# Activity: Treating Melbourne’s sewage (Years 9 and 10)

Cleaning up sewage

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| Victorian Curriculum F–10[[1]](#footnote-1) links:  **Levels 9 and 10**  **Science**  **Science Understanding**  **Science as a Human Endeavour**  The values and needs of contemporary society can influence the focus of scientific research  **Biological sciences**  Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems  **Earth and space sciences**  Global systems, including the carbon cycle, rely on interactions involving the atmosphere, biosphere, hydrosphere and lithosphere  **Geography**  **Geographical Knowledge**  **Environmental change and management**  Different types and distribution of environmental changes and the forms it takes in different places  Environmental, economic and technological factors that influence environmental change and human responses to its management |

Students are introduced to Melbourne’s sewerage system and the role of Melbourne Water’s Eastern and Western Treatment Plants. They define terms used in the sewage treatment industry, identify items and substances that are introduced to the sewerage system, create a flow chart of sewage treatment processes and calculate average daily volumes of annual sewage flow.

**Duration**

Four period sessions

**Activity steps**

1. Students use the internet to research and define the following terms:

* sewage
* sewerage
* greywater
* blackwater
* effluent
* stormwater.

As a starting point, go to:

[Sewerage – how it works, Melbourne Water](https://www.melbournewater.com.au/node/163)

[Stormwater, Melbourne Water](https://www.melbournewater.com.au/node/381)

1. Individually, students draw a plan of their house (using ICT if available) and label it to show where connections are made to the sewerage system. Ask them to identify the different items and substances that are introduced to the sewerage system. Encourage students to research and note the chemicals that compose the waste (e.g. laundry detergents contain water softeners, surfactants, bleach, enzymes, brighteners, fragrances, and many other agents).
2. As a class, combine the lists of substances to make a master list. Classify the items as contributing to greywater or blackwater. Classify whether they are organic or inorganic compounds. The class decides how this information can be displayed in a clear and concise manner and each student prepares their list.
3. Explain that the major component of sewage is water (more than 99%) and that treatment involves the separation of the 1% of other materials from it. Discuss how these materials may affect the environment if they are not removed during the treatment process.

A list of items that might end up in the sewerage system and their effect is available [here](https://www.melbournewater.com.au/node/163).

1. Students take their lists with them on their visit to the treatment plant and identify where these materials are treated and removed during the purification process.
2. Students can access resources about the Western Treatment Plant process and information about the stages in the treatment that use bacteria.
   1. [Western Treatment Plant sewage treatment process](https://www.melbournewater.com.au/node/3221)
   2. Primary treatment of sewage and anaerobic treatment of sludge
   3. <<https://www.youtube.com/watch?v=--GS_djOzcg&list=PL1zDcvEb76G6FdTMg-_VRmAE4jMoarrKr&index=1>>
   4. Secondary treatment of sewage
   5. <<https://www.youtube.com/watch?v=yF9hQUebDNA&index=2&list=PL1zDcvEb76G6FdTMg-_VRmAE4jMoarrKr> >
   6. Where does wastewater go? ABC Splash video [3:43]
   7. <<http://splash.abc.net.au/home#!/media/524873/>>

**Calculating average daily volume of sewage flow**

1. Students locate their school in Google Earth. (Google Earth will need to be downloaded from www.google.com/earth/index.html if it is not already available on the stuents’ computers.) Students use the measuring tool to determine the school’s dimensions and then calculate its area. If Google Earth is not available, students can physically measure their school ground’s dimensions to calculate the area.
2. Use the following data for students’ calculations. A total of about 320,000 megalitres (ML), or 320 gigalitres (GL), of sewage is treated by Melbourne Water, the Western Treatment Plant treated 60% and the Eastern Treatment Plant 40%. (Note: 1 megalitre (ML) = one million litres, one gigalitre (GL) = one-thousand million litres.)
3. Students determine the annual sewage flow one of the treatment plants and calculate average daily volume. Using the area of the school ground calculated previously, they determine the depth that that volume of water would be if it was contained within their school grounds, assuming the grounds are level. For instance, for a school with an area of five hectares, using a total volume of 271 GL of sewage, the average daily throughput of the Western Treatment Plant would equate to a height of about nine metres. Relate this height to physical features in the school or local area, such as sportsgrounds or shopping centres.
4. Discuss the need for sewage treatment and the processes involved and ask students to envisage what they might see, smell and hear when they visit the treatment plant.

1. Creative Commons Licence Victorian Curriculum and Assessment Authority (VCAA) <<http://victoriancurriculum.vcaa.vic.edu.au/>> Accessed 14 August 2016. [↑](#footnote-ref-1)