

# SECONDARY SCHOOL STORMWATER NCEA RESOURCES

INTRODUCTION AND LEARNING PLAN

# INTRODUCTION

## What is stormwater?

Stormwater is rain water that flows across the ground and does not get absorbed into the soil. It flows into stormwater pipes, then into streams, and from there into estuaries and the sea.

The way the region manages its stormwater, particularly as it grows, will determine the quality and health of our freshwater and marine environment. One new person arrives in Auckland approximately every twelve minutes. Auckland is expected to have a population of 2 million people by 2030.

## What are some stormwater management issues in Auckland today?

- Stormwater run-off adversely affects Auckland's urban streams.
- Stormwater contaminants are accumulating in estuaries and enclosed harbours.
- Land development and soakage adversely affect groundwater aquifers.
- Flooding can have a major impact on stormwater quality as it can cause erosion.



## Why develop assessment tasks for secondary schools?

Auckland Council has produced this resource to work in partnership with schools and with the local community to help reduce the impact of stormwater on water quality in the region. These assessment tasks and activities, which have been trialed in Auckland secondary schools, provide a context for learning that engages students with their local communities and provides opportunities for in-depth learning that can result in students gaining several achievement standards. Teachers can choose one part to teach or can use stormwater or the stream as a context for developing scientific monitoring. This will allow students to use the data to inform action for the local environment. Students can also use their experience to explore different values around stormwater and develop this through to level 3, with continued action and/or working with organisations for strategic planning and long-term scientific monitoring.

The learning program has been based around developing action competence for sustainability.



[nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability](https://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability)

Action competence here is defined as students having the ability and willingness to take action on issues regarding stormwater and sustainability that interest them. We hope that you enjoy using this resource.



# WHAT'S IN THIS RESOURCE?



## Learning plan:

A programme of learning/a course outline for level 2 and level 3 NCEA qualifications.



## Assessment resources:

Four assessment resources for the Education for Sustainability achievement standards. This resource has editable sections for you to customise for your students.

Level 2			
AS 90810	<b>EfS 2.1 Storming the Waters! Stormwater action.</b> Undertake a personal action, with reflection, that contributes to a sustainable future.	6 credits	Internal
AS 90811	<b>EfS 2.2 Stormy Waters – The science of stormwater.</b> Explain how human activity in a biophysical environment has consequences for a sustainable future.	4 credits	Internal
AS 90813	<b>EfS 2.3 What's up in my stream?</b> Demonstrate understanding of how different personal values have implications for a sustainable future.	3 credits	Internal

  

Level 3			
AS 90832	<b>EfS 3.5 Stormwater Strategy- Stepping up for Stormwater.</b> Develop a strategy for an organisation that will contribute to a sustainable future.	5 credits	Internal

The Education for Sustainability (Efs) standards are integrated across all learning areas. They are on the NZQA framework and are part of the approved subject list.



[nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/education-for-sustainability/levels](https://nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/education-for-sustainability/levels)

Efs standards can be included in a range of different courses or can be added to students' learning programmes where appropriate assessment can be part of in-depth study or extra curricula action. The standards, which were developed in 2008 have been aligned. They sit in the sub-field of science.

The senior secondary guidelines are on Te Kete Ipurangi (TKI):



[seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability](https://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability)



## Ideas for a junior programme:

This resource also supports teachers of Year 9 and Year 10 classes planning to use stormwater as a context. It helps engage in science and develops understanding and skills on an authentic issue in their own community. The programme scaffolds learning to support sustainability topics in the senior school and provides links to topic outlines and resources.



[efs.tki.org.nz](https://efs.tki.org.nz)



## Resources and support materials:

These can be used to support your programme.

## How does this resource support the key competencies of the New Zealand Curriculum?

Action competence supports the development of the key competencies of the New Zealand Curriculum through the process of taking action.

In Education for Sustainability the six aspects listed below have been identified through research in New Zealand schools to support the development of student action competence.

(See: [tlri.org.nz/tlri-research/research-completed/school-sector/investigating-relationship-between-whole-school](http://tlri.org.nz/tlri-research/research-completed/school-sector/investigating-relationship-between-whole-school))

**Experience:** E.g. visiting local streams and stormwater outlets and working to gather data.

**Reflection:** E.g. incorporating reflective learning strategies associated with experience and learning.

**Knowledge:** E.g. focusing on EfS concepts and scientific ideas.

**Vision:** E.g. providing opportunities for the student to think of their community in the next ten (or forty) years.

**Action:** E.g. assessment opportunities for students to plan and implement actions to reduce stormwater run-off.

**Connections:** E.g. deliberate teaching to make links between people and the environment, knowledge and action, attitudes and responsibility.

### Contacts for support or further information

Auckland schools are invited to contact Auckland Council about further support.

Email: [efs.administration@aucklandcouncil.govt.nz](mailto:efs.administration@aucklandcouncil.govt.nz)

Visit: [aucklandcouncil.govt.nz/educationforsustainability](http://aucklandcouncil.govt.nz/educationforsustainability)

# LEARNING PLAN

## Teacher rationale

This document provides a learning plan for the NCEA assessments in this resource. For more details see the NZQA link below.



[nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/education-for-sustainability/levels/](https://nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/education-for-sustainability/levels/)

Both AS 90811 (EfS 2.2) and AS 90810 (EfS 2.1) could be done by a level 2 class in either a sustainable futures class, environmental science or geography. Students can use the scientific data from the EfS 2.2 assessment to inform the action of EfS 2.1. In both standards it is important for students to develop an understanding of 'sustainability' and the interdependence of the aspects of society, culture and economics with the environment.

Alternatively, each assessment could be done in different subjects in a cross disciplinary context, for example a film about the human consequences on a local stream for media studies to inform the community, or a speech in English to lobby support and action from the community for the stream, informed by data gathered in biology.

Students need to link the scientific data in the stream investigation to the future of the ecosystem, catchment, harbour and community. For the action standard, students will need to experience taking action and practice planning and evaluating. There is also opportunity at level 3 AS 90832 (EfS 3.5) to develop their action and their research in the biophysical environment by working with another stakeholder.

The learning experiences provided are just suggestions so these can be used in any order for any of the assessments or however is appropriate for your students. It is advised that students experience a range of reflective practice and cooperative strategies, as well as experiences in the environment and exposure to actions for sustainability. Some of the learning experiences for each standard overlap but there are specific learning outcomes for each standard. Teachers could use the context of stormwater for a range of learning experiences and then provide options for assessment opportunities.

Work on stormwater, stream monitoring and actions for sustainability could easily be linked to other NCEA assessments, for example in science, biology, geography, technology and media studies. See the EfS teaching and learning guidelines at:



[seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability/Learning-programme-design](https://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability/Learning-programme-design)

## Key competencies

These are developed through the learning program and are denoted in **green**. For example EfS 2.2 provides:

Using language symbols and text, managing self, thinking, relating to others, and participating and contributing.

The sample unit plan overleaf will help you to develop your unit about the impact of human activity on stormwater in Auckland catchments and the effects on the Hauraki Gulf and Manukau Harbour to support the level 2 and 3 EfS assessment resources provided below.

**Curriculum links:** Principle – future focus of sustainability, citizenship.

**Values:** Ecological sustainability, innovation, inquiry and curiosity, community and partnership.



# EFS: LEARNING PROGRAMME DESIGN

## Sample unit plan for an integrated Efs programme

### Education for Sustainability

How can rubbish recycling and composting be improved at our school? How can we preserve the aquatic ecosystem? Why is it important to create zones for biodiversity in urban areas? Do green businesses really make a profit?

### History

How has human settlement affected the environmental quality of the catchment over time? What famous people have lived in the catchment area? What is the Māori view on how the land of the catchment was formed?

### Health and physical education

What types of recreational activities are there around a waterway? How do people work best together to solve environmental problems?

**Urban stream catchments:  
Drains or sustainable ecosystems?**

### Geography

What are the urban planning opportunities in response to increasing population? What type of substances do people pour into the stormwater system?

### Mathematics and statistics

What is the area of land to be used?  
What are the descriptive statistics and margins of error associated with biophysical water quality data?  
How can we quantify the increase in biomass in a planted area?

### Science

What type of pollutants are entering the waterway?  
How is water quality measured?  
What types of native plants attract birds?  
What are the best environmental conditions for growing plants?  
What types and how many invertebrates live in the stream?

# CURRICULUM LEVEL 7

## Education for Sustainability

Three level 2 NCEA assessment tasks are available as part of this resource.

Students will gain knowledge, skills, and experience to:

- investigate how to enhance and maintain biophysical systems and improve biodiversity
- investigate the aspects of sustainability in different contexts
- examine the values and behaviours that will contribute to a sustainable future
- plan, implement, and evaluate personal action for a sustainable future.



[seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability/Learning-objectives](https://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability/Learning-objectives)

## Science

**Nature of Science (NOS):** Investigation in science, participating and contributing.

- **Living world:** Ecology – explain ecological distribution patterns and explain possible causes for these patterns.
- **Planet earth and beyond:** Earth systems and interacting systems.
- **Material world:** Apply knowledge of chemistry to explain aspects of the natural world.

## Geography

- Understand how people's perceptions of and interactions with natural and cultural environments differ and have changed over time.

## Technology

- Technological practice.

(Some lessons may take more than one period).

Learning intention	We are learning to use information to take meaningful action to reduce the impact of stormwater in our local environment.			Associated Achievement Standards
<p>Responsibility Action orientation Informed decision making Guardianship/ kaitiakitanga Citizenship Regeneration Diversity</p>	<p>EFS 2.1 Achievement Standard: 90810 Undertake a personal action, with reflection, that contributes to a sustainable future. Credits: 6 Internal Visit: <a href="https://nzqa.govt.nz/hcea/assessment/view-detailed.do?standardNumber=90810">nzqa.govt.nz/hcea/assessment/view-detailed.do?standardNumber=90810</a></p>	<p><b>Key concepts</b></p>	<p><b>Lesson outline</b></p>	<p><b>Resources</b> Activities in <b>BOLD</b> are included in this resource</p>
	<p><b>Possible learning experiences</b></p> <ul style="list-style-type: none"> <li>Connect with the local environment and stream and explore the health of the place where students live.</li> <li>Review stormwater impacts on the local stream and community.</li> </ul> <p><b>Managing self</b></p> <ul style="list-style-type: none"> <li>Identify economic, social, cultural and environmental consequences or influences using 'aspects template' or 'consequence wheel.'</li> <li>Discuss the relationship to a sustainable future; what are the options for stormwater in your community in 10 years and in 50 years?</li> </ul> <p><b>Thinking</b></p>	<p><b>Opportunities for students</b></p> <ul style="list-style-type: none"> <li>Experience their local stream and reflect on the meaning of the environment to themselves.</li> <li>Describe each aspect of sustainability in relation to stormwater and develop understanding on how they relate to each other.</li> </ul>	<p><b>Resources</b> Activities in <b>BOLD</b> are included in this resource</p> <p><b>Surface types and their effects on the environment</b></p> <p><b>Stormwater Aspects</b></p> <p><b>Consequence wheel</b> <a href="https://efs.tki.org.nz/Curriculum-resources-and-tools/Consequence-Wheel">efs.tki.org.nz/Curriculum-resources-and-tools/Consequence-Wheel</a></p> <p><b>Aspects template</b> <a href="https://nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability/Tools-and-resources">nzcurriculum.tki.org.nz/Curriculum-resources/Education-for-sustainability/Tools-and-resources</a></p>	
	<p><b>3. Investigate examples of stormwater actions</b></p> <p>Visit examples of different actions to reduce stormwater impacts on the land, ecosystem, community and harbour. Visit a restored stream, local community project or explore the Project Twin Streams website activity.</p>	<p>Realise that actions taken to improve stormwater into streams taken today affect the future.</p>	<p>Investigating Project Twin Streams <b>See Project Twin Streams case study</b> <a href="https://projecttwinstreams.com">projecttwinstreams.com</a></p>	

Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources	
Responsibility Action orientation Informed decision making Guardianship/ kaitiakitanga Citizenship Regeneration Diversity	4. Take part in an action for sustainability	<ul style="list-style-type: none"> <li>Work with your teacher or community group to model planning and taking action for sustainability with a fun class project e.g. take part in tree planting.</li> </ul> <p><b>Relating to others</b></p>	<ul style="list-style-type: none"> <li>Research knowledge of the issue, its cause(s), and a range of possible ways of acting on this issue.</li> <li>Practice skills needed for taking action.</li> </ul>	<b>Possible stormwater actions Activity</b>	
	5. Reflect on the experience and explore cooperative strategies	<ul style="list-style-type: none"> <li>Use the decision making grid to practice establishing criteria to evaluate action for a sustainable future. Did it make a difference? Why and why not?</li> <li>Brainstorm a range of actions using the activity sheet and possible action sheet. Use data collected from investigations to inform action.</li> </ul> <p><b>Participating and contributing</b></p>	<ul style="list-style-type: none"> <li>Trial evaluation tools and develop their understanding of a sustainable future.</li> </ul>	<b>Decision making grid</b> <a href="https://efs.tki.org.nz/Curriculum-resources-and-tools/Decision-Making-Grids">efs.tki.org.nz/Curriculum-resources-and-tools/Decision-Making-Grids</a>	
	6. Use information to plan for action	<ul style="list-style-type: none"> <li>Decide on one action and plan in a group or individually how to implement the action. Use an action planning template if it helps.</li> <li>Establish partners for support in actions.</li> <li>Students are supported to develop a definite timeline and establish roles and deadlines for actions.</li> </ul> <p><b>Managing self</b></p>	<ul style="list-style-type: none"> <li>To create a vision for a sustainable future in their community, waterways and harbour taking into account their own and others' attitudes and values.</li> <li>Take action to work towards their vision.</li> </ul>	<b>Action planning templates</b> <a href="https://efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner">efs.tki.org.nz/Curriculum-resources-and-tools/Action-Planner</a>  <b>SMART action planners</b>	
	7. Time to plan and take action (could take several weeks and/or holidays)	<ul style="list-style-type: none"> <li>Time to carry out actions – visiting site, ringing partners, finding resources, organising dates, participating in projects, reflecting on plans.</li> <li>Document plan, evidence of action and evaluations.</li> </ul>	<ul style="list-style-type: none"> <li>Work with other people for a sustainable future and reflect on collaboration.</li> <li>Experience how to plan an action using SMART.</li> <li>Implement their own action. Critically evaluate their action in regard to a sustainable future.</li> </ul>	<b>EfS 2.1 assessment task</b> Available at: <a href="https://aucklandcouncil.govt.nz">aucklandcouncil.govt.nz</a>	
	Collect evidence and write up assessment				

Learning intention	We are learning to use information to take meaningful action to reduce the impact of stormwater in our local environment.			Associated Achievement Standards
Possible assessments	<p><b>EFS 2.2 Achievement Standard: 90811</b>            Explain how human activity in a biophysical environment has consequences for a sustainable future.            Credits: 4 Internal  <a href="http://nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90811">Visit: nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90811</a></p>			Efs 2.4 Biology 2.1, 2.6 Chemistry 2.1
Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
Scientific monitoring Ecosystems Urbanisation Biodiversity Sustainability Interdependence Community Ecosystem Whanaungatanga	<p>1. <b>Introduce stormwater and mapping on GIS</b></p> <ul style="list-style-type: none"> <li>What is stormwater? Discuss the consequences of urbanisation as a human activity on stormwater in the local catchment. Take photos of nearby stormwater drains and outlets to streams – find the worst and submit to Sustainable Coastlines: <a href="http://sustainablecoastlines.org">sustainablecoastlines.org</a></li> <li>Use maps to identify a local stream and catchment. Identify land use that may impact on the waterway.</li> <li>Use GIS to identify stormwater outlets and look at change in land use over time. Describe human intervention with stormwater in an urban environment.</li> </ul> <p><b>Using language symbols and texts</b></p> <ul style="list-style-type: none"> <li>Describe the physical environment of the stream, stormwater and why it affects humans and the environment. Draw a map of the stream and label abiotic and biotic features. Annotate and mark stormwater outlets. Draw cross sections of the stream.</li> </ul> <p>2. <b>Visit to the stream and link to stormwater</b></p>	<ul style="list-style-type: none"> <li>Share prior knowledge about stormwater.</li> <li>Use maps and GIS to gain understanding of catchment, streams and land use.</li> <li>Explore the relationship between people, stormwater and streams.</li> <li>To use new terminology: catchment, stormwater, ecosystem, habitat, impermeable surfaces, permeable surfaces.</li> </ul>	<ul style="list-style-type: none"> <li>Connect with place and visit their local community.</li> <li>Experience an environment outside the classroom.</li> <li>Explain how the urban stormwater system impacts on the stream habitat of the catchment.</li> <li>Describe how the urban stormwater system picks up pollution which affects the culture of the local community.</li> </ul>	Activities in <b>BOLD</b> are included in this resource  <b>Stormwater mind map</b> American video <a href="https://www.youtube.com/watch?v=GrBEejjxaY&amp;feature=end-screen&amp;NR=1">youtube.com/watch?v=GrBEejjxaY&amp;feature=end-screen&amp;NR=1</a> Sustainable Coastlines <a href="http://loveyourcoast.org/learn/">loveyourcoast.org/learn/</a> GIS environmental monitoring <a href="http://aucklandcouncil.govt.nz/EN/ratesbuildingproperty/propertyinformation/GIS_maps/Pages/Home.aspx">aucklandcouncil.govt.nz/EN/ratesbuildingproperty/propertyinformation/GIS_maps/Pages/Home.aspx</a> <b>Surface types and their effect on the environment</b>
				Take photos of significant findings – collate photos. <b>Support material (AS 90811 Student field trip worksheet 1)</b>

Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
Scientific monitoring Ecosystems Urbanisation Biodiversity Sustainability Interdependence Community Ecosystem Whanaungatanga	<b>3. Water testing – Wai Care (biological and physical data)</b>	<ul style="list-style-type: none"> <li>Join Wai Care and collect data at the stream:               <ul style="list-style-type: none"> <li>temperature, clarity, flow</li> <li>pH, nitrates, phosphate, oxygen</li> <li>macro-invertebrates</li> <li>raise a fish trap.</li> </ul> </li> </ul> <p><b>Managing self</b></p>	<ul style="list-style-type: none"> <li>Collect robust scientific data from authentic site.</li> <li>Compare data from GIS website.</li> </ul>	Activities in <b>BOLD</b> are included in this resource  <b>Support material (AS 90811 Student field trip worksheet 2)</b> Data from websites – Wai Care <a href="http://waicare.org.nz">waicare.org.nz</a> Tools- Environmental Monitoring in maps. <a href="http://aucklandcouncil.govt.nz/aucklandcouncilviewer/">aucklandcouncil.govt.nz/aucklandcouncilviewer/</a>
	<b>4. The stream ecosystem</b>	<ul style="list-style-type: none"> <li>Investigate species at different sites.</li> <li>Develop understanding of species tolerance to indicate the health of the stream.</li> <li>Link change in habitats to stormwater.</li> <li>Watch DVDs.</li> <li>Research form and function of macroinvertebrates/fish/algae.</li> <li>Create a wetland/stream food web and compare to species that are found in your stream.</li> </ul>	<ul style="list-style-type: none"> <li>Interpret scientific data and connect cause and effect for changes related to stormwater.</li> <li>Identify impacts on the ecosystem caused by loss of habitat – diversity, abundance, exotic species.</li> <li>Use species names of organisms in ecosystems to understand interrelationships.</li> </ul>	Macroinvertebrate identity sheets <b>Stream/wetland food web experiential activity and food web cards</b> <b>DVDs (free to Auckland schools):</b> <i>'The Guardians of the Mauri' and 'Nga Kaitiaki o te Mauri'</i> <i>'Focus on Bugs'</i> DVDs available by emailing: <a href="mailto:efs.administration@aucklandcouncil.govt.nz">efs.administration@aucklandcouncil.govt.nz</a>
	<b>5. Interpreting stream data and stormwater</b>	<ul style="list-style-type: none"> <li>Investigate the reasons for changes in stream habitat and project future issues.</li> <li>Look at data over time for your site, compare with data from other sites from Auckland Council report cards and GIS environmental monitoring.</li> </ul> <p><b>Thinking</b></p>	<ul style="list-style-type: none"> <li>Use scientific data to make conclusions and comparisons.</li> <li>Understand the importance of science for measuring and providing information.</li> </ul>	Student data Stream report cards <a href="http://stateofauckland.aucklandcouncil.govt.nz/report-type/freshwater-report-card/">stateofauckland.aucklandcouncil.govt.nz/report-type/freshwater-report-card/</a>
	<b>6. Exploring sustainability</b>	<ul style="list-style-type: none"> <li>Explore the meaning of sustainability. Use the sustainability jigsaw to discuss aspects and interrelationships. Discuss how this environment could be sustainable now and in the future. Identify gaps in knowledge for research.</li> <li>Compare Tāmaki river case study and Māori perspective.</li> </ul>	<ul style="list-style-type: none"> <li>Use tools to illustrate aspects of sustainability and how they connect.</li> </ul>	<b>Sustainability jigsaw activity</b> <a href="http://efs.tki.org.nz/Curriculum-resources-and-tools/Sustainability-jigsaw">efs.tki.org.nz/Curriculum-resources-and-tools/Sustainability-jigsaw</a> <b>Aspects grid activity</b> <a href="http://efs.tki.org.nz/Curriculum-resources-and-tools/Aspects-of-Sustainability-a-graphic-organiser">efs.tki.org.nz/Curriculum-resources-and-tools/Aspects-of-Sustainability-a-graphic-organiser</a> <b>Tāmaki river case study/questions</b>

Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
Scientific monitoring Ecosystems Urbanisation Biodiversity Sustainability Interdependence Community Ecosystem Whanaungatanga	7. <b>Guest speakers</b>	<ul style="list-style-type: none"> <li>Invite guest speakers:               <ul style="list-style-type: none"> <li>- local iwi</li> <li>- Sustainable Coastlines to introduce the links between stormwater and the sea</li> <li>- stormwater engineer</li> <li>- freshwater scientist</li> <li>- community group</li> <li>- local industry.</li> </ul> </li> </ul> <p><b>Relating to others</b></p>	<ul style="list-style-type: none"> <li>Inquire into Māori perspectives of the local environment.</li> <li>To ask questions of experts from different perspectives and explore alternative cultural perspectives.</li> </ul>	Activities in <b>BOLD</b> are included in this resource  Auckland Council Local residents and whanau Community experts
	8. <b>Actions to improve stormwater impacts</b>	<ul style="list-style-type: none"> <li>Use posters, maps, powerpoint and websites to explore consequences of increased population, impermeable surfaces, land use and behaviour on stormwater and relate this to a sustainable future.</li> <li>Explain how urban planners have changed their perceptions of stormwater and streams and research stormwater management in relation to aspects of sustainability (environmental, social, economic, cultural).</li> </ul>	<ul style="list-style-type: none"> <li>Imagine the future and realise the changes that will occur with increased populations and other pressures.</li> <li>Realise that science informs decisions for the environment and humans.</li> </ul>	<b>Stormwater powerpoint</b> <a href="http://aucklandcouncil.govt.nz/EN/environmentwaste/stormwater/Pages/home.aspx">aucklandcouncil.govt.nz/EN/environmentwaste/stormwater/Pages/home.aspx</a>  <b>Stormwater poster</b> Available by emailing: <a href="mailto:efs.administration@aucklandcouncil.govt.nz">efs.administration@aucklandcouncil.govt.nz</a>
	9. <b>Visit stormwater management developments</b>	<ul style="list-style-type: none"> <li>Bus tour of local mitigation measures – constructed wetland, swales, permeable pavers, rain gardens and unsustainable practices.</li> </ul> <p><b>Participating and contributing</b></p>	<ul style="list-style-type: none"> <li>Explore what professionals in different careers are doing to provide the best options for stormwater.</li> </ul>	<a href="http://aucklandcouncil.govt.nz">aucklandcouncil.govt.nz</a>
	10. <b>Present findings to appropriate audience</b>	<ul style="list-style-type: none"> <li>Write a report for Auckland Council or your local board, create a documentary or scientific video to show the community.</li> </ul>		<b>Efs 2.2 task</b> Available at: <a href="http://aucklandcouncil.govt.nz">aucklandcouncil.govt.nz</a>

Learning intention	We are learning to use information to take meaningful action to reduce the impact of stormwater in our local environment.			Associated Achievement Standards
Possible assessments	<p>Efs 2.3 Achievement Standard 90813</p> <p>Demonstrate understanding of how different values have implications for a sustainable future.</p> <p>Credits: 3 Internal</p> <p>Visit: <a href="http://nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90813">nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90813</a></p>			<p>Efs 2.1, 2.2</p> <p>Biology 2.1, 2.6</p> <p>Chemistry 2.1</p> <p>Geography 2.2, 2.6</p> <p>Social Studies 2.2</p>
Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
<p>Values</p> <p>Economics</p> <p>Ecological sustainability</p> <p>Culture</p> <p>Society</p> <p>Environment</p> <p>Respect</p> <p>Kaitiakitanga</p> <p>Interdependence</p> <p>Equity</p> <p>Diversity</p>	1. What are values?	<ul style="list-style-type: none"> <li>Explore what values are and give examples.</li> <li>Investigate different value positions in different scenarios.</li> <li>Discuss student values.</li> </ul>	<ul style="list-style-type: none"> <li>Develop understanding of values, their own and others. Link values to sustainability.</li> </ul>	<p>NZC page 10 – values</p> <p>Tāmaki River case study</p>
	2 Establish prior knowledge about stormwater	<ul style="list-style-type: none"> <li>Mind map, KWL table, cooperative grid.</li> </ul>	<ul style="list-style-type: none"> <li>Share their knowledge about stormwater.</li> </ul>	<p>Stormwater mind map</p> <p><a href="http://efs.tki.org.nz/Curriculum-resources-and-tools/The-Cooperative-Learning-Grid">efs.tki.org.nz/Curriculum-resources-and-tools/The-Cooperative-Learning-Grid</a></p> <p>DVDs (free to Auckland schools):</p> <p>'The Guardians of the Mauri' and 'Nga Kaitiaki o te Mauri'</p> <p>'Focus on Bugs'</p> <p>DVDs available by emailing: <a href="mailto:efs.administration@aucklandcouncil.govt.nz">efs.administration@aucklandcouncil.govt.nz</a></p>
	3. Visit your community and local waterway	<ul style="list-style-type: none"> <li>Visit a local stream and include experiential activities to connect students with the place. E.g. sound log, capturing photos and reflection. Using pictures or words to describe the place.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss values in their local community and environment.</li> </ul>	<p><b>Sound log – record sounds.</b></p> <p>Magic spot – students reflect in silence and record with a picture/word or symbols.</p> <p>Human camera and reflective statements: "I see, I feel, I think..." Frame camera around things that students value.</p>
	4. Investigate local stream and stormwater impacts	<ul style="list-style-type: none"> <li>Use GIS to identify the catchment, the stream from source to sea, the changes in land use and impact of stormwater. How has the area changed over time and what is valued?</li> </ul>	<ul style="list-style-type: none"> <li>Use GIS viewer and the different overlays and functions to identify terrain, waterways, stormwater infrastructure and changes over time.</li> </ul>	<p>GIS environmental monitoring</p> <p><a href="http://aucklandcouncil.govt.nz/EN/ratesbuildingproperty/propertyinformation/GIS_maps/Home.aspx">aucklandcouncil.govt.nz/EN/ratesbuildingproperty/propertyinformation/GIS_maps/Home.aspx</a></p> <p><b>Surface types and their effect on the environment</b></p>

Learning intention	We are learning to use information to take meaningful action to reduce the impact of stormwater in our local environment.			Associated Achievement Standards
Possible assessments	<p>Efs 2.3 Achievement Standard 90813</p> <p>Demonstrate understanding of how different personal values have implications for a sustainable future.</p> <p>Credits: 3 Internal</p> <p>Visit: <a href="https://nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90813">nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90813</a></p>			<p>Efs 2.1, 2.2</p> <p>Biology 2.1, 2.6</p> <p>Chemistry 2.1</p> <p>Geography 2.2, 2.6</p> <p>Social Studies 2.2</p>
Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
Values	<p>5. Aspects of sustainability</p> <ul style="list-style-type: none"> <li>Use a sustainability model to make connections between the environment, society, culture and economics.</li> </ul>	<ul style="list-style-type: none"> <li>Compare a strong sustainability model and discuss aspects of sustainability in relation to stormwater.</li> </ul>	<p>Activities in <b>BOLD</b> are included in this resource</p> <p><b>Aspects of sustainability activity</b></p> <p><b>Stormwater posters</b> – alternative stormwater options. Posters available by emailing: <a href="mailto:efs.administration@aucklandcouncil.govt.nz">efs.administration@aucklandcouncil.govt.nz</a></p>	<p>For example; Freshwater scientist</p> <p>Property developer</p> <p>Council officer</p> <p>Local Iwi</p> <p>Landowner</p>
Economics	<p>6. Guest speakers</p> <ul style="list-style-type: none"> <li>invite speakers to class</li> <li>freshwater scientist</li> <li>stormwater engineer</li> <li>local kaumatua</li> <li>community groups</li> <li>Wai Care</li> <li>urban developer.</li> </ul>	<ul style="list-style-type: none"> <li>Identify people who could share different values and perspectives about waterways and how that affects decisions and action.</li> </ul>	<p><b>Consequence wheel template</b></p> <p><a href="https://efs.tki.org.nz/Curriculum-resources-and-tools/Consequence-Wheel">efs.tki.org.nz/Curriculum-resources-and-tools/Consequence-Wheel</a></p>	<p><b>Efs 2.4 task</b></p> <p>Available at: <a href="https://aucklandcouncil.govt.nz">aucklandcouncil.govt.nz</a></p>
Ecological sustainability	<p>7. Consequence wheel</p> <ul style="list-style-type: none"> <li>Use the consequence wheel to explore a range of values positions.</li> </ul>	<ul style="list-style-type: none"> <li>Relate values to possible outcomes.</li> </ul>		
Culture	<p>8. Assessment</p> <ul style="list-style-type: none"> <li>What's up in my stream?</li> </ul>			
Society				
Environment				
Respect				
Kaitiakitanga				
Interdependence				
Equity				
Diversity				

# CURRICULUM LEVEL 8

## Education for Sustainability

Auckland Council has generated this level 8 stormwater task in recognition of the critical role organisations play in stormwater outcomes. We really encourage you to take the lead in offering this task to your students. Where students do not have access to an organisation, the council can assist with finding an organisation for your students to work alongside.

- Evaluate social, economic, and technological measures that could be taken to sustain natural resources and improve biodiversity now and for the future.
- Analyse the impact of strategies and initiatives for a sustainable future.
- Analyse actions necessary for sustainability and plan, implement and critically evaluate a personal action for a sustainable future.

## Science

**Nature of Science (NOS):** Communicating in science, participating and contributing.

- **Planet earth and beyond:** Develop an in-depth understanding of the interrelationships between human activities and the hydrosphere and biosphere over time.
- **Geography:** Understand how people's diverse values and perceptions influence the environmental, social and economic decisions and responses they make.

Learning intention	We are learning to use information to take meaningful action to reduce the impact of stormwater in our local environment.			Associated Achievement Standards
Possible assessments	<p><b>EFS 3.5 Achievement Standard: 90832</b> Develop a strategy for an organisation that will contribute to a sustainable future.</p> <p><b>Credits: 5 Internal</b> <a href="http://www.nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90832">Visit: nzqa.govt.nz/ncea/assessment/view-detailed.do?standardNumber=90832</a></p>			<p>Geography 3.6 Chemistry 3.1 Technology 3.1, 3.2, 3.31</p>
Key concepts	<p><b>Lesson outline</b></p> <p><b>1. Research stormwater issues in relation to sustainability</b></p>	<p><b>Possible learning experiences</b></p> <ul style="list-style-type: none"> <li>Review your understanding of sustainability using new examples, case studies and activities to relate to stormwater.</li> <li>Compare a range of strategies and identify essential elements of strategy and what they mean (see assessment resource for examples).</li> </ul>	<p><b>Opportunities for students</b></p> <ul style="list-style-type: none"> <li>Make connections with all aspects of sustainability and stormwater.</li> <li>Gather an understanding of relevant contemporary ideas on stormwater to inform decisions.</li> </ul>	<p><b>Resources</b></p> <p>Activities in <b>BOLD</b> are included in this resource</p> <p><b>Support materials (AS 90832 Student activity. HGMP decision matrix for action and worksheets).</b></p> <p><a href="http://aucklandcouncil.govt.nz/EN/environmentwaste/stormwater/Pages/home.aspx">aucklandcouncil.govt.nz/EN/environmentwaste/stormwater/Pages/home.aspx</a></p> <p><a href="http://efs.tki.org.nz/Curriculum-resources-and-tools/Sustainable-Options">efs.tki.org.nz/Curriculum-resources-and-tools/Sustainable-Options</a></p> <p>Strategy</p> <p><a href="http://mfe.govt.nz/publications/urban/urban-toolkit-2009/html/page7.html">mfe.govt.nz/publications/urban/urban-toolkit-2009/html/page7.html</a></p>
Resilience Respect for all life Social justice Finite resources Intergenerational equity	<p><b>2. Visit relevant stormwater sites in your community</b></p>	<ul style="list-style-type: none"> <li>Visit stormwater outlets, streams and estuaries. Investigate the stormwater system on GIS.</li> </ul>	<ul style="list-style-type: none"> <li>Experience the environment where change could enhance the community.</li> </ul>	<p><b>Surface types and their effect on the environment</b></p> <p>Where students do not have access to an organisation, the council can assist with finding an organisation for your students to work alongside. Contact: <a href="mailto:efs.administration@aucklandcouncil.govt.nz">efs.administration@aucklandcouncil.govt.nz</a></p>
	<p><b>3. Identify organisations for partnerships and set up collaborative planning</b></p>	<ul style="list-style-type: none"> <li>Research possible stormwater issues and current ideas for reducing impacts.</li> <li>Model cooperative learning strategies and communication techniques.</li> </ul>	<ul style="list-style-type: none"> <li>Collaborate with outside partners to connect learning to authentic situations.</li> </ul>	
	<p><b>4. Research the organisation's impact on stormwater</b></p>	<ul style="list-style-type: none"> <li>Visit an organisation and discuss common goals for stormwater outcomes.</li> <li>Carry out a needs analysis to identify gaps and strengths.</li> </ul>	<ul style="list-style-type: none"> <li>Experience working with other members of the community.</li> </ul>	<p>PCE Fresh Water Quality in New Zealand <a href="http://pce.parliament.nz/assets/Uploads/PCE-Water-Quality-in-New-Zealand.pdf">pce.parliament.nz/assets/Uploads/PCE-Water-Quality-in-New-Zealand.pdf</a> Hauraki Gulf Forum Report</p>

Key concepts	Lesson outline	Possible learning experiences	Opportunities for students	Resources
Resilience Respect for all life Social justice Finite resources Intergenerational equity	5. Explore aspects of sustainability in relation to the organisation's practices	<ul style="list-style-type: none"> <li>Collaboratively decide on actions for a strategic plan.</li> </ul>	<ul style="list-style-type: none"> <li>Reflect on potential of working with organisations to take action.</li> </ul>	<p>Activities in <b>BOLD</b> are included in this resource</p> <p><b>Support materials (AS 90832 Student activity. Decision matrix).</b></p>
	6. Investigate strategies and how to develop/purpose	<ul style="list-style-type: none"> <li>Research possible outcomes and set targets/indicators to inform progress.</li> <li>Develop criteria for effective stormwater planning to use in an evaluation.</li> </ul>	<ul style="list-style-type: none"> <li>Develop understanding of strategies in order to support their ideas of planning.</li> </ul>	<p><a href="https://unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/">unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/</a></p> <p><b>Support materials (AS 90832 decision matrix)</b></p>
	7. Create visions for a sustainable future for local community	<ul style="list-style-type: none"> <li>Use role playing to envisage the future and how the local community and environment could be affected.</li> </ul>	<ul style="list-style-type: none"> <li>Imagine possible futures using new information and relate to a strategy that will create a better future.</li> </ul>	<p><b>Support materials (AS 90832 social marketing strategy)</b></p>
	8. Develop your strategy for presentation	<ul style="list-style-type: none"> <li>Develop strategy and present.</li> </ul>		
	9. Assessment			