be more than $337 billion in 2100[3].

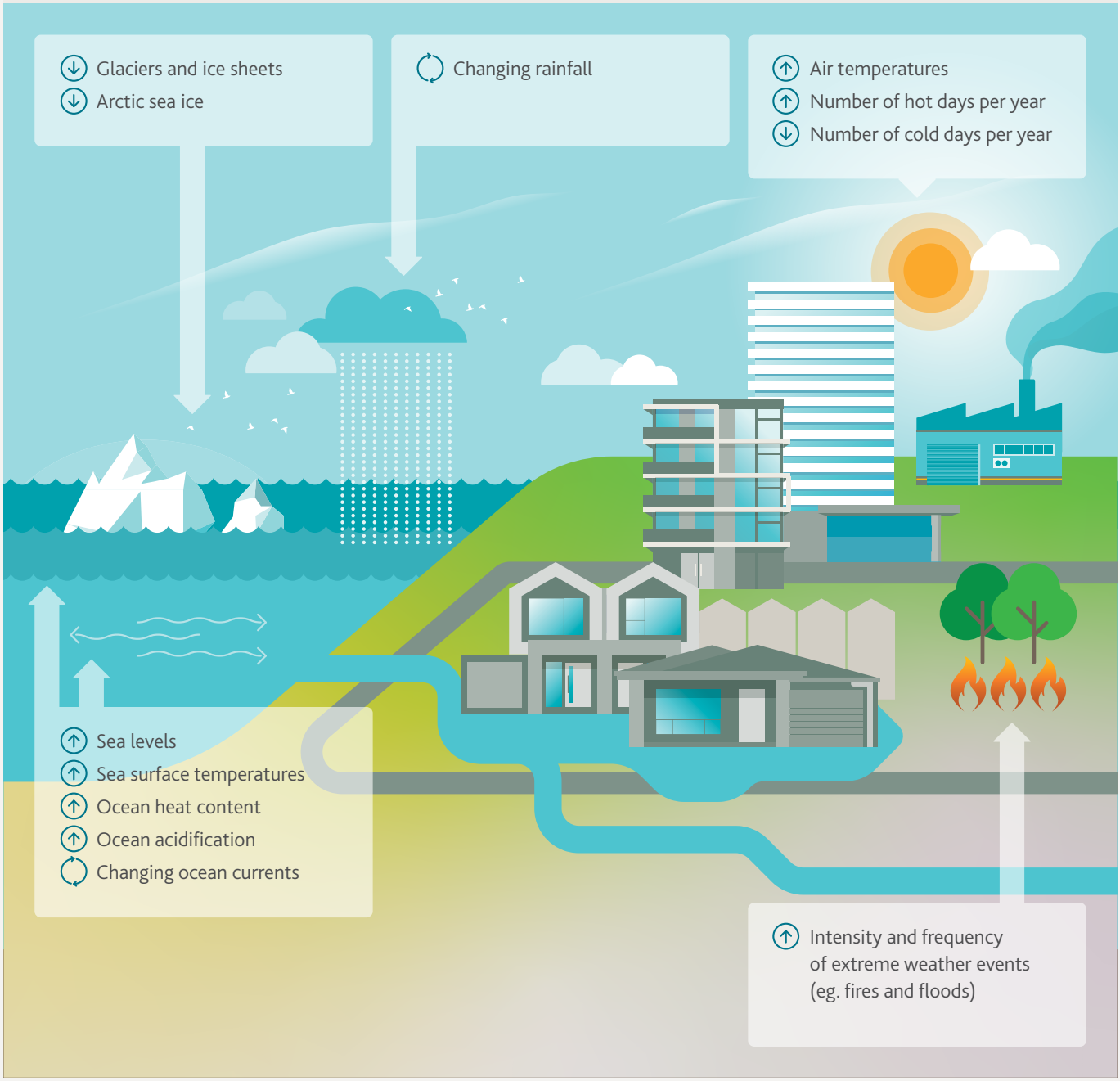
It is critical that land use planning decisions address these impacts to ensure that future communities are safe and the built environment is resilient to flooding.

1. State Government of Victoria, https://www.vic.gov.au/how-we-will-ensure-housing-supply-meets-demand
2. State Government of Victoria (2017), Plan Melbourne Policy 2.1.2, p.47
3. Kompas et al. (2022), A general summary of the report Economic Impacts from Sea Level Rise and Storm Surge in Victoria, Australia over the 21st century

Main cover image: Chelsea Road, Chelsea 2007
(Luke Cunningham, Rain Consulting Pty Ltd)

Climate change impacts on the Earth system

Many aspects of the Earth system are changing and will continue to change due to increased greenhouse gases in the atmosphere.



Source: Adapted from Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2024, under CC BY 4.0, with redesigning.

Melbourne Water's Role

Melbourne Water has a key role in land use planning for flood resilience in the context of climate change.

As a relevant Floodplain Management Authority under the Water Act (1989), Melbourne Water has functions including (but not limited) to:

- find out how far floodwaters are likely to extend and how far they are likely to rise.
- develop and implement plans and to take any action necessary to minimise flooding and flood damage.
- control developments that have occurred or that may be proposed for land adjoining waterways.
- provide advice about flooding and controls on development to local councils, the Secretary to the Department and the community.

Melbourne Water also has duties as a Referral Authority under the Planning and Environment Act (1987) for floodplain management and for sea level rise. This allows Melbourne Water to impose conditions on a permit or to object to a land use or development application where it determines that a proposal is inappropriate. Similarly, the Building Regulations (2018) provide an avenue for Melbourne Water to provide advice to the relevant Council before a Building Permit is granted.

In addition to these statutory pathways, Melbourne Water also provides strategic and site-specific advice to other government agencies and authorities where development and infrastructure is proposed in flood affected areas.

Climate Change Legislation, Strategy and Policy Settings

Legislation, Strategy and Policies direct Melbourne Water to consider climate change impacts in flood affected areas.

See Figure 1 on page 9.

On the 26 March 2025, amendments to the *Planning and Environment Act 1987* (section 4(2)) came into operation and introduced a new:

- Climate change objective of the planning framework – consideration of greenhouse gas emissions reduction targets and increasing climate change resilience when making decisions about the use and development of land.
- Requirement for planning authorities to consider climate change in decision making
- Power enabling the Minister for Planning to issue a Ministerial Direction on climate change matters that planning authorities must consider.

Planning authorities are required to assess how climate risks could impact proposed land uses or developments when updating planning schemes, ensuring future planning aligns with Victoria's climate commitments.

The Victorian Government's *Climate Action Act (2017)* states that Victoria acknowledges the need for 'strong action to build resilience to, and reduce the risks posed by climate change and protect those most vulnerable'.

Melbourne Water has been committed to becoming a leader in climate change mitigation, adaptation and planning.

The State Government's Victorian Floodplain Management Strategy (2016) which provides specific instruction for flood studies to consider a location's sensitivity to climate change (Policy 9a), to make decisions responsive to the latest scientific information (Chapter 4) and to be informed by the most recent edition of Australian Rainfall and Runoff (Policy 12a).

The State Government's planning strategy for Victoria, Plan for Victoria, also addresses flooding and climate change in several key ways, particularly under Pillar 4: Sustainable Environments. This is done through specific actions aimed at improving climate resilience and planning outcomes.

The Victoria Planning Provisions guide land use and development and include Clause 13.01 'Climate Change Impacts' which has an objective to 'plan for and manage coastal hazard risk and climate change impacts, adapt to the impacts of climate change through risk-based planning and use the best available data and climate change science'.

Strategies in the clause include to identify at risk areas using the best available data and climate change science, to integrate strategic land use planning with emergency management decision making, to direct population and development to low-risk locations and to site and design development to minimise risk to life, health, property, the natural environment and community infrastructure from natural hazards.

In the context of sea level rise, Clause 13.03 'Floodplain Management' has an objective to 'assist the protection of life, property and community infrastructure from flood hazard, including coastal inundation, riverine and overland flows'. A key strategy is to Avoid intensifying the impact of flooding through inappropriately located use and development.

The Marine and Coastal Policy (2020) and Victoria Planning Provisions set out that authorities should 'plan for sea level rise of not less than 0.8 metres by 2100, and to allow for the combined effects of tides, storm surges, flooding, coastal processes and local conditions such as topography and geology, when assessing risks and coastal impacts associated with climate change'. Clause 13.01 Coastal inundation and erosion directs to avoid use and development in areas vulnerable to coastal inundation and erosion.

Climate parameters must be selected and incorporated into flood modelling and decision making so that the impact of climate change can be quantified.

With the imperative to understand and consider climate change impacts established in these policies, climate settings must be incorporated into flood modelling and decision making so that the impact of climate change can be quantified.

There are a range of climate projections available and there is significant complexity in translating these projections into modelling parameters.

Melbourne Water has been working through this complexity across our policy and mapping programs. In the context of increased rainfall intensity, Melbourne Water has been informed by observed temperatures in Victoria, the Australian Rainfall & Runoff Guide (2019) as well as the Marine and Coastal Policy (2020) in setting design and modelling parameters. Consistent with these policies, the settings utilise a precautionary approach in adopting a high emissions scenario to ensure that risks are appropriately captured and mitigated[4].

4. Detailed flood modelling parameters are set out in Melbourne Water's Climate Change in Land Use Planning Policy and Flood Mapping Project Specifications (2023).

Victoria's Climate Science

Victoria's Climate Science Report 2024 (VCSR24) is a statutory requirement under the *Climate Change Act 2017*. A report is required every 5 years, with the first report released in 2019.[5]

The VCSR24 summarises the best available scientific evidence for Victoria's climate, and downscales the global observations stated by the Intergovernmental Panel on Climate Change (IPCC). The latest report builds on the 2019 version, which remains a relevant component of the reports' evidence base.

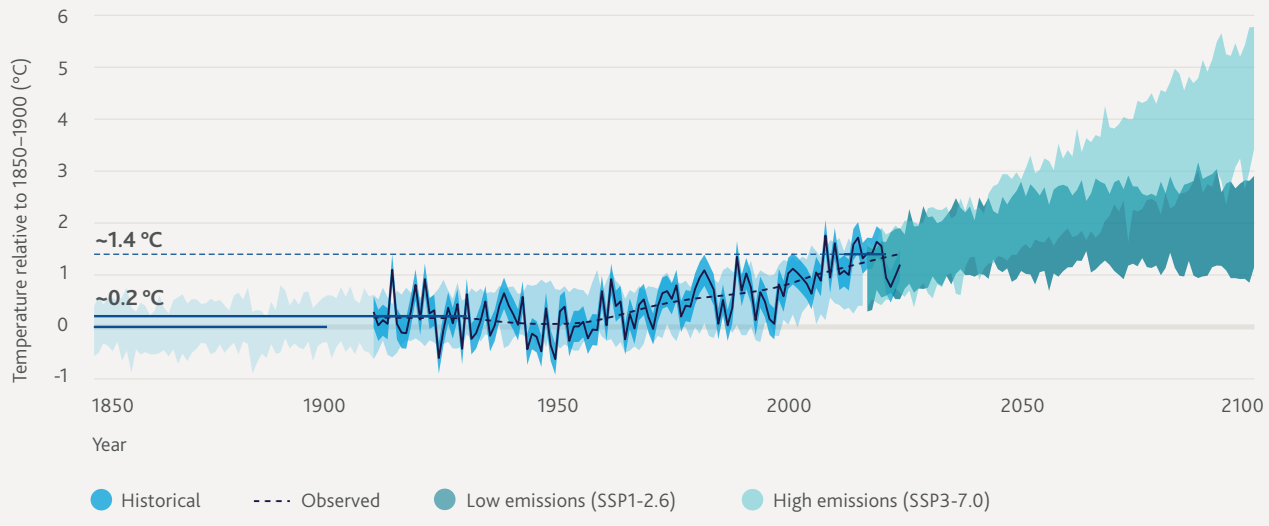
Past and future climate is continually improving based on new observations, updated science on climate processes, and improvements in climate modelling.[6]

The VCSR24 serves as a first point of reference for decision-makers across government, business, and community sectors, and supports climate resilience planning, risk assessments, and policy development. For the purposes of this paper, the key focus is on flooding and rainfall.

The key findings from the VCSR24 are:

- The state is experiencing more frequent and intense hot days and heatwaves.
- Victoria's overall warming of 1.4 °C since the pre-industrial era is slightly less than the Australian wide average warming of 1.6 °C between 1850–1900 and 2011–20.
- Warming is projected to continue, with higher increases under high emissions scenarios.
- Victoria is becoming drier, especially during the cool season.
- Despite overall drying, short-duration extreme rainfall events are expected to become more intense.
- High-impact hazards such as floods and sea-level rise are changing and projected to worsen under a warming climate.

A warmer Victoria by 2100



5, 6 Victorian Government, 2024, Victoria's Climate Science Report. pg. 4; https://www.climatechange.vic.gov.au/victorias-changing-climate/Victorias-Climate-Science-Report-2024.pdf

Climate hazards in Victoria are changing under a warming climate:

- Extreme floods will increase in magnitude – large floods becoming larger will continue at a greater rate.
- Over the past 70 years, Victoria has experienced:
  - extreme flood events at different locations at least 10 times
  - an increase of approximately 3% per decade in the magnitude of large floods due to increasing rainfall intensities
  - a decrease of between 5% and 13% per decade in the magnitude of smaller floods.
- Smaller and more frequent floods that contribute to floodplain and riverine environmental health have been decreasing in magnitude, despite increases in extreme rainfall.
- If greenhouse gas emissions continue to rise at a moderate to high rate, flood risks will double by the end of this century.
- Projections for future summer rainfall are subject to significant uncertainty.
- Drought may develop more quickly, faster onset
- Following a lower emissions pathway will help slow the rate of sea level rise but will not stop SLR.

Since the report was first prepared in 2019, the Intergovernmental Panel on Climate Change (IPCC) has released its Sixth Assessment Report (AR6), which contains the latest global scientific, technical and socio-economic assessments of climate change.

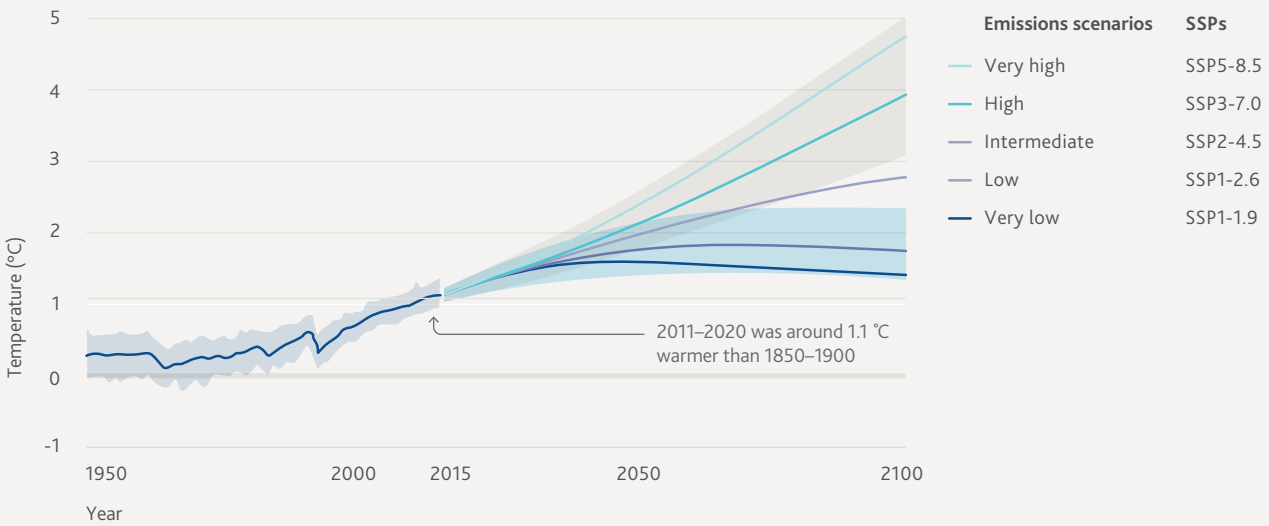
The updated climate science report outlines five Shared Socio-economic Pathways (SSP's) and their likelihood.

The models provide more global simulations at a higher resolution than were previously available, and are based on the latest understanding of ocean, atmospheric and terrestrial processes.

The scenarios describe different futures, with variations in types of energy generation, rates of population growth, economic development and land-uses. This is a change from the previous report which described RCP scenarios. The change is nationally consistent and reflected in the updated Australian Rainfall and Runoff Guidelines.

The models provide more global simulations at a higher resolution than were previously available, and are based on the latest understanding of ocean, atmospheric and terrestrial processes.

Projected increase in global temperatures under emissions scenarios



Updated climate projections

Climate change will increase flood risk in Melbourne as a result of increased rainfall intensity and sea level rise.

VCSR24 adds to the climate projections for Victoria presented in the 2019 report.

The updated climate projections are based on the latest generation of global climate modelling.

In alignment with Australia's National Partnership on Climate Projections (NPCP) and internationally recognised guidance, the 'low emissions scenario' (SSP1-2.6) and 'high emissions scenario' (SSP3-7.0) have been prioritised by regional climate modellers across Australia and for analysis in VCSR24.

Melbourne Water has updated its climate scenario from a Representative Concentration Pathway (RCP 8.5) to a SSP consistent with the change in VCSR24 and ARR 4.2. Consistent with Flood Strategy commitments, Melbourne Water will apply a not less than SSP3-7.0 high emission scenario which is considered a likely high emission scenario. Moderate and very high scenarios may be modelled to inform infrastructure and policy sensitivity testing. It includes continued reliance globally on fossil fuels, no carbon dioxide removal and a global warming of 2.8–4.6 degrees Celsius.

Figure 1: Victorian Flood and Climate Land Use Planning Frameworks Context

Driver	Relevance
Legislation	
Climate Change Act (2017)	Legislative foundation to manage climate risks, including to take 'strong action to build resilience to, and reduce risks posed by, climate change' (preamble).
Water Act (1989)	Legal framework for Melbourne Water's role in managing flooding, including to find out the extent of floodwaters, declaring flood levels, controlling developments adjoining waterways and providing advice about flooding and controls on development (S. 202).
Planning and Environment Act (1987)	Legislation that includes a planning framework objective to consider greenhouse gas emissions reduction targets and the need to increase resilience to climate change, when decisions are made about the use and development of land. Sets out Melbourne Water's duties as a referral authority (S. 14A) and provides for the opportunity to impose conditions if a permit is to be granted or to object to an application (S. 56).
Subdivision Act (1988)	Sets out Melbourne Water's referral authority responsibilities for subdivisions.
Building Act (1993)	Allows for Melbourne Water's consultative role in building permit process.
Marine and Coastal Act (2018)	Sets out objectives for the planning and management of the marine and coastal environment (Part 2) including to promote resilience to climate change (S. 9).

Driver	Relevance
Strategies	
Marine and Coastal Strategy (2022)	Notes that the planning benchmark will be updated 'as necessary and supported by modelling that places global projections into the Victorian context' (p.18).
Victorian Floodplain Management Strategy (2016)	Provides specific instruction to ensure all new flood maps are informed by the most recent edition of ARR (Policy 12a), and to apply the state-wide Guidelines for Development in Flood Affected Areas in referral advice (Policy 13g).
Flood Management Strategy for Port Philip and Westernport (2021)	Commits Melbourne Water to applying high emissions scenario climate modelling for future planning scheme amendments (Action 4.4) and modelling/mapping all new drainage schemes (Action 4.5).
Plan for Victoria	Includes various directions and policies to manage exposure to natural hazards, with a focus on flood mapping, coastal hazard data, and resilient building design. Action 19 aims to better communicate and manage flood, bushfire and climate hazard risks, with a focus on flood mapping, coastal hazard data, and resilient building design. Emphasizes up-to-date flood modelling, planning scheme amendments, and design guidelines for flood-resilient buildings. Notes that urban renewal areas like Fishermans Bend and Arden are at risk. Acknowledges climate change impacts like sea level rise, bushfires, and extreme weather.
Built Environment Climate Change Adaptation Action Plan 2022–2026	Lays out the priorities to better understand and manage current impacts, and to prepare for the long-term risks of climate change. It also states that 'all new government-funded flood studies [should] consider climate change' (p.33).

Driver	Relevance
Policies	
Marine and Coastal Policy (2020)	Sets the direction to 'plan for [sea level rise] not less than 0.8 metres by 2100' (Policy 6.1).
Victoria Planning Provisions	Reflects the need to identify the 1% AEP flood affected land in planning schemes Cl 13.03-1S), provides a mechanism (zone and overlays) to identify flood affected land and trigger referrals (Cl 37.03, Cl 44.03, Cl 44.04 & Cl 44.05).
Planning Practice Notes	Provides guidance on the flood zone/overlays (PPN 11 & 12) as well as permit assessment. States 'it is important to avoid future development or intensification in coastal areas outside of existing settlements that are likely to be impacted by projected coastal hazards.' (PPN 53).
Ministerial Directions	Requires consideration of sea level rise and/or combined effects of storm surges, tides, river flooding and coastal erosion in the explanatory report for rezoning non-urban land (Direction 13). The Minister for Planning may provide further climate change related Directions to a planning authority (Planning and Environment Act 1987 (section 12A)).
Australian Rainfall and Runoff Guide (ARR) (2019)	National guideline document, data and software suite used for the estimation of design flood characteristics in Australia, including recommendations on how to estimate the expected impacts as a result of climate change.
Guidelines for Development in Flood Affected Areas (2019)	State wide document sets out the four key objectives for development in flood affected areas and requirements that apply to development applications.
Building Regulations (2018)	Requires report and consent for flood affected areas including consideration of design floor levels and danger to life in building permit process (Reg 153).

Utilising the Current Planning Framework

Having established the policy and technical basis for considering climate change, there are a range of existing tools and mechanisms that can be utilised to incorporate this information into strategic and statutory decision making.

Melbourne Water understands that up-to-date flood information is the foundation of best practice planning and the need to consider climate change in decision making.

To address this, we are incorporating climate impacts to the year 2100 into our flood maps and models for every catchment in Melbourne. Building these models is a very long and detailed process and we are accelerating that program, with a commitment to remodelling catchments across Melbourne.

Once flood information is produced, verified and adopted, it can be utilised in strategic plan making processes, incorporated into municipal planning schemes and inform land use and building activity decisions. Ensuring that the relevant flood zone and overlays accurately reflect climate change flood extents is a key priority highlighted in the Victorian Floodplain Management Strategy (2016), the Victorian Government's Built Environment Climate Change Action Plan 2022-2026,Melbourne Water's Flood Management Strategy, and Plan for Victoria - Action 19.

The Victorian Government's Water Cycle Adaptation Action Plan also highlights the need for the built environment system to reflect fit-for-purpose flood risk data that accounts for climate change (DELWP, 2022, p.50). This is because up-to-date overlays provide transparency to the community, increase awareness of flooding, enable the broader land use and access context to be considered and provide developers with clearer expectations of development potential.

With climate-informed flood information available and incorporated into planning schemes, precinct and site scale proposals can be assessed and designed to address flood hazard. This occurs at a range of spatial scales, from precinct planning to site scale development including major infrastructure projects.

For example, new greenfield Development Services Schemes are being designed with climate factors to the year 2100, including the implementation of appropriate infrastructure to mitigate any downstream impacts.

Melbourne Water also provides advice to the State Government on major infrastructure projects when requested, and this advice requires the consideration of climate impacts to ensure that critical community infrastructure is resilient to flooding in future.

The State Government has also recently announced a series of major planning reforms aimed at fast-tracking housing development, modernising the planning system, and addressing the housing crisis. The recent announcements include specific provisions related to climate change, marking a significant shift in how climate considerations are embedded in land use planning.

Climate change is embedded as a core consideration in land use planning by amending the *Planning and Environment Act 1987* to require assessment of emissions and climate risks. Further to this, Ministerial Direction No. 22 mandates that strategic planning decisions must support net zero targets and climate resilience. These changes ensure that future development, especially intensified housing, is designed to withstand climate hazards and contribute to emissions reduction.

How Melbourne Water makes land use and planning decisions using flood information

Melbourne Water will use the following Climate Change Settings to determine the impact of climate change on flood information when undertaking flood modelling and mapping for providing input to planning scheme amendments, in land use planning and building decisions, and in providing flood advice:

1. 1% Annual Exceedance Probability (AEP) for flood events;
2. A rainfall intensity consistent with a high emissions climate change scenario (not less than High Shared Socio-economic Pathway (SSP) SSP3 - 7.0;
3. A nominal planning horizon to the year 2100;
4. Tail water levels (i.e. level of the bay or downstream waterway) that is also consistent with a High Shared Socio-economic Pathway (SSP) between SSP3 - 7.0. Reference to the Flood Strategy Action Plan that adopts the high emission 2100 scenario for flood modelling.

In the event that there is a variation to these settings in the State flood strategy or the Victoria Planning Provisions (VPPs), the settings in State Strategy or the VPPs will apply. All new and updated flood modelling and mapping published by Melbourne Water from April 2020, and new Development Service Schemes (DSS) from July 2020 will apply the Climate Change settings.

State Government amended the Planning and Environment Act 1987 to make climate change a mandatory consideration in land use planning decisions, including emissions reduction and resilience to climate risks.

These changes apply to new planning schemes and amendments, especially those involving urban intensification or land exposed to natural hazards, but do not affect individual planning permits unless specified in the scheme. The reforms are supported by Ministerial Direction No. 22, which outlines how planning authorities must address climate risks like bushfire, flood, and heatwaves, and promote low-emissions urban design and renewable energy integration.

There are four key objectives that Melbourne Water assesses when considering planning proposals within flood affected areas. These objectives are set out in the Victorian Government's state-wide Guidelines for Development in Flood Affected Areas ("the Guidelines") (DELWP, 2019) and include:

Flood Safety – protecting human life and health.

Flood Damage – minimising flood damage to property and infrastructure.

Offsite Impacts – maintaining free passage and temporary storage of floodwaters.

Waterway and Floodplain Protection – protecting and enhancing environmental features of waterways and floodplains.

The Guidelines highlight the need to consider climate change in flood assessments, noting that 'if flood studies have not assessed the impacts of climate change, allowance should be considered through applying additional freeboard to development proposals'.

Melbourne Water has also prepared specific policy and guidelines for assessing development in areas affected by climate change and sea level rise. These have been developed to build on the state-wide Guidelines and provide greater specificity to decision making in climate contexts.

These policies include:

- The four key objectives outlined in the Guidelines for Development in Flood Affected Areas must be achieved.
- The year 2100 is the planning horizon for the assessment of development proposals, with the exception of minor and temporary structures such as sheds.
- Development must be designed to withstand flood damage to the year 2100.
- Detrimental offsite impacts must be assessed to the year 2100.
- Where flood modelling incorporating climate change impacts is unavailable, additional allowances (e.g. freeboard) may be required to address future risks.

Forward Plan

Melbourne Water is working to utilise existing planning frameworks to achieve best practice floodplain management in responding to climate change and provide consistent and transparent guidance and decisions.

Melbourne Water will continue to investigate the need to develop additional guideance and decision making tools to support decision making as we understand climate impacts.

These projects include (but not limited to):

- updating the flood modelling for our whole catchment to incorporate climate impacts and working with stakeholders to implement updated flood information into planning and building system decisions;
- modeling, mapping and designing infrastructure for new Drainage Services Schemes and urban renewal precincts in consideration of climate parameters (2100, high emissions scenario), and developing supporting guidance material.;
- improving the detail and specificity of our policy and guidelines concerning the assessment of development proposals in climate impacted areas; and
- undertaking a Strategic Urban Planning Climate Impact Assessment to provide insights on the impacts of changing flood risk for Melbourne.

In addition, we are collaborating with Government departments to:

- streamline the process and options for Melbourne Water to incorporate flood information into planning and building system decisions;
- strengthening strategic planning for climate futures, including greater consideration of flood hazard in metropolitan and settlement planning, such as Plan for Victoria and local council housing strategies;
- improve flood policy and the specificity of climate policy and requirements within the Victoria Planning Provisions; and
- secure funding for critical flood mitigation infrastructure to support existing and future communities, as well as considering the use of funding mechanisms such as Development Contribution Plans.
- strengthening the way Melbourne Water works with key partners, such as planning authorities, State Government and the SES, to unlock land in strategic locations and plan together for a climate resilient Melbourne.

Conclusion

Climate change will have a significant impact on flooding and coastal inundation across Victoria in vulnerable locations. To address this, Melbourne Water will work with State Government and local Councils to enhance the assessment of regional and local hazards and vulnerability. This will support a consistent approach to climate change adaptation which combines place-based solutions as part of catchment-wide planning.

Adaptation to climate change will be best achieved by planning for climate impacts at every scale, from strategic metropolitan settlement planning, through to precinct planning and finally at the site scale. Each of these 'levels' of planning need to work together to ensure resilient outcomes for the community. By considering risk-based approaches to managing hazards, we can guide growth to safer locations, and help reduce the hazard exposure of the most vulnerable communities and infrastructure.

Together we are aware, responsive and resilient.

Communities, business and government understand flooding, plan collaboratively for challenges and take action to manage risks and optimise opportunities, for now and the future. *Flood Management Strategy Port Phillip and Westernport 2021–2031*

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