

Sustainable Learning @ Calmsley Hill

Stage 4 Design & Technology

Sustainable Living

Fieldwork Excursion

This booklet is to be filled in throughout your fieldwork excursion to Calmsley Hill.

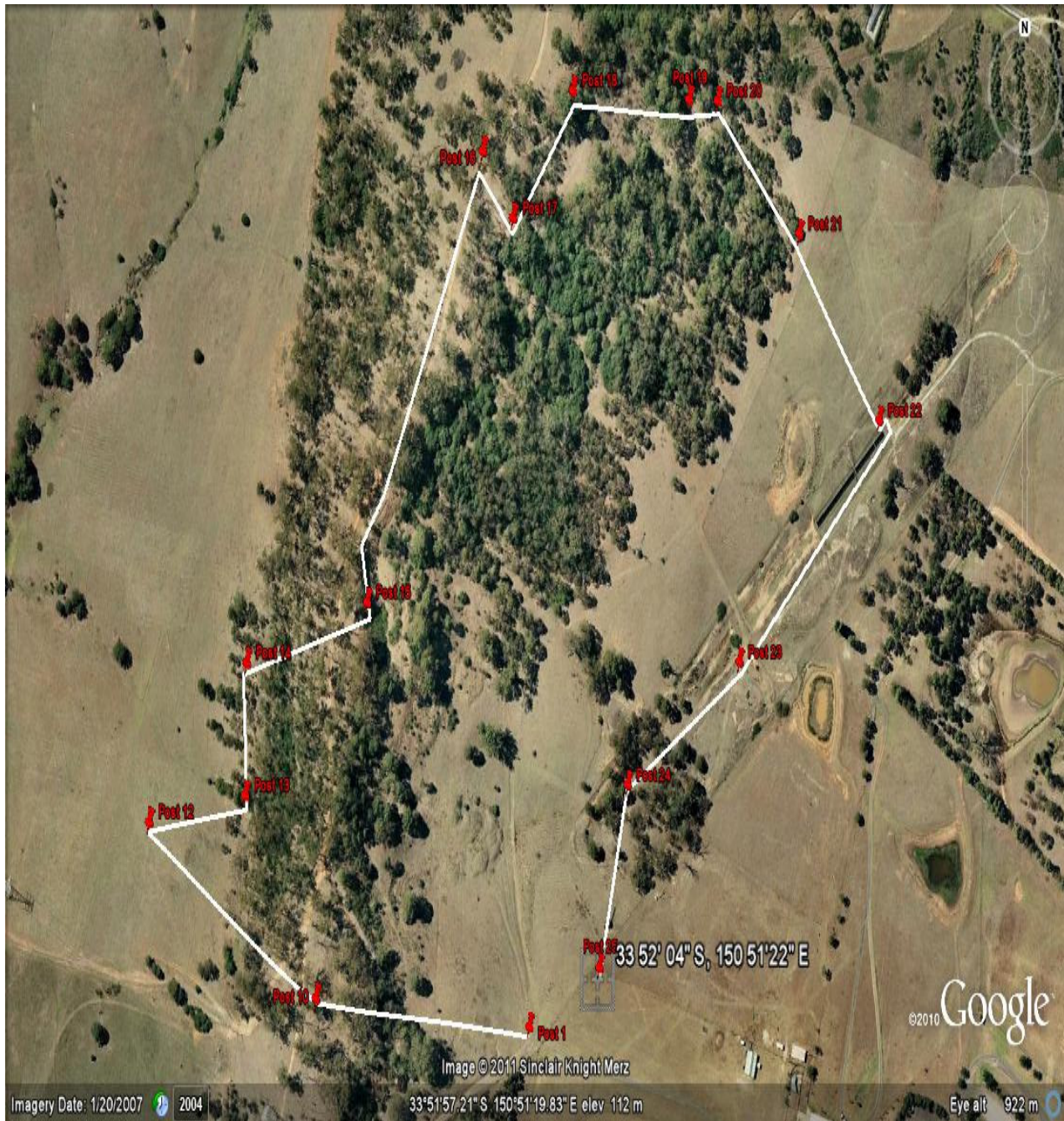
Syllabus outcomes:

4.1.1	<i>applies design processes that respond to needs and opportunities in each design project</i>
4.1.2	<i>describes factors influencing design in the areas of study of Built Environments, Products, and Information and Communications</i>
4.2.1	<i>generates and communicates creative design ideas and solutions</i>
4.3.1	<i>applies a broad range of contemporary and appropriate tools, materials and techniques with competence in the development of design projects</i>
4.4.1	<i>explains the impact of innovation and emerging technologies on society and the environment</i>
4.5.1	<i>applies management processes to successfully complete design projects</i>
4.6.2	<i>identifies and explains ethical, social, environmental and sustainability considerations related to design projects</i>

Rules of the Farm

- Listen carefully to the directions of your teachers and make sure you stay on the prescribed paths.
- Wear a hat, sun screen, sensible walking shoes and long socks &/or trousers
- Ensure to carry sufficient water a day's outing in the field
- Make sure all gates are closed after you go through them.
- Don't scare the farm animals
- Take all litter with you.

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Background

Calmsley Hill has a long human history. Aboriginal Australian oral history tells of the Cannemagal people [1] living in the region for thousands of the years. They were very much part of the land taking from it only what they required.

The European history of the area starts around 1795 when the Horsley Park Corridor was settled. The bulk of the current Calmsley Hill site was initially granted to Sir John Jamison who received 240 hectares in three separate grants in 1799, 1805 and 1809, which he named 'Calmsley Hill'

During the nineteenth century, the land was cleared and developed. Some of trees cleared during that period are still in evidence as seen by their ringbarked stumps in the hills behind the farm.

At around the turn of the twentieth century the canal that carries Sydney's water supply to Prospect Reservoir was constructed. The canal can be seen and is still functional today carrying water to the reservoir.

The property was then sold in 1947 to the Big Brother Movement, an organisation formed in the 1920s to help young British men migrate to Australia. Many of the existing buildings, dams and fences were built by the Big Brother Movement.

In 1971 the land was zoned as open space in the Sydney Region Outline Plan, and as a result of which the property was sold to the NSW Department of Environment and Planning who are the current owners.

[1] City of Sydney, 2002, Indigenous History of Sydney, [URL: <http://www.cityofsydney.nsw.gov.au/barani/themes/theme1.htm>], Accessed 20 May 2010.

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Calmsley Hill invites Design & Technology students and teachers to undertake field research on the property. We recognize designers draw inspiration and stimulus from their environment. The farm site provides a rich context to challenge students on the issues surrounding Sustainability facing society today.

The notion of Sustainability takes into account three key features: the economic, environmental and social impact of our lifestyle. The challenge for designers is to consider how these factors inter-relate.

To help our students focus on some the issues, the fieldwork tasks centre around considering four aspects of our day-to-day life and how they relate to the sustainability of our lifestyle.

The students consider the issues and problems relating to:

- Energy
- Land
- Waste
- Water

Students examine a range of historical solutions from early life in Sydney that exist at Calmsley Hill site, and consider what designs and technologies are needed to maintain a Sustainable lifestyle.

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Task 1: Energy – The noisy windmill

Location: Pond

4.1.2 describes factors influencing design in the areas of study of Built Environments, Products, and Information and Communications
 4.2.1 generates and communicates creative design ideas and solutions
 4.4.1 explains the impact of innovation and emerging technologies on society and the environment
 4.6.2 identifies and explains ethical, social, environmental and sustainability considerations related to design projects

Humans depend on energy to provide many of our “wants” and needs”. A comfortable house, reliable transport, entertainment, health services, and the list goes on. On the farm, the windmill is a cost-effective means for pumping water from the damn. However, the neighbours complain about the noise. Many farmers have similar complaints about larger wind farms built in the country side. As we develop clean energy solutions good for the environment, we face encounter other problems.

- Most of Sydney’s electricity is generated a long way out of the city. How does it reach our homes?

- Why do you think they build major electricity generators away from the city?

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- Why do we need to build new electricity generation that doesn't generate greenhouse gas emissions?

- What alternative technologies are available for generating electricity without burning coal or gas?

- Can we design electricity generators for use at home? List some examples.

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- What are the important design features needed for electricity generation at home?

- How could you generate electricity at your school?

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Task 2: Land – changing machinery used on the farm

Location: Behind Big Brother shed

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Over the years, our understanding of farming and impact on the environment has changed the way equipments has been designed and built. Tillage, or “working the soil”, is a very common operation on the farm. Technology has improved over the years to reduce the damage done to soil and the environment.

- Select and sketch a piece of machinery on display

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- Using the design process, analyse what is required for designing a piece of equipment used for tilling the soil

<ul style="list-style-type: none"> What do you need to design? 	
<ul style="list-style-type: none"> What does it need to do? 	
<ul style="list-style-type: none"> What problems do you see in using the technology 	
<ul style="list-style-type: none"> What opportunities exist if your equipment is successful 	
<ul style="list-style-type: none"> List features for a successful design 	
<ul style="list-style-type: none"> What research do you need to do before completing your design? 	

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Task 3: Waste - How do you measure Greenhouse gas emissions from animals

Location: Outside milking pen/cattle yard

4.1.1 *applies design processes that respond to needs and opportunities in each design project*
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 4.3.1 *applies a broad range of contemporary and appropriate tools, materials and techniques with competence in the development of design projects*

There is much debate about carbon pollution in the media. Scientists responsible for measuring greenhouse gas emissions need to calculate emissions coming from animals. How do they know how much gas comes from a cow? How do they collect the gas? Which end does it come from?

- Using the design process, analyse what is required for designing a piece of equipment to measure emissions from cows.

<ul style="list-style-type: none"> • What do you need to design? 	
<ul style="list-style-type: none"> • What does it need to do? 	
<ul style="list-style-type: none"> • What problems do you see in using the technology 	
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<ul style="list-style-type: none"> • List features for a successful design 	

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<ul style="list-style-type: none">• What research do you need to do before completing your design?	
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- Sketch and label your animal emission collector

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- Describe:

a. How would you test your device?

b. What risks are involved with your equipment

c. What material would you use

- School Activity - Use your design to construct a “prototype” emissions collector from **recycled** material.

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Task 4: Materials – Impact on the Cumberland Woodland

Location: Stump – Post 16

4.4.1 explains the impact of innovation and emerging technologies on society and the environment
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Since the first European settlement only 6% of the Cumberland Woodland now remains. Much of the woodland has made way for a growing Sydney and much of the wood was used to “build” that expansion.

- Trees are seen as a readily available resource for construction of buildings. What has happened to the Cumberland Woodland and other forests because of the need to house a growing population?

- What impact does the loss of resources such as woodlands have on communities and the environment?

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- Suggest ways to manage the supply of wood used in construction that do not harm the area.

- What materials do we now use in the construction industry?

- Describe any environmental issues that arise from using these alternatives materials.

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Task 5: Water – An engineering feat

Location: Sydney Catchment Authority water canal – Post 22

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The open water canal forms part of the innovative Upper Nepean Scheme and was Sydney's fourth source of water supply. Completed in 1888, the scheme diverted water from a series of weirs on the Cataract, Cordeaux, Avon and Nepean rivers to Prospect Reservoir via 64km of tunnels, canals and aqueducts collectively known as the Upper Canal. The Upper Canal System, which relies on gravity to divert water, was a remarkable feat of the time, and functions as efficiently today as it did more than 100 years ago.

- Describe the open canal. What are some of the key features?

- Consider the technologies available in 1888. List what equipment might have been used to construct the canal.

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- Describe what challenges were faced by the designers of the Upper Canal.

- Suggest where some of the materials used in construction were sourced.

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- Describe how the canal might have been constructed today. What problems would engineers face in 2011?
