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This document and appendices are available at http://www.eev.vic.edu.au/resources/school-as-catchment/

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1. INTRODUCTION TO THE RESOURCE KIT

During 2014, Environment Education Victoria (EEV) received a Victorian State Government grant to work with a school to reduce their stormwater run-off, ease pressure on local drainage and increase green space. EEV emailed every principal in the Western Metropolitan region, inviting them to partner in this project. Elizabeth Balharrie, Principal at Deer Park North Primary School (DPNPS) was the first to respond and was chosen to take part in this project.

DPNPS occupies approximately 2ha and currently has 374 students and 40 staff members. DPNPS is a ResourceSmart School, spending 2015 to work towards their Core and Energy Module certification. DPNPS is fortunate to have an enthusiastic and proactive Principal, a dedicated science and sustainability teacher and environment educator on staff. Artificial turf and large expanses of asphalt has resulted in a relatively impervious school campus, lacking in shade and natural areas for engagement. Project partner, Josh Byrne & Associates designed and oversaw the construction of several key areas of the grounds to begin the transformation of the school landscape.

A key element of the project was the production of this resource kit. The kit steps through the DPNPS journey, and includes all project documentation, landscape plans, design methodology and project costings as well as reflections and testimonials from project participants along with links to curriculum that demonstrate how the students are now involved in using these areas for learning.

This resource kit is not meant to be a step by step guide but rather a resource kit that contains detailed information presented in an easy to follow format for schools wanting to undertake a water catchment project to dip into and extract relevant information to guide their journey.

We hope you, whether you are a principal, teacher, facilities manager, sustainability coordinator, passionate parent and/or buildings and grounds committee member, are inspired to adapt these learnings to suit your local context to improve water catchment capacity and green space in your own school grounds.

“Having worked at Deer Park North Primary for over 25 years, the remarkable change to the school’s landscape in the last 12 months has been breathtaking. The enthusiasm engendered in the children by the creation of the new garden spaces has developed their sense of connection to the natural world.

Ross Dixon, Science and Sustainability Teacher

Ross Dixon
Science and Sustainability Teacher
2. PROJECT BACKGROUND

Located in Melbourne’s west, the DPNPS ‘School as a Catchment’ project demonstrates the value that educational institutions can play in better water management and sustainable urban landscaping. Supported by the Victorian State Government and delivered by Environment Education Victoria (EEV) and Josh Byrne & Associates, the project showcases integrated water management and urban greening via an on-ground demonstration project and a subsequent ‘School as a Catchment’ resource kit.

The management of urban water and the need for increased green space are two topical issues in Australia. Gardens and water are inherently linked, with green space well recognised for its role in the control and improvement of urban water impacts, through reducing stormwater runoff, flood mitigation, soil erosion and pollution loads.

A wealth of research has demonstrated the benefits of urban greening, most recognisably the environmental, water and air quality improvements, but also valuable social attributes such as improved aesthetics, mental wellbeing and physical health. Likewise there are a number of strong arguments for improved workplace and community productivity.

Water and vegetation are both recognised in reducing the urban heat island effect, which is where hard surfaces such as buildings, roads and concrete absorb heat causing them to be much warmer than surrounding vegetated areas. DPNPS is located within the City of Brimbank, where research has shown there is a very low amount of tree coverage and a high amount of bare ground. This project represents a school and local community based effort to address these issues.

The key partners involved in this project were Environment Education Victoria, Josh Byrne & Associates, Deer Park North Primary School, however there were many other supporters without whom this project would not have been completed successfully. They provided their time, expertise and in some cases free materials which all contributed to the project outcomes.

3. THE TRANSFORMATION FROM UNUSED CARPARK TO WETLAND

A wetland garden has replaced a previously unused carpark. Harsh, impervious concrete was replaced with a ‘dampland depression’ type constructed wetland for capturing and filtering stormwater runoff.

The area was planted with native rushes, sedges and grasses, as well as a selection of trees for shade and bird habitat. The existing 4m security fence was reduced in height and softened with native plantings to create a welcoming arrival.

For a detailed wetland drawing, see Appendix 2.

“
The school’s enthusiasm to this project has been electric. As a design team, the opportunities to transform the grounds into something special were clear from the outset. The fact that everyone was so keen to see it happen has been fantastic. The leadership shown has been inspiring.

Josh Byrne
Director,
Josh Byrne & Associates

”

April 2015
Large expanse of concrete in a disused carpark. Harsh security fencing.

September 2015
A reclaimed timber boardwalk allows access to the wetland area. Stormwater run off provides water for native plants.
3. THE TRANSFORMATION FROM UNUSED CARPARK TO WETLAND CONT...

“I like how the wetland catches water before it runs down into the gutters.”

Leon
Grade 5/6

“I am a student from Deer Park North Primary School and what I like about the garden is that everyone gets to go in and it’s peaceful. I am really looking forward to the wetland area to find new things to learn about.”

Tracey
Grade 5/6

“I am a green team member and we have learnt a lot about catchment in the garden and planted lots of plants in the garden.”

Taylah
Grade 5/6

April 2015

September 2015
Paved path provides access to wetland. Stormwater run off provides water for native plants.
The productive garden provides hands-on opportunities for students, staff and the local community to engage in organic food production in a dedicated and protected area for ease of management. Key components include rotational vegetable beds for seasonal cropping, including dedicated beds for universal access, trellised fruit trees under planted with a diverse array of herbs, flowers and other companion species. Composting systems including bays, bins and worm farms for processing organic material and an outdoor teaching space for holding classes. Irrigation is provided via a hydrozoned drip-line system fed from an existing rainwater tank, with mains water backup.

**April 2015**
Unused garden beds. Existing tank and pump were not set up correctly and were not collecting water.

**September 2015**
Raised timber garden beds for vegetables and herbs also provide informal classroom bench seating. Composting and irrigation systems complete the set up.
3. THE TRANSFORMATION
PRODUCTIVE GARDEN

A key element of this project was integrating the new physical environment to the teaching and learning program at DPNPS. Lesson sequences for Years 1&2 and Years 3&4 that have been developed so the garden spaces can be incorporated into the curriculum.

See page 14, Sample Lesson Plans.

"I am in green team and we have a garden full of plants and veggies. It's really cool seeing plants grow, day by day.

Eduardo
Grade 5/6"

"The way we grow the way we have a garden. We get a seed and plant it grows to a tree. P.S. I think the water garden is beautiful.

Zainab
Grade 5/6"

April 2015
Large expanse of underutilised space.

September 2015
Groups of plantings with similar water needs are irrigated on separate stations based on hydrozining principles. Water efficient drip irrigation installed throughout.
4. PROJECT TIMELINE

IN THE BEGINNING ...

A crucial first step for this project was the initial site inspection by Josh Byrne & Associates. Opportunities for landscape development and water management improvements were identified and discussed with the project team (DPNPS and EEV).

During this phase, key information was sourced from relevant authorities and stakeholders, including site plans and historical water use data from the school, and stormwater drainage plans from Brimbank City Council.

A Draft Master Plan and Integrated Water Systems Report was prepared and presented to the project team and key stakeholders, including Melbourne Water, City West Water, Brimbank City Council and Greening the West. Feedback was incorporated into the final designs.

The Integrated Water System Report (Appendix 3) and Master Plan (Appendix 1) were finalised. Detailed landscape plans and construction budgets were prepared for key areas to be built including the Community Hub area, wetland, productive garden and rain garden (see Appendices 1 and 2).

DPNPS Principal, DPNPS School Council and EEV were all involved in reviewing and approving the draft plans. DPNPS Principal provided the final sign off on the plans prior to construction commencing (see Appendices 1 and 2).
Given the scale and nature of the impact on the school grounds that this project entailed it was crucial to gain support from the teaching and learning staff as well as the broader community. The school community was provided with project updates through the school website, assemblies, newsletters and invitations to participate in activities. It was essential to keep everyone informed as to when contractors would be on site, which areas were out of bounds and when, and how the change would ultimately benefit the school. For key events such as the Community Planting Day additional volunteers were sought including the Green Army, Braybrook Secondary College students and Community Hub staff. The Community Hub is a community engagement initiative that operates onsite at DPNPS and is a key part of school community life. Braybrook College is a neighbouring secondary school that is considered a leader in sustainability in Victoria.

JBA were key in sourcing contractors for this project. JBA engineers completed the Integrated Water System Report, NewGrow was responsible for all the construction works, Warners Nursery and Diggers Seeds provided the materials and EEV contracted Ben Wrigley to photograph the site prior to construction, during the planting day and after project was completed. Investigate if there are skilled local contractors within your school community or even parents who are able to undertake particular elements or donate materials. Also, talk to your local nursery to see how they can be involved or if they can donate any plants or other materials.
ENGAGING STUDENTS IN THE PROCESS:
EEV spoke to the DPNPS Green Team during the consultation phase of the project to find out what they would like their school grounds to look like. The draft plans were also on display in the school reception area for the school community to view. Science and Sustainability teacher, Ross Dixon engaged the green team and greater school body; briefing them during every phase of the project.

COMMUNITY WORKING TOGETHER:
Staff, students, parents, project reference group members, project partners, The Green Army and Braybrook Secondary College students participated in a community planting day which resulted in a vegetated wetland, Community Hub and productive garden.

KEEPING ON TRACK:
For a large project of this nature it’s important to check in regularly to ensure progress stays on track. Project partners, including EEV, JBA and DPNPS held monthly progress meetings and NewGrow provided regular updates via phone and photographs. EEV prepared regular progress reports for the Victorian State Government throughout the project and phoned and visited the school on a number of occasions to ensure the project was on track. Representatives from JBA also visited DPNPS during the planning phase and to monitor progress on site.
The major construction works were completed during the school holiday periods to reduce the impact on staff and students. During Term’s 2 and 3, the areas under construction were fenced off to ensure the safety of students.

An automated irrigation system has been installed to ensure all plants are sufficiently watered. This reduces the demand on teachers, students or parents to water manually during weekends and school holiday periods. Crop rotation and soil nutrition is the responsibility of the science/sustainability and environmental educator at DPNPS.

A key element of this project was integrating the new physical environment to the teaching and learning program at DPNPS. To enable this to happen a new part-time Environmental Education Teacher position (0.4 FTE – 2 days per week) was created within the school to work alongside the Science/Sustainability Teacher (1.0 FTE – full time) to develop curriculum and support teachers to enable the integration of environmental education across all levels of the school.

See below for an overview of these positions, the role of the school’s Green Team in the project as well as some sample lesson sequences for Years 1&2 and Years 3&4 that have been developed so the garden spaces can be incorporated into the curriculum.
5. INTEGRATED ENVIRONMENTAL EDUCATION  
OVERVIEW OF ROLES

The **Environmental Education Teacher** position focuses on:
- maintaining and developing new garden spaces and programs
- supporting classroom teachers to deliver inquiry programs (in rooms, the new outdoor garden spaces and excursion programs)
- supporting teachers to plan and assess student learning at Professional Learning Teams (PLTs) and representing school at meetings and conferences
- whole school sustainability/ResourceSmart Schools progress.

Environmental Education Support includes:
- timetables for classes
- collaborative planning of support and advise teachers in PLTs
- integrate experiences in School As Catchment garden spaces such as the ‘Productive Garden’ and ‘Wetland’ with inquiry units.

The **Science and Sustainability Teacher** delivers relevant learning programs across all levels, which are linked to the four resource modules of ResourceSmart Schools. This builds the capacity of students to implement the actions and behaviours required to live sustainable lifestyles and complements the science skills and knowledge learnt in classroom based lessons.

The Environmental Education Teacher works with classroom teachers to integrate and support the delivery of outdoor and environmental education experiences in the school grounds, garden spaces and on excursions. These experiences support student achievement in inquiry learning, science, geography, literacy and numeracy learning programs.

**Green Team (students across Year 1 to 6)**
The DPNPS Green Team is made up of 30 students from Years 1-6. They are chosen at the start of each year based on their commitment and interest in aspects of sustainability.

Typically the Green Team are involved in and undertake planning and implementation of:
- Garden tasks/projects
- Waste and Energy projects
- Presenting at the Kids Teaching Kids conference at Derrimut PS in Sep 2015
- Preparation for the Kids Teaching Kids conference including incursions from Brimbank City Council in Aug and Sep 2015
- Helping out with school tours of the new gardens.
6. SAMPLE LESSON SEQUENCES

The following sample lesson sequences for Years 1&2 and Years 3&4 have been developed so the garden spaces can be incorporated into the curriculum. These units will be undertaken in Term 3, 2015. Units for Years Prep and 5&6 are in development and will be added to this kit as additional material when it becomes available.

YEAR 1/2 UNIT - WHAT MAKES WATER PRECIOUS?

LESSON 1
Concept Map
Complete water concept map by brainstorming key words for the unit based on film/documentary.

LESSON 2
Surfaces Around the School
Key words: surfaces, concrete, asphalt, roof, drain and mulch

Look at Google map of school (IWB)
What can we see from the air? – roof, artificial turf, concrete, paths, asphalt. These are ‘surfaces’ Some surfaces make water ‘run-off’ other ‘absorb’ water.

Go outside and investigate… Pour from a bucket of water to show water flow near drains. Is there litter nearby? What happens to the litter? Look at angle of roof, follow to water tank, then to the vegetable garden/wetland – flow through into irrigation. Water flows through plants like pipe/tube – roots to shoots. Students test a variety of surfaces to see which absorb and which run off pouring cups of water in pairs. Mark areas on Google map printout where rain would be absorbed (gardens, mulch area) and where it would run off (roofs, concrete).

LESSON 3
Excursion to Melbourne Sea Life Aquarium

LESSON 4
Salt and Freshwater Habitats
Review Melbourne Sea Life Aquarium excursion - what animals/habitats did you see? Discuss ‘Saltwater’ or ‘freshwater’ habitats? Water runs-off to drains, to rivers, to the ocean that is salty, like water at the beach.

Show bowl of freshwater (tap water). Where does salt in ocean come from? Discuss origin of salt and how it gets to shops. Mix salt into water to make saltwater. Salt dissolves. Then use coffee stirrers (broken in half) to dip and taste salt water and prove salt is still there.

How could we get the salt out of the water? Set up salt crystal experiment with jar, saltwater and string dipped into water and leave in windowsill in classroom for a week. Refer to [http://www.sciencekids.co.nz/projects/saltcrystals.html](http://www.sciencekids.co.nz/projects/saltcrystals.html) Visit wetland and compare with ‘Board of Works Wetland’ poster or similar. What is the difference? What will make it a habitat for animals? What is missing? Is it saltwater or freshwater? Why? Discovery Stations: posters, books (e.g. ‘Why is the sea salty?’), salt in jars, salt crystals and magnifiers.
YEAR 1/2 UNIT - WHAT MAKES WATER PRECIOUS?

LESSON 5

Local Animals
(based on Gould League ‘Food webs..’ p7 )

Review salt and freshwater…
(check prior salt experiment)

Habitats in the school?
Animals and plants are around the school?

What do you see at school?
Students identify animal/plant cards of animals they have seen in the local area or at school. Show Gould League ‘Urban birds’ poster or similar. Walk around school grounds with cards – where can/could these animals be found? List what we find. iPad to take photos/video of animals we see. Review what we found in circle time.

Option – use Museum Victoria Field Guide app

LESSON 6

Animal Classification and Drawing of Nature


Pass specimens around in circle. Explain gentle handling. Sort the animal specimens as a class into groups, such as birds, reptiles, mammals, amphibians, insects, based on the features of the specimens and other skeletons. Compare animals in school wetland and schoolyard.

Use IWB and search “scientific animal drawing”

Students draw specimens placed on desks/in groups. Model techniques and rules for scientific drawing (that is; using pencil, labels and drawing what you see). Students draw in journal/on paper.

Extension – computer/iPad research of animals.


LESSON 7

‘Plein Air’ Wetland/ Garden Drawing

Draw plants/animals they see in schoolyard and wetland.

Draw wetland with animals and plants they expect/hope to see. Use boards/books/paper.

Refer to ‘Board of Works Wetland’ and Gould League ‘Urban birds’ posters or similar.

Write names of animals/plants drawn. Option - create simple sentences e.g. “Magpies are …”

6. SAMPLE LESSON SEQUENCES
CONT...

YEAR 1/2 UNIT - WHAT MAKES WATER PRECIOUS?

LESSONS 8 - 10

Diorama Model Making

Collect boxes from home and paint blue at school.

Research habitats of animals to include in models.

Collect natural materials in brown paper bags from schoolyard. First, explain and guide students what sort of items to collect. Lead students to places around the schoolyard. Share ideas of what the materials could be used for in circle time, e.g. fine leaves for seaweed, small seeds for coral or cling wrap for jelly-fish.

Reflective Journal - throughout the duration of this unit students write in their reflective journals.

YEAR 3/4 UNIT - WHAT ARE WE EATING?

LESSON 1

Lunch Box Investigation

Students are to look through their lunch boxes and write/list what they can see in their lunch boxes over the week.

Students are to do a tally/graph of items in their lunch box every day.

A class graph is then to be done at the end of each day. Discuss the class graph with the students.


LESSON 2

Paired Interview

Students work in pairs to interview each other, each day about the following questions and ones they devise.

What did you eat for breakfast today?

What snacks did you eat after school yesterday?

What did you eat for dinner last night?

Students are to select one item from each meal that they have eaten. With their partner they are find pictures of their foods and are to research and find out information about the foods that they have eaten.
6. SAMPLE LESSON SEQUENCES CONT...

YEAR 3/4 UNIT - WHAT ARE WE EATING?

LESSON 3

Plant to Plate

Review what we eat for breakfast, lunch and dinner (refer to prior activity ‘Lunch Box Investigation’ and ‘Paired Interview’ or brainstorm). Are they plants or animals? Other??

Challenge - think of food/meal that does not come from plants or from animals that eat plants. Work some examples with the class and demonstrate with lines on IWB to show “farm to fork” or “paddock to plate.” Students choose food they like/have eaten recently/or from meal cards and draw line diagrams to show plant to plate sequence.

If we eat plants what parts of plant do we eat? …Go to garden and look, consider parts of plants. Show food cards – what part of the plant is that? Show seasonal cookbook – introduce concept of seasonal harvest. What will we cook with our seasonal harvest? (refer to plant list). Sample food plants if available.

LESSON 4

Plant Growth

Review - our food comes from plants.

In the productive garden, pose question - where plants get energy from? …sun/sol/solar system

Leaves use water, carbon dioxide and sunlight to make sugars.

Read Big Book – ‘Seeds Grow’

Use life cycle of plants flash cards and ask student volunteers to line up in order; “Seed, shoots, flowers, then fruits.” Create plant life cycles by drawing pictures of plants in garden on worksheet and show stages. Photograph plants with iPads/digital cameras.

Discovery Stations: seeds, leaves, flowers, fruits in jars/containers.

Option –watch seed germination YouTube videos.

LESSON 5

Food Plant Mini Posters

Use printed images from iPads from last session.

Stick on A4 ‘mini-poster’ and research growth stages/planting guide/ parts we eat/recipes or cooking/origins on iPads/ laptops in productive garden space/indoors in pairs/small groups. Write and draw facts on posters.

Share mini posters in circle time.

Extension: Plant study and some gardening tasks (subject to weather).
LESSONS 6-10

Healthy Menu and Food Packaging

Students are to design a ‘Healthy Menu’. The menu must include a meal for breakfast, lunch and dinner.

Students are also to create a healthy product of their own. This product must have a food label showing ingredients and intake. A cereal product or similar product with slogan could be created. Use rectangle box net to design the packaging for chosen product. Rubric opportunity to assess these tasks – students could self-assess according to rubric.

Reflective Journal - throughout the duration of this unit students write in their reflective journals.

Extension:
- Planting and gardening tasks throughout unit.
- Investigate cultural uses of food, religious meanings of food in different cultures. Consider recipes for food from different cultures. Plant significant cultural plants such as Vietnamese mint. Big Book “Fantastic Food”.
- Watch carnivorous plants on YouTube, time-lapse videos showing venus fly trap, pitcher plant & sundew.

Literacy:
Stories about food:
- ‘Magic Pudding’
- ‘Magic Pasta Pot’
- ‘Hansel and Gretel and Gingerbread House’
- ‘Little Red Hen’
- ‘Rosie Plants a Radish’ picture storybook
- Big Books ‘Food’ ‘Fantastic Food’ and ‘Seeds Grow’.

Excursions:
- CERES Community Environment Park
- Royal Botanic Gardens, Victoria
- Food processing plant or similar factory.
The following reflections from project participants provide a more personal picture of the project’s outcomes and significant changes made not just to the physical environment of the school but also the education and social elements and potential economic changes to the school made possible by this project.

“The school’s enthusiasm to this project has been electric. As a design team, the opportunities to transform the grounds into something special were clear from the outset. The fact that everyone was so keen to see it happen has been fantastic. The leadership shown has been inspiring.”

Josh Byrne
Director, Josh Byrne & Associates

“As a teacher with a background in environmental education I am privileged to be part of a school community, which shows such commitment to the education and wellbeing of its students by establishing a series of outdoor learning landscapes. The impact on the school has already been significant, as students appreciate the role of plants in our food systems and the importance of providing habitats for animals. It has been wonderful to see students’ joy in and enthusiasm for the natural world around them, renewed by the School As Catchment gardens spaces.”

Matthew Navaretti
Environmental Education Teacher

“The School as a Catchment Project has given me a greater awareness of water catchment on the school site and provided direction in maximising the effectiveness of our water collection systems. The project provided the opportunity to have existing water collection systems checked and to make informed decisions about improving the systems already in place. With some relatively simple and low cost adjustments we were able to increase the area of water collection for use on the school site.

I was surprised to learn that the water tanks and pumps that were in place were not actually functioning properly. In fact, the tanks were not necessarily located in the most suitable position.”

Elizabeth Balharrie
Principal, Deer Park North PS
PROJECT PARTNERS
• NewGrow
• Warners
• Diggers
• Ben Wrigley.

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• City West Water
• Brimbank Council
• Department of Education.

DOWNLOAD
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