How can the Western Treatment Plant help Melbourne to thrive and adapt to an uncertain future

# Overview

In this series of lessons, students use an inquiry approach to

1. Explore how the Western Treatment Plant processes sewage
2. Investigate how this water could be used to mitigate the impacts of population growth and climate change.

Working in groups allows students to learn from each other and justify their thinking, but this module could be adapted for individual or pair work.

# Rationale

Demand for water is growing in Melbourne. This is due to population growth and climate change. Victoria’s population is predicted to almost double and reach 10 million people by 2051. As our climate changes, Melbourne will experience more frequent warm and dry days. During periods of dry and warm weather, demand for water increases and water stores can fall very quickly.

The Desalination Plant was built following the Millennium Drought and provides a valuable supply of water to top up water stores. Currently, it can deliver s up to one third of Melbourne’s current annual water needs, 150 billion litres of high-quality drinking water a year. As demand increases in the future, Melbourne will need to find additional water sources to secure our supply, including expanding the use of recycled water.

At the end of the unit, students will design a campaign to address the ‘yuck’ factor of recycled effluent and encourage Melbournians to embrace the potential of the Western Treatment Plant.

# Lesson outline

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| Dive in | Find Out | Dive Deeper | Make Conclusions | Reflect and Act |
| 1. See, think, wonder  2. Claim, Evidence, Question  3. Water restrictions  4. SEEP table | 1. KFL Chart  2. Find out about the WTP, take the virtual tour  3. Rubric: Hexagonal thinking  4. Rubric: Find out what Melbournians think - collect primary data.  5. Benefits of recycled water - SEE chart | 1. Case Study drinking recycled water - Toowoomba  2. Which cities already use recycled water? Mapping activity | 1. Rubric: Socratic Seminar to consolidate learning/ arguments  2. Rubric: Social Media campaign to promote benefits of recycled water.  3.Presentation and feedback in the form of  ‘I like, I wonder’ | 1. I used to think, now I think  2. Completed KFL chart. |
| PowerPoint presentations, Instructions and Rubrics | | | | | |
| [WTP 1. Dive In](https://www.melbournewater.com.au/media/19836/download) | [WTP 2. Find Out](https://www.melbournewater.com.au/media/19841/download);  [WTP Survey Task Instructions](https://www.melbournewater.com.au/media/19846/download);  [WTP Rubric Survey](https://www.melbournewater.com.au/media/19851/download);  [WTP Rubric Hexagonal Concept Thinking](https://www.melbournewater.com.au/media/19856/download) | [WTP 3. Dive Deeper](https://www.melbournewater.com.au/media/19861/download) | [WTP 4. Make Conclusions](https://www.melbournewater.com.au/media/19866/download);  [WTP Socratic Seminar](https://www.melbournewater.com.au/media/19881/download);  [WTP Socratic Seminar Rubric](https://www.melbournewater.com.au/media/19876/download);  [WTP Rubric Social Media Campaign](https://www.melbournewater.com.au/media/19871/download) | [WTP 5. Reflect and Act](https://www.melbournewater.com.au/media/19886/download) |

# Dive In

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| Learning Intentions |
| For students to: |
| * Understand Victoria’s recent history of drought. * Consider some of the challenges facing Melbourne. * Analyse a variety of geographic data. |

**Activities** [**WTP 1. Dive In**](https://www.melbournewater.com.au/media/19836/download) **- 1-2 hours.**

The aim of the opening ‘dive in’ section is to spark students' curiosity about the topic of water storages and introduce the problem of managing the uncertainty of future water supplies. By the end of the ‘dive in’ activities, students can articulate why Victoria needs a diverse mix of water sources, including recycled water, for our future water supplies.

1. Students begin the unit by examining sources from a past drought; the Millennium drought. Students might be familiar with the examples of water saving measures that were widely used to conserve water and reduce consumption. These sources can be used to discuss how the drought impacted people’s everyday lives and the concern that was felt across the community about the prospect of water storages running low. The Millennium drought ended a decade ago and we are currently enjoying a period of high rainfall. This activity closes with a question prompting the students to go on to consider whether Victoria now has a secure water supply?
2. Students are presented with four sources on Victoria’s predicted climate and population growth. Using the table provided, students should analyse the sources and select examples from the data that indicate that the population of Victoria is likely to continue to grow significantly, increasing demand for water at the same time that the climate will be more variable, with decreasing rainfall.
3. Students use the directed resources to complete a SEEP table where they consider the potential impacts of water shortages. SEEP is the framework used in the 2022-2026 Geography study design to analyse impacts.

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| Victorian Curriculum |
| Geography 7-8   * Analyse maps and other geographical data and information using digital and spatial technologies as appropriate, to develop identifications, descriptions, explanations and conclusions that use geographical terminology [(VCGGC104)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCGGC104) * Nature of water scarcity and the role of humans in creating and overcoming it, including studies drawn from Australia [(VCGGK108)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCGGK108) * The spiritual, economic, cultural and aesthetic. value of water for people [(VCGGK109)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCGGK109) |
| Science 7-8   * Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090) |

# Find Out

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| Learning Intentions |
| For students to: |
| * Identify what they know and what they need to find out to respond to the inquiry question. * Gather information and data from primary and secondary sources. * Produce a concept map to visualise research findings. |

**Activities** [**WTP 2. Find Out**](https://www.melbournewater.com.au/media/19841/download) **- 3 hours**

In the ‘find out’ section, the inquiry question and end products are revealed to the groups. Students then need to identify the information they need to respond to the inquiry question. They will go on to gather information from Melbourne Water and other sources, including their own primary data collection in the form of a survey.

1. Students are introduced to the inquiry question; ‘How can the Western Treatment Plant help Melbourne to thrive and adapt to an uncertain future?’ In groups, they discuss the inquiry question and complete the first two columns of a ‘Know, Find Out, Learnt’ chart (KFL).
2. Using the suggested resources from Melbourne Water, including the Western Treatment Plant Virtual Tour, groups of students find the information they need to respond to the inquiry question.
3. In groups, students design a survey of friends and family to find out what they know and feel about recycled water. [WTP Survey Task Instructions](https://www.melbournewater.com.au/media/19846/download)  [WTP Rubric Survey](https://www.melbournewater.com.au/media/19851/download)
4. Students create a hexagon or concept map to visualise their learning and make connections between topics. [WTP Rubric Hexagonal Concept Thinking](https://www.melbournewater.com.au/media/19856/download)

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| Victorian Curriculum |
| Geography 7-8   * Classification of environmental resources and the forms that water takes as a resource (VCGGK105) |
| Science 7-8   * Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090) * Water is an important resource that cycles through the environment [(VCSSU101)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU101) * Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques [(VCSSU095)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU095) |

# Dive Deeper

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| Learning Intentions |
| For students to: |
| * Understand that the use of science and technology to address issues such as water shortages, may have social and ethical implications. * To identify other cities that use recycled water for drinking. |

**Activities:** [**WTP 3. Dive Deeper**](https://www.melbournewater.com.au/media/19861/download) **- 1-2 hours**

Students dive deeper into the controversies surrounding recycled water by considering the dilemma facing Toowoomba in 2006.

1. Students evaluate the use of referendums.
2. Students analyse three sources from the 2006 Toowoomba referendum.
3. Students research the use of potable recycled water from around the world at a selected location.

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| Victorian Curriculum |
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| Science 7-8   * Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090) * Water is an important resource that cycles through the environment [(VCSSU101)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU101) |
| Citizenship, Diversity and Identity 7-8   * Identify different points of view on a contemporary issue relating to democracy and citizenship [(VCCCC015)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCCCC015) * Investigate how peoplewith shared beliefs and values work together toachieve their goals and plan for action [(VCCCC016)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCCCC016) |
| Ethical Capability 7-8   * Explore the extent of ethical obligation and the implications for thinking about consequences and duties in decision-making and action [(VCECD017)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD017) * Discuss the role of context and experience in ethical decision-making and actions [(VCECD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD018) |

# Make Conclusions

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| Learning Intentions |
| For students to: |
| * consolidate and share their understanding of the issue * make connections between topics * synthesize and apply their learning to produce a campaign |

**Activities** [**WTP 4. Make Conclusions/ End Product**](https://www.melbournewater.com.au/media/19866/download)**- 2-3 hours**

Students make connections between topics and articulate their conclusions during the Socratic Seminar. They then apply their understanding to the inquiry question by designing a social media campaign that tackles the ‘yuck’ factor of recycled effluent and encourages Melbournians to embrace the potential of the Western Treatment Plant.

1. Hold a Socratic Seminar to encourage students to discuss, debate, draw connections and consolidate their learning. The discussion prompts can be edited or curated to suit the interests of each group of learners. Use the seminar to return to any big questions or contested ideas that have arisen over the unit. Give students a class or homework task to prepare for the seminar. During the seminar, the role of the teacher is to listen and use the PPT to keep the discussion flowing. The teacher should try to avoid commenting or prompting.

[WTP Socratic Seminar](https://www.melbournewater.com.au/media/19881/download)

[WTP Socratic Seminar Rubric](https://www.melbournewater.com.au/media/19876/download)

1. In groups, students will apply what they have learnt and design a social media campaign that aims to:

* Rebrand recycled water. It needs a different name with positive and clean connotations.
* Change the perception of recycled water by communicating a benefit of recycled water.

[WTP Rubric Social Media Campaign](https://www.melbournewater.com.au/media/19871/download)

[WTP Survey Task Instructions](https://www.melbournewater.com.au/media/19846/download)

After each presentation, the class provides peer feedback in the form of sentences that start with ‘I liked….’ and ‘ I wonder…’.

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| Science 7-8   * Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090) * Water is an important resource that cycles through the environment [(VCSSU101)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU101) |

# Reflect

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| Learning Intentions |
| For students to: |
| * articulate what they have learnt and how their thinking and behaviour might have changed. * evaluate the outcomes of their learning |

**Activities** [**WTP 5. Reflect and Act**](https://www.melbournewater.com.au/media/19886/download) **- 20 minutes**

This activity concludes the inquiry unit by asking students to reflect on what they have learnt and how their ideas have changed.

1. Students go back and complete the final column of the KFL chart from the ‘Find Out’ section.
2. Students complete an individual reflection using the sentence stems;

* *I used to think….*
* *Now, I think…..*
* *In the future, I will…..*

These reflections can be shared and discussed or students can be invited to add their reflections to a class poster or post-it note display.

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