Stage 4 Science – Living World: Environment
Teacher lesson plan – Wipes out of pipes lesson plan

Sydney WATER

Key inquiry questions
How has new evidence about wipes helped address a real-world problem of wastewater blockages? How can we reduce the effect of wipes on our wastewater system and the environment?

Time: 45-60 min

Syllabus outcomes

SC4-1VA - appreciates the importance of science in their lives and the role of scientific inquiry in **increasing understanding of the world around them.**
SC4-13ES - explains how advances in scientific understanding of processes that occur within and on the Earth, influence the choices people make about **resource use and management.**
SC4-15LW - explains how new biological **evidence changes people's understanding** of the world.

Syllabus Content

LW4 Scientific knowledge changes as **new evidence** becomes available, and some scientific discoveries have significantly changed people's **understanding of the world**.

b. recount how evidence from a scientific discovery has changed understanding and contributed to solving a real-world problem, eg animal or plant disease, hygiene, food preservation, **sewage treatment** or biotechnology.

Working scientifically skills

SC4-4WS - identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge.
SC4-5WS - collaboratively and individually produces a plan to investigate questions and problems.
SC4-6WS - follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually.
SC4-7WS - processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions.

Sydney Water's aim for activity

- Our core objectives are to protect the environment and protect public health. Every day we provide clean safe drinking water and treat your wastewater.
- The wastewater we treat can be recycled or safely discharged into the environment used to keep our creeks and rivers healthy.
- In this lesson, we'll investigate how wet wipes impact our wastewater system and the environment.
- This practical investigation will show how we can use working scientifically skills in water management.
- We'll explore the importance in carrying out experiments to gather evidence to help solve a real-world problem. We'll also look at how communicating scientific evidence in the community is important to reduce the effect of wipes.

Teaching and learning

Introduction – What's in wastewater?

Q. Have you ever wondered what happens to water after you've used it inside the house?
A. Probably not! Once you've used that amazing water and it goes down the drain – it becomes a mixture. We call this mixture wastewater. Wastewater is 99% water and the remaining one per cent is made up of things we add to the water as we've used it.

Q. Where does your wastewater go?
A. The drains from inside your house go underground and make their way to our wastewater treatment or wastewater recycling plants. See our Wastewater treatment webpage and *What's in wastewater?* factsheet for more information.
Did you know? That around 70% of all wastewater comes from our homes. That means it is our actions at home that makes up most of the wastewater in Sydney.

Resources

Sydney Water resources

Wastewater treatment
sydneywater.com.au/SW/education/Wastewater-recycling/Wastewater-treatment/index.htm

What's in wastewater?
sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mjew/~edisp/dd_210923.pdf

Wastewater network map

Activity: Look at the *Wastewater network map*. See how far the wastewater from your school must travel to reach a wastewater treatment or water recycling plant.

Q. What do we do with the wastewater at the plant?
A. Our scientists and engineer's use different separation techniques to remove waste from wastewater. So, understanding the science you're learning in class is important for these jobs. We do this to:

- protect public health – we treat and remove pathogens and bacteria in wastewater making it safe for re-use or releasing it into the environment.
- protect the environment – we remove substances like rubbish, nutrients, and chemicals to keep rivers and creeks healthy. We also recycle some of the organic waste as a safe fertiliser!

See our Wastewater treatment, Protecting the environment and Solids recycling webpages for more information.

Q. Has anyone seen or experienced a blocked pipe before? What happens when wastewater can't make it to our plant?
A. It's hard to believe that some people use the toilet like a rubbish bin. Nearly one million people are flushing wet wipes and other items which don't break down. That's a problem for your pipes and ours.

- If your property has a blocked pipe wastewater may spill out onto the floor. It's a stinky problem that can be costly often thousands of dollars to fix.
- When we get blocked pipes in our network, such as our sewer mains, pumping stations or at treatment plants, our staff have to manually unblock pipes.
- Blocks can also cause wastewater overflows where the untreated wastewater comes up and spills out. This can potentially harm the environment and public health. We carefully isolate, manage and clean these spills working with the Environmental Protection Agency (EPA).

We can all work together and do our part and prevent blocked pipes and overflows to protect the environment.

Q. So, what are some common things in wastewater? What shouldn't be in wastewater?
A. Let's do a little activity to get the answer. See Wastewater treatment webpage for this image and information.

Activity:

1. Students break into groups; each group is given a list of common things in wastewater.
2. Sort items by which room they come from in the house (kitchen, bathroom, or laundry).
3. Circle/highlight the items that students think will cause a blockage.
4. Check answers.

sydneywater.com.au/web/groups/publicwebcontent/documents/webasset/zgrf/mdq1/~edisp/dd_045245.pdf

Protecting the environment
sydneywater.com.au/SW/education/Wastewater-recycling/Protecting-the-environmen

Solids recycling
sydneywater.com.au/SW/education/Wastewater-recycling/Solids-recycling

Sydney Water Talk – wet wipes
sydneywatertalk.com.au/wet-wipes

NSW Environment Protection Authority (EPA)
https://www.epa.nsw.gov.au/

Body – Our gripes with wipes!

Q. How can we use working scientifically skills to find out about wipes?
At Sydney Water – we used experiments to demonstrate that wet wipes aren't the same as toilet paper. It's important to use scientific methods to find new evidence. When a problem arises, we conduct experiments to

Sydney Water resources
Sydney Water Talk – wet wipes
sydneywatertalk.com.au/wet-wipes

High school

test a hypothesis before making a claim or stating it's a fact. So, can you be a Sydney Water scientist too? How can we simulate the conditions of toilet paper and wipes and conduct a fair test?

Activity: Complete *Practical investigation – wipes out of pipes* found on our High school webpage to find the answers to these questions.

Safety first! Complete a risk assessment before starting.

Risk	Rating	Control
Cut	L	Elimination – don't use glassware
Poison	L	Administration – don't consume the water/wipes
Slips/Trips	L	Administration – make sure you have a tight lid, report and spills.

Q. If you didn't do this experiment? How would you know that wipes shouldn't be "flushable"? How could you communicate this with the community to get wipes out of pipes?
A. Well doing the experiment was a great way to see it with your own eyes. We also have many public campaigns, use media in multiple languages to help spread the word. However, we still need people like you to help and spread the word. Unfortunately, "flushable" remains on the packet, many think they are doing the right thing. See our *Media release - Decision shouldn't change diligence with wet wipes* for more information about wipes marketing.

Activity: Watch the *Guardian – Fatbergs & flushable wipes video* (and fats, oils and grease) causing fatbergs in our pipes. Discuss these questions at the end of the short video.

- What do you see? How does this make you feel?
- Do you think the wipes experiment help communicate the problem?
- What do think is the solution to getting wipes out of pipes?

sydneywater.com.au/SW/education/programs-resources/Highschool

Media release - Decision shouldn't change diligence with wet wipes
sydneywater.com.au/SW/about-us/our-publications/Media/decision-shouldn-t-change-diligence-with-wet-wipes

Other resources
Guardian – Fatbergs & flushable wipes
theguardian.com/global/video/2019/aug/10/fatbergs-flushable-wet-wipes-are-creating-an-environmental-catastrophe-video

Extension options

1. Biodegradable wipes?
Biodegradability has many definitions, it's how fast something breaks down in the environment. For Sydney Water, the time between toilet flushing and reaching a plant can be as little as a couple hours so we need things like toilet paper to break down very quickly. Unfortunately, most wipes we remove gets sent to landfill because it doesn't break up and is tangled up with other rubbish in wastewater.

For landfill, biodegradable can mean it will decompose over months. You can conduct and experiment pouring all the jars in the *Practical investigation – wipes out of pipes* and burying them in a marked location in the ground or compost. Check after a week, a month, maybe more? See the *ACCC - Biodegradable, degradable and recyclable claims* for more information.

Did you know? That organic waste removed from wastewater, including toilet paper and human waste, can be turned into a valuable resource called Biosolids. See our Solids recycling web page for more information.

2. Create a campaign
Your students can get a message out to family, friends and the school community. Why don't they make a video, poster, or social media campaign to inform people about keeping wipes out of the pipes. See our "Make a change" section on our Wastewater audit website for more information.

Sydney Water resources

Wastewater audit

sydneywater.com.au/SW/education/programs-resources/Highschool/wastewater-audit

Wastewater treatment plant virtual tour
sydneywater.com.au/Education/Tours/virtualtour/tour.html

Penrith Water Recycling Plant

sydneywater.com.au/SW/education/Wastewater-recycling/Water-recycling/penrith-water-recycling-plant

Other resources

ACCC - Biodegradable, degradable and recyclable claims

3. Try a wastewater audit Wondered what you and your family are putting down in your wastewater? Doing a wastewater audit can help you discover: • how much wastewater you make? • what's in your wastewater? • how you can make a positive impact on wastewater quality? All while building numeracy and working scientifically skills and meeting communication and sustainability outcomes. **4. Try our separation practical investigations or come behind the scenes** • We have a range of other practical investigations and lesson ideas you can use to show how separation techniques are used at our wastewater and water recycling plants. See our High school webpage for more information. • You can also book a free excursion with us at our Penrith Water Recycling Plant. Go to our Excursion request webpage for more information.	https://www.accc.gov.au/system/files/Biodegradable%2C%20degradable%20and%20recyclable%20claims%20on%20plastic%20bags.pdf
Conclusion **Evaluation questions** • What could you at home to help protect our water and the environment? • How can you help send a message to your community to help get wipes out of pipes? • How can using science help to protect the environment? **Reflection activity** - Students finish these statements 1. I used to think ……(at the start of these lessons) 2. But now I think …….(at the end of these lessons) **Would you like to book an excursion?** • Come behind the scenes and see how we protect public health, the environment and manage water sustainably. • Our qualified teachers and industry professionals deliver our **free** programs. • See our Excursion Request webpage for more information. **Proud of your students?** We'd love to hear from you. We welcome feedback, example work and any new ideas you want to share with us.	**Sydney Water resources** Excursion requests sydneywater.com.au/tours **Contact us** Email us education@sydneywater.com.au Share on our social media channels: • facebook.com/SydneyWater • instagram.com/sydneywater • twitter.com/SydneyWaterNews