

Stage 6 Earth and Environmental Science Depth Study program outline

Site	Excursion time	Duration	Student numbers
Penrith Water Recycling Plant	10.00 am – 2.00 pm	4 hours	10*-120

* Groups with less than 20 students will be combined with other schools doing the same program.

Content covered

Syllabus link

Module 4: Human Impacts

Water management

Inquiry question: How can water be managed for use by humans and ecosystems?

- Investigate the treatment and potential reuse of different types of water, including but not limited to: industrial wastewater, sewage, stormwater
- Describe ways in which human activity can influence the availability and quality of water both directly (eg over-extraction) or indirectly (e.g. algal blooms)

Learning Across the Curriculum

Sustainability

Outcomes

Knowledge and understanding

EES11-11 describes human impact on the Earth in relation to hydrological processes, geological processes and biological changes

Working scientifically

CH11/12-1 Questioning and Predicting, H11/12-6 Problem solving

CH11/12-5 Analysing data and Information, CH11/12-7 Communicating

Who will provide worksheets?

We'll provide printed, syllabus linked worksheets for students and a teacher answer sheet. Students will need to bring a pen to complete the worksheet.

Where can we have a meal break?

Time for an on-site lunch break is included in the program. There are no food outlets near the site or canteen facilities and students will need to bring a packed lunch and drink (water refill is available).

What can school students and teachers wear?

Everyone, including teachers and group leaders, **must** wear sturdy, fully enclosed, flat soled shoes

such as joggers, closed school shoes or boots.

There should be no skin showing on feet. No open shoes such as sandals, thongs or ballet flats.

School students are permitted to wear school or sports day uniforms.

What happens if it's raining or too hot?

If it's very hot, raining or has been raining for a long period of time before your tour, it may not be safe to go outside or complete the whole tour. Your Education Officer will negotiate alterations to the program to make sure you still get the most out of your visit.

Excursion itinerary

Arrival	
Introduction	<ul style="list-style-type: none"> • Receive an orientation and safety induction. • Discuss the objectives of the excursion program. • Discuss the importance of the application of science in industry to treat and manage drinking water to protect public health.
Walking tour of the plant	<ul style="list-style-type: none"> • Observe wastewater treatment processes and how we separate matter based on its properties. • See how we use polymers to optimise water treatment processes and ultimately protect the environment.
Water management discussion	<ul style="list-style-type: none"> • Use an augmented reality sandbox to investigate the natural water cycle. • Use an interactive catchment model to explore Sydney's urban environment, the urban water cycle and managing impacts on the environment. • Examine the disposal, removal and recycling of organic substances in wastewater treatment. • Identify environmental, economic and sociocultural implications of obtaining, utilising and disposing of organic substances in the water industry.
Break	
Biosolids demonstration	<ul style="list-style-type: none"> • observe a flocculation and dewatering demonstration. • discuss the use of polymers in wastewater and biosolids management. • perform a first-hand investigation for optimal polymers conditions (volume and mixing speed). • explain how the properties of polymers improve the efficiency of wastewater treatment.
Hands-on water quality experiment.	<ul style="list-style-type: none"> • complete a practical investigation with a mock wastewater sample. Use a combination of filtration materials to separate the mixture with the aim of getting the sample as "clean" as possible and manage waste collection. • Identify the separation techniques they use and record a flow chart of their results and conduct calculation of results obtained. • Perform basic water quality tests (phosphates, nitrates, turbidity) and discuss why monitoring these ions are important in protecting the environment.
Conclusion	<ul style="list-style-type: none"> • Discuss how the data collected throughout the day may be incorporated into a depth study. • Discuss their role in the urban water cycle. • Discuss how to access online information from Sydney Water website and outline potential depth study ideas.
Departure	