

Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria

Summary of the 2020 edition



Victoria's climate is changing, and this poses many challenges for the water sector as well as Victoria's businesses, industries and communities that rely on water.

Our water resources are largely climate dependent, so planning for climate change is extremely important for Victorian water resource management. Multiple lines of evidence indicate that Victoria will be hotter and drier in the future and this has clear implications for Victoria's water security. Climate change also impacts how we assess and understand our water resource availability right now and moving forward.

Although the body of scientific knowledge on climate change continues to mature, future climate projections reflect modelling uncertainty and uncertainty around future greenhouse gas emissions. It is therefore important that a range of possible climate scenarios are considered when planning for the sustainability of Victoria's water future.

What are the guidelines?

The *Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria* present a consistent approach for applying climate change scenarios across water resource modelling and planning, considering factors such as temperature, potential evapotranspiration, rainfall, runoff and groundwater recharge which are used when assessing the impact of climate change on water availability. The

guidelines also provide information on changes to climate variability associated with climate change.

Who uses the guidelines?

The guidelines support Water Corporations to apply best practice water resource planning consistent with their responsibilities under Clause 6-A of the Statement of Obligations issued by the Minister for Environment, Climate Change and Water. This requires Water Corporations to 'comply with any guidelines for forecasting the impact of climate change on water supplies' issued by the Department of Environment, Land, Water and Planning (DELWP).

In addition to urban and rural water impact assessments, the guidelines can be used to assess future water availability for water intensive industry, integrated water cycle management, environmental water assessments and other purposes.

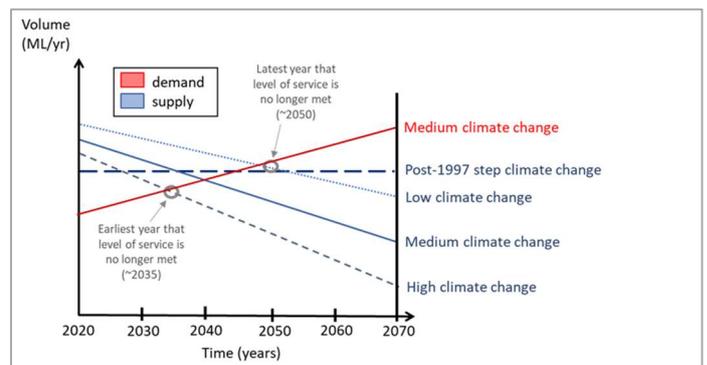


Figure 1: The guidelines can be used to explore future urban water supply and demand under scenarios of projected climate change.

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Why update the guidelines?

The guidelines have been updated to inform the preparation of urban water strategies, which are planned for release in 2022. The guidelines are being updated to reflect:

- Lessons learnt from previous application of the guidelines.
- New research findings, including those from the Victorian Water and Climate Initiative (VicWaCI).
- New and updated legislation and water policy.

This update ensures that the guidelines remain user-focused, incorporate the best available science and reflect the current context for water management in Victoria.

What was the process for updating the guidelines?

The guidelines were developed by DELWP with input from climate and hydrology researchers from CSIRO, Bureau of Meteorology, University of Melbourne and Victoria's Water Corporations and other users of the guidelines. The guidelines build on the previous edition published in 2016.

What are the key features of the guidelines?

Key features of the guidelines include:

- Information on the role of the guidelines relative to other climate change and water supply planning guidance issued by DELWP.
- An overview of observed climate change to date.
- An overview of the methods used by CSIRO to generate climate change projections for the guidelines and their associated uncertainties and limitations.
- Information and methods for undertaking climate change impact assessments for water availability and supply.
- Guidance on when to consider additional assessment techniques and/or planning approaches to manage near-term planning risks.

What are the benefits of using the guidelines?

The benefits of the guidelines include:

(i) Providing tailored guidance on how to apply the climate science for water resource planning applications. Applying the science can be complex, and the guidelines describe how to do this in a manner consistent with best available research findings so that Victorians can use the information to plan for and manage the impact of climate change to water availability.

(ii) Promoting a consistent approach to climate change impact assessment for water supplies. This enables comparisons of current and future water availability and use for shared water resources across Victoria.

(iii) Enabling more efficient climate change impact assessments by pre-generating a standard set of climate change information. Doing this removes the burden for individual Water Corporations, or other users, to generate their own climate change projections in an area of complex science.

What has changed in the guidelines and what are the implications for my organisation?

Key changes to the guidelines are documented in the table overleaf.

Where should I go for future information?

DELWP's Hydrology and Climate Science Team sits within the Water Resource Strategy Division of the Water and Catchments Group of DELWP. The Hydrology and Climate Science team can be contacted at HCS.Team@delwp.vic.gov.au.

You can also use this email address to subscribe to the team newsletter, which provides the latest information on research, publications, webinars and science days from the research program.

Information on the research program can also be accessed by visiting the [DELWP Water and Catchments website](#).

Any future updates of these guidelines will be made available online.

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Table 1 - Key changes to the guidelines and implications for water availability assessments.

Change	Implications
<p>1. Emissions Scenarios</p> <p>Representative Concentration Pathway (RCP) scenarios incorporate different assumptions of greenhouse gas and aerosol emissions and their concentrations over time, as well as land use/land cover changes. The RCP8.5 scenario is a high emissions scenario that is recommended by the guidelines for water supply planning applications. The RCP8.5 scenario spans a wide range of plausible futures, allowing for robust decision making, and is consistent with a precautionary approach for water supply impact assessments, which is appropriate in the context of projection uncertainty.</p> <p>The guidelines now also include the option to utilise a more moderate RCP scenario (RCP4.5). This scenario reflects the potential lower rates of greenhouse gas emissions that could occur under greenhouse gas mitigation measures pledged by the world's governments</p>	<p>If desired, additional modelling using the RCP4.5 scenario can be undertaken to test the robustness of planning decisions under a milder emissions trajectory.</p>
<p>2. Interpolation of Global Climate Model (GCM) projections</p> <p>The updated guidelines clarify the approach to interpolating GCM projections between now and 2040. This clarification addresses an information gap in earlier editions of the guidelines. The recommended approach is consistent with the methods by which GCM projections have been derived, and was developed in consultation with climate scientists.</p>	<p>The recommended approach will have the effect of (i) representing current water availability as a range with respect to GCM projection uncertainty from 1995 to date and (ii) potentially reducing estimated water availability in the short term under projected climate change under the high scenario and, to a lesser extent, the medium scenario.</p>
<p>3. Seasonal scaling factors</p> <p>There is now greater certainty about the seasonal nature of observed climate changes to date, and a greater understanding of the seasonal nature of the influences on Victoria's climate into the future. For example, over the past thirty years there has been a decrease in cool season rainfall (defined as April to October for Victoria) and this decline has persisted even after the end of the Millennium Drought. In response to this, DELWP commissioned CSIRO to provide cool season (April to October) and warm season (November to March) projections. These projections have been used to generate a plausible range of cool season and warm season rainfall projections for sensitivity testing of planning outcomes.</p>	<p>Information can be utilised to assess the sensitivity of planning outcomes to projected changes in seasonal rainfall (in addition to annual changes).</p>
<p>4. Alternative impact assessments</p> <p>The guidelines now include additional information that can support alternative impact assessment approaches. These are in addition to</p>	<p>Information can be utilised to further assess the sensitivity of planning outcomes to the assumptions in the guidelines.</p>

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the scenario assessment approach outlined in the body of the guidelines, which is typically applied within an adaptive management framework within Victoria. The additional information includes guidance on supplementary downscaled GCM results for Victoria.

In addition, the updated guidelines include:

- > New guidance on the impacts of climate change to snow cover.
- > Updated guidance on the impacts of climate change to peak rainfall and streamflow.
- > Updated guidance on the impacts of climate change to groundwater recharge.
- > Additional guidance on assessing shifts in rainfall-runoff behaviour during and after prolonged drought.

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