



Stage 6 Earth and Environmental Science Depth Study

Sample Depth Study assessment

Depth Study Inquiry Question:

How does scientific knowledge in an industrial setting (Sydney Water) enable effective treatment of wastewater (sewage) to produce high quality recycled water and biosolids for re-use and to protect the environment?

Context:

Students will create a scientific field report or presentation related to application of separation techniques and the need for scientific monitoring during process to protect the environment. Students will do a fieldwork investigation on wastewater treatment processes at Penrith Water Recycling Plant or St Marys Advanced Water Recycling Plant, with secondary research and content from Modules 4.

Students will:

- participate in fieldwork investigating the processes at a water recycling plant
- gather knowledge and skills to help understand implications of science for society and the environment.

The suggested Depth Study time allocated is 4 to 8 hours including:

1. Excursion/ fieldwork at Penrith Water Recycling Plant or St Marys Advanced Water Recycling Plant, where you will:
 - see how we apply separation techniques to produce recycled water and biosolids
 - understand how wastewater is treated to produce recycled water
 - recognise the importance of monitoring pollutants that can impact the environment
2. 4 hours in class time for secondary research, data analysis and create report/presentation using our online resources and teacher/student investigations.

Task number: 3	Weighting: 35%	Timing: Term 3, Week 9
Outcomes assessed A student: • describes human impact on the Earth in relation to hydrological processes, geological processes and biological changes EES11-11 • designs and evaluates investigations to obtain primary and secondary data and information EES11/12-2 • analyses and evaluates primary and secondary data and information EES11/12-5 • communicates scientific understanding using suitable language and terminology for a specific audience or purpose EES11/12-7 • conducts investigation to collect valid and reliable primary and secondary data and information EES11/12-3 (optional)		
Nature of the task A report/presentation requires students to: • describe the context of the site (Penrith Water Recycling Plant and/or St Marys Advanced Water Recycling Plant) • explain the relevance of the site to the investigation's question • process and analyse first-hand lab activities, fieldwork and secondary data • communicate the results and conclusion of the fieldwork, lab and research investigations		

Outcomes:

Syllabus Knowledge and Understanding outcomes

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

Students:

- investigate the treatment and potential reuse of different types of water, including but not limited to sewage
- describe ways in which human activity can influence the availability and quality of water both directly or indirectly

Working Scientifically outcomes

Planning

EES11/12-2 Designs and evaluates investigations to obtain primary and secondary data and information

Students:

- assess risks, consider ethical issues and select appropriate materials and technologies when designing and planning an investigation

Analysis and problem solving

EES11/12-5 Analyses and evaluates primary and secondary data and information

Students:

- assess relevance and reliability of the gathered information
- collate useful and relevant information into water recycling process that relates to treatment and potential reuse of sewage and human impacts
- evaluate the influence of recycled water and biosolids for re-use and to protect the environment

Communicating

EES11/12-7 Communicates scientific understanding using suitable language and terminology for a specific audience or purpose

Students:

- propose ideas in a coherent and logical way and correctly use scientific terminology and principles
- present information on the science and chemistry of acid/base reactions and buffers
- summarise from a range of sources and appropriately acknowledge sources

Conducting Investigations (Optional)

EES11/12-3 Conducts investigation to collect valid and reliable primary and secondary data and information

Students:

- employ and evaluate safe work practices and manage risks
- use appropriate technologies to ensure and evaluate accuracy
- select and extract information from a wide range of reliable secondary sources and acknowledge them using an accepted referencing style

Marking Guidelines:

Students:	Range of Marks
• assess risks, consider ethical issues and select appropriate materials and technologies • demonstrate comprehensive knowledge and understanding of treatment and potential reuse of sewage that are applied in industries • evaluate ways in which human activity can influence the availability and quality of water both directly or indirectly • evaluate a wastewater treatment process that relates to separation techniques and their products (recycled water and biosolids) to protect the environment • assess the relevance and reliability of the gathered information • use scientific terminology and principles effectively • acknowledge sources appropriately and thoroughly	30–35
• assess risks, consider relevant issues, materials and technologies • demonstrate accurate knowledge and understanding of treatment and potential reuse of sewage that are applied in industries • discuss ways in which human activity can influence the availability and quality of water both directly or indirectly • presents a wastewater treatment process that collates useful and relevant information referring to separation techniques and products (recycled water and biosolids) to protect the environment • describe the relevance and reliability of the gathered information • use scientific terminology and principles • acknowledge sources appropriately	23–29
• assess risks, consider issues, materials and technologies • demonstrate sound knowledge and understanding of treatment and potential reuse of sewage that are applied in industries • describe ways in which human activity can influence the availability and quality of water • presents a wastewater treatment process that outlines the applications or products (recycled water and biosolids) of separation techniques • describe relevance or reliability of the gathered information • use some scientific terminology • acknowledge sources	17–22
• assess risks, consider issues, materials or technologies • demonstrate basic knowledge and understanding of treatment and potential reuse of sewage that are applied in industries • identify ways in which human activity can influence the availability and quality of water • presents a wastewater treatment process that identifies the applications or products of separation techniques • outlines the relevance or reliability of the gathered information • use limited scientific terminology • acknowledge some sources	11–16
• assess risks • gather some relevant information about of treatment and potential reuse of sewage that are applied in industries • present an incomplete wastewater treatment process relates to separation techniques • use some scientific terms • attempt to acknowledge some sources	1–10



Teacher Comments

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