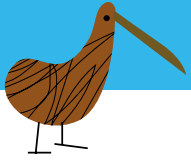


## SECTION THREE:

# How water gets to our taps

This section explores how water is delivered from water collection areas to our taps.





## Section 3: How water gets to our taps

The purpose of this section is to help students to:

- Understand how water gets from the water collection area to their taps
- Understand that getting water to taps takes time, energy and money

Overarching concepts for Section Three:

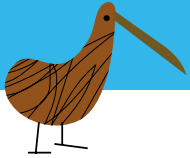
- Water is collected from dams, aquifers and groundwater and is distributed through a network of pipes to residents

## Section 3: How water gets to our taps



### Learning experiences – Section Three

Learning experiences	Learning intentions Students will . . .	Curriculum links (Achievement objectives)	Content
1. Our water supply	<ul style="list-style-type: none"> <li>Understand how drinking water is collected for Wellington's water supply</li> <li>Identify where their drinking water is collected from</li> </ul>	<p><b>Social Sciences: Level 4</b> Understand how producers and consumers exercise their rights and meet their responsibilities</p>	Students examine a map describing the water sources in Wellington; the Waiwhetu Aquifer, Hutt Water Collection Area and Wainuiomata/Orongorongo Water Collection Area. They then identify where their water comes from and how it gets to their school
2. Water's journey to our taps	<ul style="list-style-type: none"> <li>Understand how drinking water gets from water collection areas to taps</li> <li>Identify who is responsible for delivering water to residents</li> </ul>	<p><b>Social Sciences: Level 4</b> Understand how producers and consumers exercise their rights and meet their responsibilities</p> <p><b>Technology: Level 3</b> <b>Nature of Technology:</b> <i>Characteristics of technology</i> Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function</p>	Students order steps in the process of getting water from the water collection area to our taps
3. The right water in the right place	<ul style="list-style-type: none"> <li>Recognise the difference between treated water, untreated water, greywater and wastewater</li> <li>Describe safe uses for the different types of water</li> </ul>	<p><b>Social Sciences: Level 3</b> Understand how people make decisions about access to and use of resources</p> <p><b>Health: Level 3</b> <b>Personal Health and Physical Development:</b> <i>Safety management</i> Identify risks and their causes and describe safe practices to manage these</p>	View examples of treated drinking water, untreated water, greywater and wastewater. Learn about the differences between the types of water and describe appropriate uses for each
4. No water supply for a day	<ul style="list-style-type: none"> <li>Understand the possible effects of an earthquake on the water supply network</li> <li>Plan the use of emergency water supplies during a natural disaster</li> </ul>	<p><b>Health: Level 3</b> <b>Personal Health and Physical Development:</b> <i>Safety management</i> Identify risks and their causes and describe safe practices to manage these</p> <p><b>Social Sciences: Level 4</b> Understand how people participate individually and collectively in response to community challenges</p>	Students are led through a scenario involving a fictional earthquake. They investigate the possibility of a disrupted water supply and make plans to prioritise emergency water use



## 3:1 Our water supply – teacher notes

### Curriculum links

#### Social Sciences: Level 4

Understand how producers and consumers exercise their rights and meet their responsibilities

#### Other curriculum links: L 3 and 4

**Mathematics:** *Geometry and Measurement*

**Technology:** *Nature of technology*



### Education for sustainability concepts

*Interdependence/ Whanaungatanga:*

Everything and everyone in our world is connected

*Equity:* respect for all life, social justice, intergenerational equity, finite resources

## Background knowledge

### Methods of water collection

There are a variety of different methods used around New Zealand to get water to our taps. Methods include:

1. *Collection from roofs directing rainwater into tanks*
2. *Pump systems in streams to transport water to houses*
3. *Intake pipes to divert water from rivers into water treatment plants and then into a piped network*
4. *Bores and wells to extract water from the ground directly to homes or to a piped network*

### The worldwide situation

In New Zealand, most people receive water that is diverted from rivers into a piped network (3). Worldwide, only 5 out of 10 people have some kind of connection to a piped water supply in their homes. Two out of 10 people don't have any access to a treated water supply<sup>12</sup>.

### Water collection areas in Wellington

We are fortunate that almost all of the people living in the greater Wellington region are connected to a piped water supply to their homes. The Wairarapa and the Kapiti Coast have their own local water supplied by their district councils.

In the four metropolitan cities (Lower Hutt, Porirua, Upper Hutt, and Wellington), the pipe network receives water from three places and distributes it to our taps.

- 40% of this water comes from the Hutt Water Collection Area
- 20% comes from the Wainuiomata/Orongorongo Water Collection Area
- 40% comes from eight wells at Waterloo which pump water from the Waiwhetu Aquifer

### Water supply to different suburbs

Usually, water collected in certain areas is supplied to certain suburbs. However, our water supply system is flexible in that water from one area can be supplied to another area if needed. This generally happens when maintenance is being carried out on the pipe network or when a water treatment plant has been shutdown (due to dirty river conditions after heavy rain or for maintenance).

<sup>12</sup> World Business Council for Sustainable Development. n.d. Facts and Trends: Water. Geneva: WBCSD. URL: <http://www.wbcsd.org/web/projects/water/Water%20Facts%20and%20Trends%20-PPT.pdf> Retrieved June 2010.



## The Hutt Water Collection Area

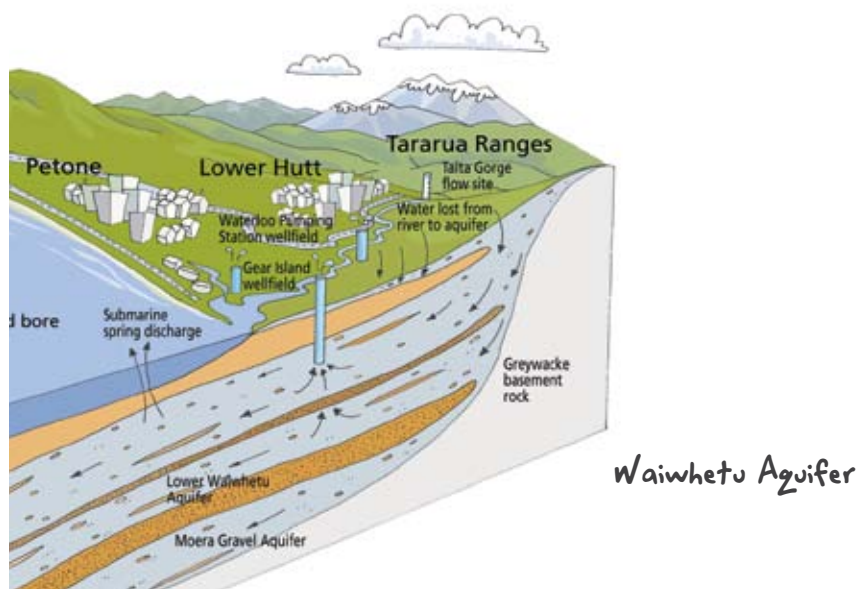
The **Hutt Water Collection Area** is in the hills behind Kaitoke. Water runs off the hills and into streams, collecting naturally in the Hutt River. There is a weir (a small dam) in the river that raises the level of the water. A small proportion of the water from the river is diverted into an intake pipe at the centre of the weir. From the weir, the water is piped to the **Te Marua Water Treatment Plant** and distributed to **Upper Hutt, Manor Park, Stokes Valley, Porirua and the Wellington City western suburbs** (*the area shown in red in the poster 'Greater Wellington's bulk water supply network'*). Some of the water from the weir is also stored in the water storage lakes at Te Marua.

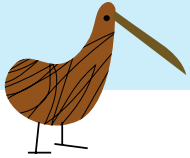
## The Wainuiomata/Orongorongo Water Collection Area

Water from the hills behind Wainuiomata collects naturally in the Wainuiomata and Orongorongo rivers. Weirs raise the level of these and other rivers for the intake pipes, diverting some of the water into the pipe system. The diverted water passes through to the **Wainuiomata Water Treatment Plant** before being distributed to **Wainuiomata** (*the area shown in blue*), the **Wellington City Business District** and the **southern and eastern suburbs of Wellington City** (*the area shown in blue and yellow stripes*).

## The Waiwhetu Aquifer

The remaining water for Wellington's four metropolitan cities comes from the **Waiwhetu Aquifer**, which is located under **Lower Hutt**. Eight wells pump water from the aquifer to the **Waterloo Treatment Plant**. This water is distributed to **Lower Hutt** (*the area shown in yellow*), except for Stokes Valley and Manor Park, and is *mixed with water from Wainuiomata* to help supply the **Wellington City Business District** and the **southern and eastern suburbs of Wellington City** (*the area shown in blue and yellow stripes*).





## 3:1 Our water supply – learning experience

### Learning intentions



#### Students will:

Understand how drinking water is collected for Wellington's water supply

Identify where their drinking water is collected from

### Success criteria



#### Students can:

Show where their water is collected from and what path it takes on a map of Wellington

Explain how water is collected at the water collection areas

### Resources



**Poster** Greater Wellington's bulk water supply network

**BLM 3a** The source of our drinking water

## Learning experience

- Share learning intentions and success criteria
- Turn on a tap in the classroom. Ask students if they know where the water in the tap comes from. Discuss their ideas
- Explain that water from the tap originally comes from one of three water collection areas; the weir at Kaitoke in the Hutt River, the weirs in the Wainuiomata and Orongorongo rivers or the wells into the Waiwhetu Aquifer. (*This will depend on where your school is located – see teacher notes and the poster*)
- Display the poster 'Greater Wellington's bulk water supply network' and identify the water collection areas. Explain how water is collected; briefly explain how a weir works and how wells access water from an aquifer (*see teacher notes*). Explain that this poster only shows the bulk water network. The city council's water supply network takes over at the reservoirs shown and delivers the water the rest of the way to your taps (*see page 50 – 3.2. Water's journey to our taps for more information*)
- Hand out BLM 3a. Draw attention again to the water collection areas, and emphasise the one which provides water to your school. Mention the pipes which carry the water from the water collection area to the suburbs. Ask students to highlight the appropriate water collection area and attempt to trace the path of the pipes from this area to the suburb where your school is. Use the poster as a guide
- Ask if any students are not on town supply and discuss alternatives to town supply

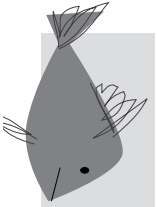
*As an extension, students could also trace the pipe network from the water collection areas to their home/Wellington zoo/the airport or other familiar landmarks.*

## Reflection questions

- What is an intake pipe? *An intake pipe is a pipe in the weir which takes water in from the river to be delivered to the water treatment plant*
- What would happen if there was no water available at one of the water collection areas? *Water from another water collection area would be used. The pipe network is designed to be able to deliver water from most water collection areas to most suburbs*

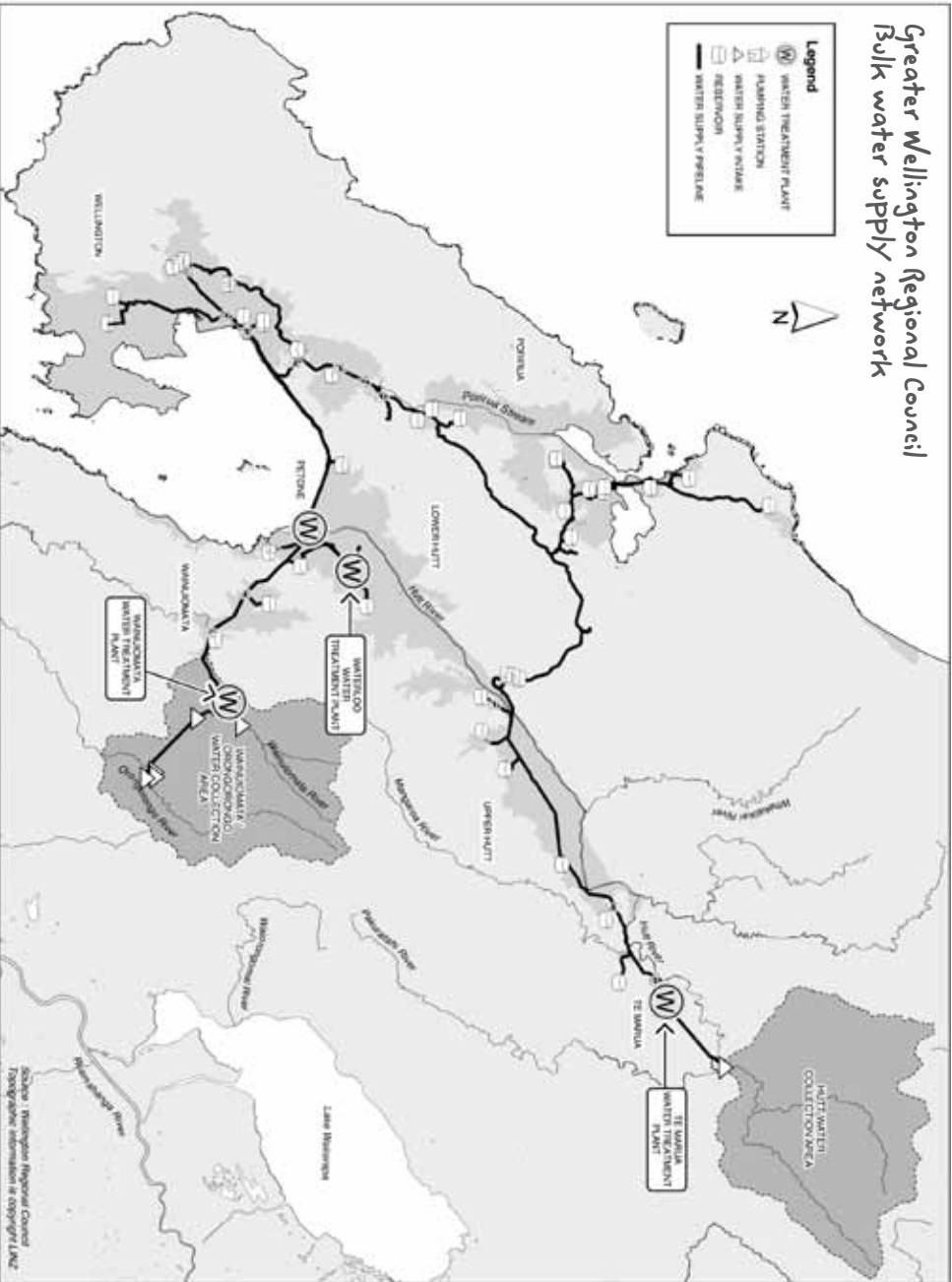
## Vocabulary

- water collection area
- Wainuiomata
- Orongorongo
- Waiwhetu
- Kaitoke



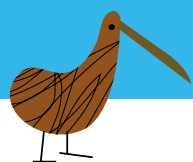
## BLM 3a: The source of our drinking water

Colour in the water collection area(s) where your drinking water comes from. Trace the path(s) of the main pipes from the water collection area to your school.



How is water collected from this area?  
(explain in your own words)





## 3:2 Water's journey to our taps – teacher notes



### Curriculum links



#### **Social Sciences: Level 4**

Understand how producers and consumers exercise their rights and meet their responsibilities

#### **Technology: Level 3** **Nature of Technology:**

*Characteristics of Technology:*

Understand how society and environments impact on and are influenced by technology in historical and contemporary contexts and that technological knowledge is validated by successful function

#### **Other curriculum links:** **L 3 and 4**

**Social Sciences, Science –**  
*Investigating in Science*



### Education for sustainability concepts

*Interdependence/ Whanaungatanga:*

Everything and everyone in our world is connected

*Sustainability/Hauora:* The choices we make today affect the choices we can make in the future

## Background knowledge

### Water's journey through the pipe network

From a water collection area (e.g. river/aquifer), water takes a complicated journey through a series of pipes before it finally ends up in our homes or workplaces. The combined councils' network (city and regional councils) has a total of 141 reservoirs and tanks, 77 pumping stations, and 2,478 kilometres of pipelines.

### The cost of providing water to Wellington

In 2010, it cost \$64,000 a day to manage the Greater Wellington (GW) part of that water supply network. This \$64,000 a day only gets our water to the 43 reservoirs that GW manages. It actually costs even more to get the water from these reservoirs to our taps because local councils also need to pay for running and maintaining their part of the water supply network.

### Water distribution

Most of the water supply network is underground, and we hardly ever see it. If you dug up the area around your house, you would find evidence of the pipe network and in some steep hillside suburbs, you might see some exposed pipes.

### Gravity and pumping water

The piped network operates with the help of gravity and pumping stations which boost the flow of water in the pipelines up hills. Gravity assists the flow of water downhill. See <http://www.sciencemadesimple.co.uk/page72g.html>.

Reservoirs store water on its way to residents, evening out differences in the amount of water being treated and the amount being used. Reservoirs can also be a supply of water when the main supply is disrupted.

### Maintenance

A network of meters and gauges monitor the flows and levels in reservoirs and pipes and let suppliers know if any maintenance is needed. Water delivery systems are complex and expensive to maintain.

### Water pipes

The photo on page 51 was taken at a home where some construction work was taking place. The two large pipes are the stormwater and wastewater/ sewer pipes. The water supply pipe is the small grey pipe on the far left.

Although you may think that our drinking water is really important and therefore would need a large pipe, this water supply pipe is only 15 mm (or 1.5 cm) in diameter. It connects to a larger water main pipe at the street. Water main pipes in streets are between 100-300 mm in diameter. The bulk water pipes from the water treatment plant are even bigger – the biggest pipes are 1050 mm in diameter.



## 3:2 Water's journey to our taps – learning experience



### Learning experience

- Share the learning intentions and success criteria
- Examine the pipes connected to the taps in the classroom and attempt to trace where they go next. Ask students how the water gets from the water collection area discussed in the previous learning experience to the taps at school or at home. *Encourage further detail than just the pipe network. If you are able to, view local examples of reservoirs, pumping stations and water pipes below ground*
- Explain that water has weight and is heavy. Use an example of a bucket filled with water to illustrate this. Invite students to try to lift the bucket full of water
- Explain that effort and energy is required to move water uphill (against gravity). Water will always try to flow downhill (with gravity). Ask students how the movement of water uphill might be possible. Briefly explain how pumps assist the process (see *teacher notes*)
- Ask students if they know who is responsible for delivering water to residents. (*Greater Wellington Regional Council provides the water and delivers it to reservoirs and the local council e.g Wellington City Council, purchases this water and delivers it to residents from reservoirs to taps*). <http://www.wellington.govt.nz/services/watersupply/index.html>
- Hand out BLM 3b. Point out the reservoir. Ask students to share their ideas about what a reservoir does (see *teacher notes for description*)
- Ask students to cut out the squares showing the stages of water's journey to our taps on BLM 3b and put them into the correct order. They could also record notes about each stage of the process
- Share answers on BLM 3b: *Answer sheet* and discuss

### Reflection questions

- If there was no town supply, how would you get water?  
*Answers will vary e.g. collect rainwater, emergency supplies*
- How do the councils know if there is a problem with the water supply network? (see *teacher notes*)

### Vocabulary

- gravity
- pumping station

#### Learning intentions



##### Students will:

Understand how drinking water gets from the water collection area to their taps

Identify who is responsible for delivering water to residents

#### Success criteria



##### Students can:

Order the steps in the process of delivering water from the water collection area to tap

Describe who is responsible for delivering their water

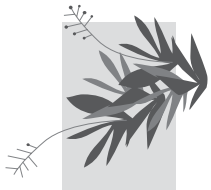
#### Resources



**BLM 3b** Water's journey from collection area to tap

Water supply pipe

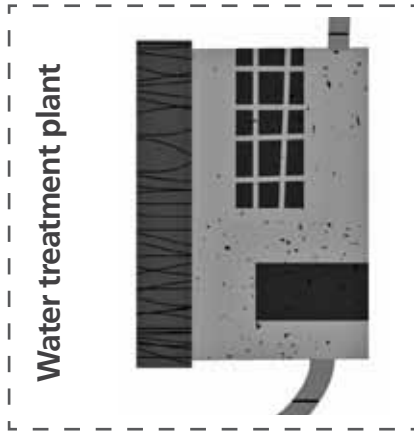
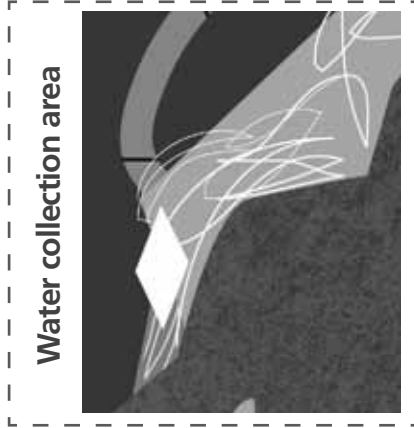
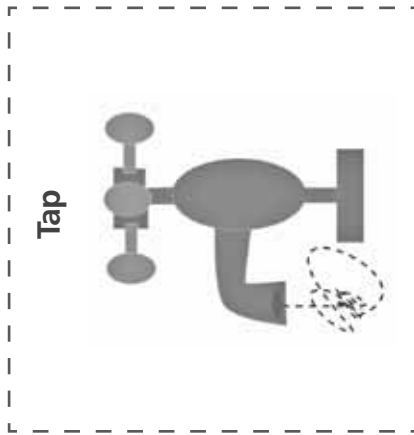
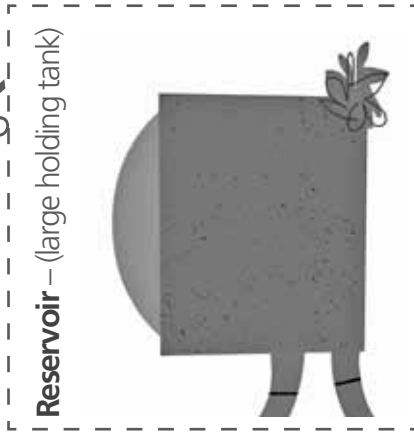
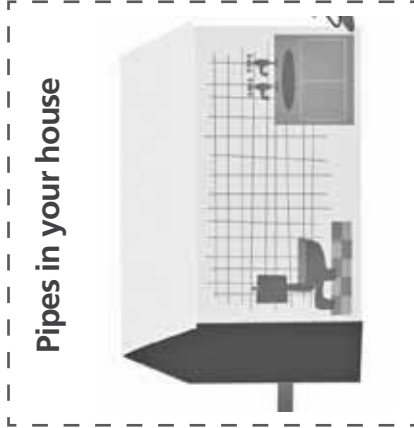
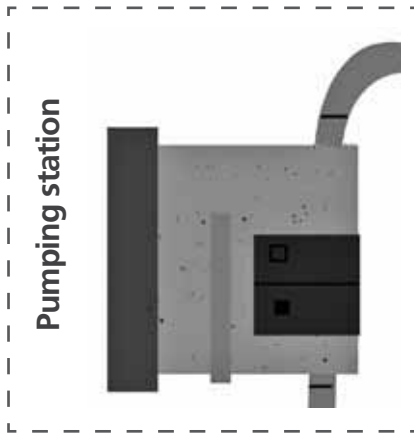


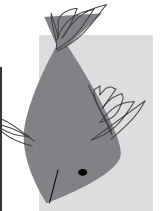


# BLM 3b: Water's journey from water collection area to tap

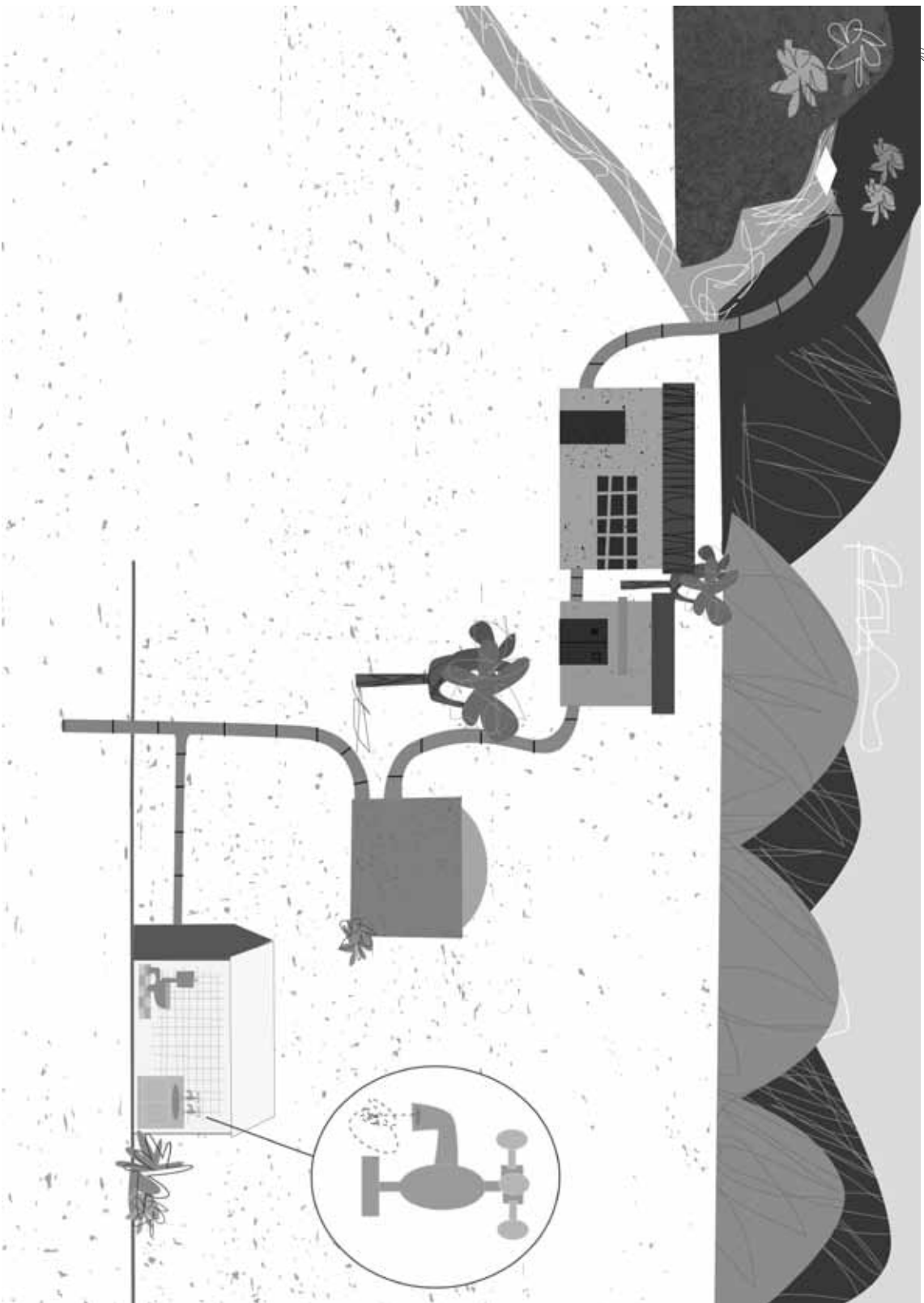
Cut out the cards below and arrange them in the correct order to show water's journey from the water collection area to the tap.

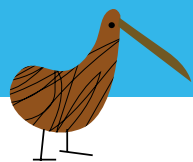
Explain each step of the journey in your own words.





**BLM 3b: Water's Journey from water collection area to tap: Answer sheet**





## 3:3 The right water in the right place – teacher notes



### Curriculum links

#### **Social Sciences: Level 3**

Understand how people make decisions about access to and use of resources

#### **Health: Level 3**

#### **Personal Health and Physical Development:**

##### *Safety management:*

Identify risks and their causes and describe safe practices to manage these

#### **Other curriculum links: L 3 and 4**

**Social Sciences, Science –**  
*Investigating in Science*



### Education for sustainability concepts

#### *Sustainability/Hauora:*

The choices we make today affect the choices we can make in the future

#### *Responsibility for Action/Kaitiakitanga:*

If we want to use taonga, we must look after the taonga. Taking action, informed decision-making, citizenship, consumerism, enterprise, resilience and regeneration

## Background knowledge

### Water quality

Water in the environment will always carry with it varying levels of impurities, such as metals, bacteria or organic matter. Sometimes we can see these impurities (e.g. dirt/grit), but often they are so small that the water could look perfectly clear and still be carrying them.

Water from different sources will contain differing levels of a variety of impurities, depending on the environment it has passed through. Some of these impurities can be harmful to our health.

### Greywater

Greywater can be defined as the left-over water from baths, showers, hand basins, and washing machines. It is not free from impurities like treated water. It can be contaminated with waste (e.g. soap, dirt). Greywater can be re-used on gardens or for outdoor use.

### Wastewater

Wastewater is water that has been contaminated with human waste and cannot be re-used. Wastewater enters the sewage system and is treated at a sewage treatment plant before being discharged.

### Wastewater hazards

Wastewater can contain bacteria, fungi, parasites or viruses that can cause serious infections in humans. It is not to be handled.

### Why re-use water?

Often people use treated, drinking-quality water for activities that don't require drinking-quality water, for example, watering the garden or flushing the toilet. In many countries it is common to re-use greywater for these purposes.

To ensure a steady supply of water for future generations and for a larger population we may need to start re-using greywater more in the future. A greywater recycling system cuts down demand for drinking water and reduces the pressure on our water supplies.

### Pressure on the water supply

The more water we use, the more 'pressure' we put on the water supply to meet our demands. If everyone used water carefully and used more water efficient appliances (washing machines, dual flush toilets etc) there would not be as much demand for water and the current water supply would be adequate.

## 3:3 The right water in the right place – learning experience



### Learning experience

Before beginning the activity, set up four glasses of water – treated, untreated, greywater, and wastewater\* (as described in resources on bottom right)

- Share the learning intentions and success criteria
- Display the four numbered glasses of water. Describe what treated water means and explain that one of the four glasses is treated water (out of the tap)
- Write a definition for treated water and record the definition
- Explain the differences between the other types of water (*untreated, greywater and wastewater*). Together write definitions of these types of water
- Ask students to guess which types of water are in each numbered glass. Ask them to justify their answers. *Reveal the contents of each glass. Discuss differences in appearance of each type of water*
- As a class, discuss the quality of the treated water that comes out of the tap. Ask students how we use water from the tap. Are there some activities that we use drinking-quality water for which don't need treated water? (e.g. should we use greywater instead of treated water for watering plants?)
- Hand out a copy of BLM 3c. Ask students to record the appearance and appropriate uses of each type of water
- Compare and discuss answers. Discuss appropriate uses of each type of water. Share examples

### Reflection questions

- What do we mean by pressure on the water supply? (*see teacher notes*)
- How much less water could we use from the water supply by re-using untreated water or greywater for some activities where we currently use tap water?
- Why can't we re-use wastewater? (*see teacher notes*)
- Why don't we use more rainwater or greywater now?

### Vocabulary

- greywater
- wastewater
- untreated
- impurities

#### Learning intentions

##### Students will:

Recognise the difference between treated water, untreated water, greywater and wastewater

Describe safe uses for the different types of water

##### Success criteria

##### Students can:

Describe the differences between treated water, untreated water, greywater and wastewater

Explain appropriate uses for these different types of water

#### Resources

**BLM 3c:** Types of water and their uses

##### Four clear glasses containing water:

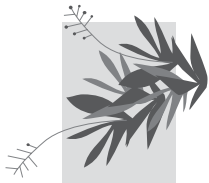
**1. Treated water** (from the tap/bottled water)

**2. Untreated water** (from a stream or rainwater tank or other source)

**3. Greywater** (water that has been used to wash hands or from other washing activity)



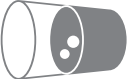
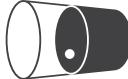
**4. 'Wastewater'\*** (a teaspoon of dirt mixed with tap water to simulate wastewater)

**\*DO NOT use real wastewater**



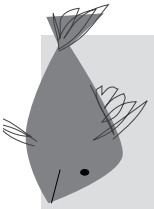
## BLM 3c: Types of water and their uses

Describe the appearance of each type of water and give examples of the types of activities you could use it for in the table below:

Type of water	Description	Appearance	Quality	Possible use
<b>A: Treated water</b> 	Water that has been treated and/or filtered and is safe to drink		Clean, healthy water containing no bacteria, viruses or harmful minerals	
<b>B: Untreated water</b> 	Fresh water, such as rainwater, collected from a roof or water from a stream or river. Water that has not been treated and could possibly contain bugs or other impurities		Probably healthy water. Usually safe for drinking	
<b>C: Grey water</b> 	Greywater is water that is left after washing clothes, dishes, baths or showers. It may contain bugs that make it unsuitable for drinking but can still be used for things like watering gardens. It is not fresh but not seriously polluted		Probably unhealthy water, not safe to use for drinking	
<b>D: Wastewater</b> 	Wastewater from toilets, containing human waste, that cannot be used again and must be treated to remove contaminants before it can go back into the water system		Unhealthy water, definitely not safe to use for drinking, probably contains waste	

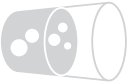
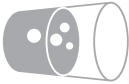
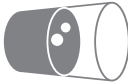
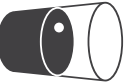






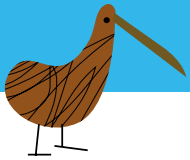
## BLM 3c: Types of water and their uses: Answer sheet

Describe the appearance of each type of water and give examples of the types of activities you could use it for in the table below:

Type of water	Description	Appearance	Quality	Possible use
<b>A: Treated water</b> 	Water that has been treated and/or filtered and is safe to drink	Clear, no colour or impurities	Clean, healthy water containing no bacteria, viruses or harmful minerals	Drinking, washing the dishes, cooking, showering/bathing, washing hands
<b>B: Untreated water</b> 	Fresh water, such as rainwater, collected from a roof or water from a stream or river. Water that has not been treated and could possibly contain bugs or other impurities	May be clear or slightly coloured. May have impurities	Probably healthy water. Usually safe for drinking	Washing clothes, cleaning, filling the pool, drinking (after being boiled)
<b>C: Grey water</b> 	Greywater is water that is left after washing clothes, dishes, baths or showers. It may contain bugs that make it unsuitable for drinking but can still be used for things like watering gardens. It is not fresh but not seriously polluted	May be grey in colour or cloudy. Likely to have some impurities	Probably unhealthy water, not safe to use for drinking	Flushing toilets, watering the garden, cleaning the car
<b>D: Wastewater</b> 	Wastewater from toilets, containing human waste, that cannot be used again and must be treated to remove contaminants before it can go back into the water system	Dark or dirty in appearance, will contain impurities	Unhealthy water, definitely not safe to use for drinking, probably contains waste	No suitable use. Should be put into sewage system for treatment







## 3:4 No water supply for a day – teacher notes



### Curriculum links



**Health: Level 3**  
**Personal Health and Physical Development:**

*Safety management:*  
Identify risks and their causes and describe safe practices to manage these

**Social Sciences: Level 4**

Understand how people participate individually and collectively in response to community challenges

**Other curriculum links:**  
**L 3 and 4**  
**Social Sciences**



### Education for sustainability concepts

*Interdependence/*

*Whanaungatanga:*

Everything and everyone in our world is connected

*Sustainability/Hauora:*

The choices we make today affect the choices we can make in the future

## Background knowledge

### Water supply issues

We can easily take our water supply for granted. Because the water supply network is so complex and widespread, it is vulnerable to a variety of potential problems. A natural disaster of any kind or a severe weather event can disrupt water services.

### How could an earthquake affect our water supply?

An earthquake is usually the result of tectonic plates moving and colliding, causing shaking and movement. The water supply network in Wellington crosses faultlines many times. There may be severe damage to some parts of the network in an earthquake.

### Be prepared before a disaster

Being prepared for a disaster like an earthquake is a particular concern in Wellington because of the many faultlines running through the city and surrounds and the vulnerability of these to disruption during an earthquake. After a natural disaster, demand for help from agencies like the Civil Defence will be overwhelming. Therefore, it is up to individual households to prepare for the possibility that they may not have water or food available for several days. In a severe earthquake it may even take several weeks or months to restore water to all homes. It is important that everyone prepares for this possibility. Students should consider how their families would be prepared for a disaster. They should ideally have a family emergency plan and an emergency kit including food and water.

### Emergency water supplies

Schools are required to have at least 4 litres of water on hand per person per day when a public supply is not available. Homes should have enough emergency water stored for at least 3 litres of water per person for at least 3 days. This amount is just for drinking. More water should be stored for cooking and personal hygiene. Stored water should be replaced every year.

### What should we do during an earthquake?

In an earthquake, it is advised to take no more than a few steps and *drop, cover, and hold*. It is recommended that students shelter underneath a strong table or beside an interior wall.

**More information about emergency preparedness is available at:**

<http://www.whatstheplanstan.govt.nz/earthquake.html>

<http://www.gw.govt.nz/3-step-emergency-plan/>

## 3:4 No water supply for a day – learning experience



### Learning experience

- Share the learning intentions and success criteria
- Explain to students that they are about to hear a fictional scenario about an earthquake. The earthquake has not really happened. It is only a scenario to help them learn about how to prepare for the possibility of a natural disaster
- Read the fictional news report and earthquake scenario on BLM 3d to the students. Clarify the scenario and answer any questions
- Discuss what an earthquake is. What should students do during an earthquake? See: <http://www.whatstheplanstan.govt.nz/earthquake.html>
- Explain to students that they will be responsible for organising how the emergency water supplies are used in their homes. If you have emergency water bottles, display these for effect. (*In a real emergency, students would be picked up from school where possible*)
- Share the other information on BLM 3d. Discuss how much water is required for each activity and share ideas about how they would use the 6 litres a day per person
- Together with the students, decide which water uses would be the highest priority during an emergency situation and which would be the lowest priority
- Reassure students that there has not been an earthquake and that they are safe
- Now that you have explored the possibility that one day there may be a natural disaster, investigate how prepared people are at school and at home for the possibility of such an event
- Ask school staff and the principal whether there are emergency water supplies at the school. Discuss findings
- Ask students if they are prepared for a natural disaster at home. Explain that they should have water and food stored at home in case of emergency and a family plan for emergency situations

*As an extension, students could design an emergency survival plan for home or school.*

*For more information about the Wellington fault, including video footage see: <http://juliansrockandiceblog.blogspot.com/2010/05/wellington-fault-with-learnz.html>*

### Learning intentions

#### Students will:

Understand the possible effects of an earthquake on the water supply network

Plan the use of emergency water supplies during a natural disaster

### Success criteria

#### Students can:

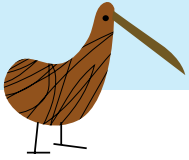
Describe how the water supply network may be affected by an earthquake or other natural disaster

Plan how they will use a limited supply of water during an emergency situation

### Resources

**BLM 3d** Earthquake scenario

Emergency water bottles



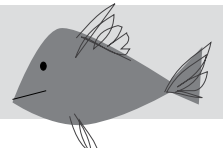
## Reflection questions

- How could we clean ourselves if there is very little water? *We would need to clean ourselves with a flannel and a small amount of water*
- How could the water supply be affected during an earthquake? *Shaking and movement of the ground may cause pipes to break*

## Vocabulary

- scenario
- fictional
- emergency
- disaster
- disrupted
- damage
- aftershocks

## BLM 3d: Earthquake scenario



### Fictional news report

At 9:15am this morning, an earthquake occurred on the Wellington faultline, near Upper Hutt. The earthquake measured 7.3 on the Richter scale and could be felt as far away as Taupo. During the earthquake, the ground was shaking for 50 seconds. The earthquake was followed by several aftershocks. More aftershocks are expected in the next few days.

Along the faultline, the ground rose up several metres. The enormous ground movements caused damage to buildings, pipes and cables. There is some damage to many buildings throughout Wellington city and Upper and Lower Hutt. Some buildings have had walls fall down and several roads have been damaged.

Police have said there is also damage to power lines, stormwater pipes and sewer lines. Some water supply pipes have also been disrupted. Because sewer lines and water pipes have ruptured there is a chance that the water supply might be polluted with waste from the wastewater system.

Major damage has been caused to water supply lines from two of the three water collection areas. These events have interfered with the water supply to most areas of Wellington city, and some areas of Lower Hutt and Porirua.

Residents are asked to not use the water supply until the pipes can be repaired. This may take up to a week. Water will be available from Civil Defence staff very shortly but in the meantime we ask that you use any emergency supplies of water that you have available.

### Scenario

Imagine that you have several containers of water stored for emergency situations at home. You have enough for 6 litres of water per person in your family for three days.

1. How would you use water differently in an emergency?
2. What would be a high priority for water use? What would be a low priority?  
List the activities you would use water for and rank them in order of importance. Use the chart below for ideas.

Water use	Amount of water used (litres)	Notes
Flushing toilet	6L full flush	Because sewage pipes may be damaged this should be done only when absolutely necessary
Using taps	10L per minute	
Washing dishes (by hand)	6L	
Drinking water	At least 3L per person per day	
Shower	15L per minute	A bath uses about 90L
Garden hose	15L per minute	
Washing machine	100L per load	
Cooking	About 1.5L per pot	

3. How could you adapt some of the water uses above so that you would use less water?

