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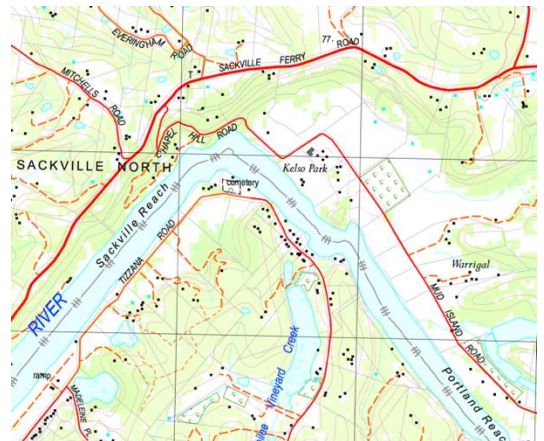
Class: .....

## Landscapes and landforms: Sackville North

The Hawkesbury Nepean River has been a vital part of our landscape for many thousands of years. It played a key role in the lives of Indigenous Dharug people living in the area, the early European settlers, and is important to many thousands of people today. This geographical inquiry will focus on the environmental and human processes that form and transform landscapes and landforms, with a particular focus on the Hawkesbury River at Sackville North.

### Inquiry questions:

- What are the dominant landforms that make up the landscape at Brewongle EEC and the Hawkesbury River at Sackville North?
- What environmental and human processes form and transform the landscape and landforms around the Hawkesbury River at Sackville North?
- Why do people value landscapes and landforms at Sackville North?



### Health and Safety Issues

As you are working out in the field you need to be aware that:

- Ground material is often covered in moss and can be very slippery.
- Vines and dense undergrowth can trip.
- Fallen trees can be rotten and weak.
- Some animals can deliver painful or venomous bites.
- On slopes, rocks can be easily dislodged.

### Outcomes

GE4-1: Locates and describes the diverse features and characteristics of a range of places and environments  
 GE4-2: Describes processes and influences that form and transform places and environments  
 GE4-4: Examines perspectives of people and organisations on a range of geographical issues  
 GE4-5: Discusses management of places and environments for their sustainability  
 GE4-7: Acquires and processes geographical information by selecting and using geographical tools for inquiry

### Inquiry aim:

The aim of this Geographical Inquiry is to investigate the landscapes and landforms of the Hawkesbury River Catchment at Sackville North.

To conduct your Geographical Inquiry, you will assess landforms and environmental elements at four different locations along a transect.

### Pre-visit activity one

SIX Maps has been developed by the NSW Department of Land and Property. It provides access to cadastral (land and property boundaries) and topographic (hills and valleys) information, satellite data and aerial photography. Use [SIX Maps](#) to complete the following tasks.

1. On SIX Maps, type in Sackville North.
2. Click on Basemaps (top right of page) and drag the tab down until you can see the Street and Suburb names.
3. Zoom out and fly around until you find your local Suburb.
4. Click on Basemaps and move the tab back up until you can see the satellite image.
5. Zoom out to a scale around 1:600 000 (you can see this in the bottom left of screen). Follow the Hawkesbury Nepean River upstream from the ocean to Warragamba Dam. By holding a piece of string to your computer screen, estimate the length of the Hawkesbury Nepean River.

### Definitions

1. What is a landscape? (Provide examples.)

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2. What is a landform? (Provide examples.)

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3. What is geomorphology?

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4. List 3 geomorphic processes

1. 

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2. 

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3. 

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4. What is topography?

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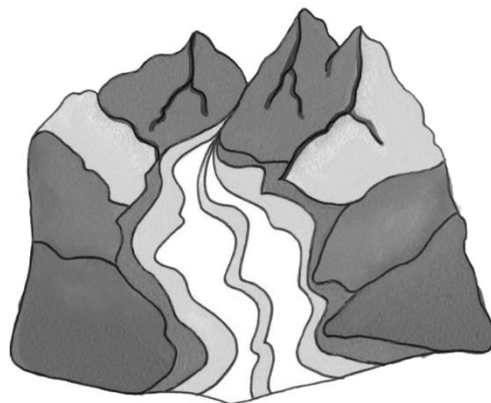
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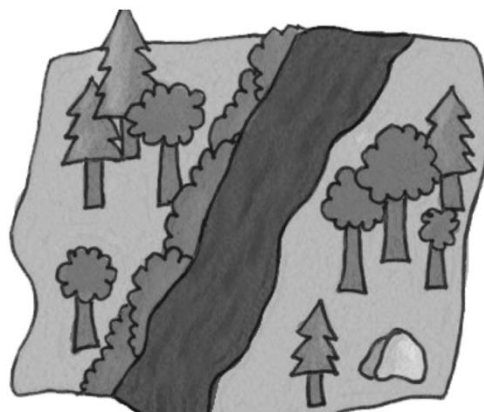
## Weathering

The breaking down or disintegration of substances such as rocks and minerals by physical, chemical, or biological processes



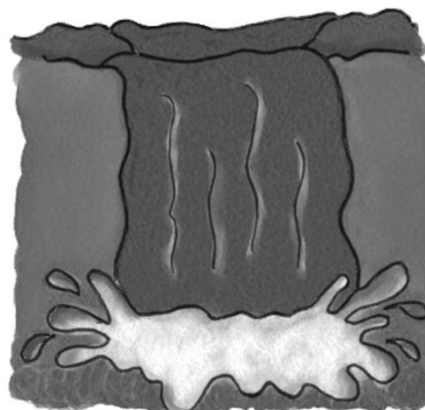
## Erosion

The movement of sediment or soil from one location to another by means of water, ice, or wind



## Deposition

When particles carried by water, ice, or wind are deposited (dropped) in another location



### Pre-visit activity two: Geographical questions

*Geographical questions are questions which help you identify the information you need to answer the inquiry questions. Your inquiry questions are written on Page 1.*

Brainstorm: What are some geographical questions you might ask for this Inquiry?

Example: Why might people choose to live in a specific area or suburb?

Geographical question 1: \_\_\_\_\_

\_\_\_\_\_

Geographical question 2: \_\_\_\_\_

\_\_\_\_\_

Geographical question 3: \_\_\_\_\_

\_\_\_\_\_

Geographical question 4: \_\_\_\_\_

\_\_\_\_\_

Geographical question 5: \_\_\_\_\_

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### Pre-visit activity three: Planning your inquiry

Answer the following questions for each of the geographical questions you came up with last lesson:

1. What information is needed to answer this geographical question and where can you find that information?

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2. What are the geographical tools you need to access the information?

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3. Develop a system for recording the information you get.

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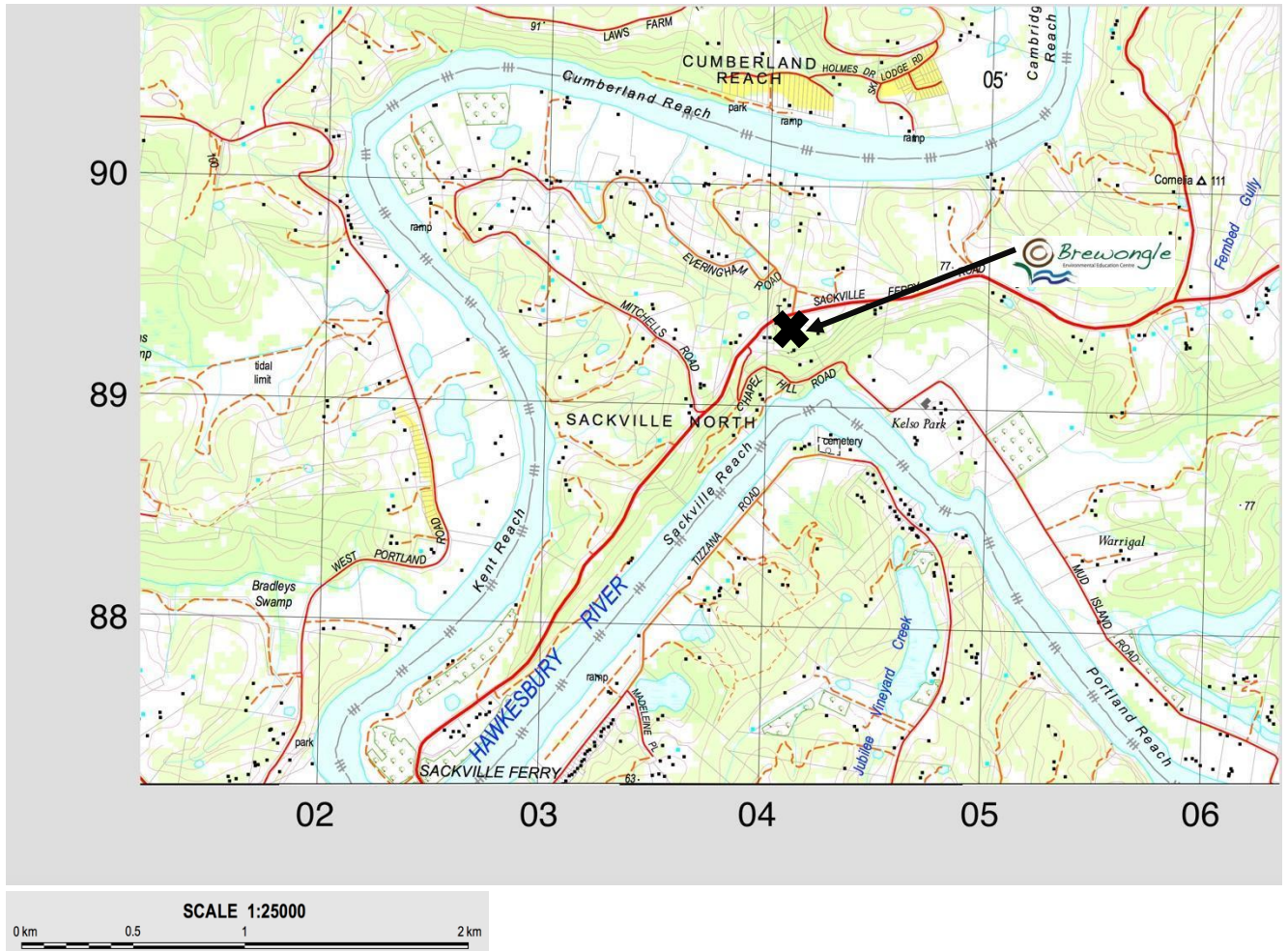
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
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### Pre-visit activity four: Mapping and change



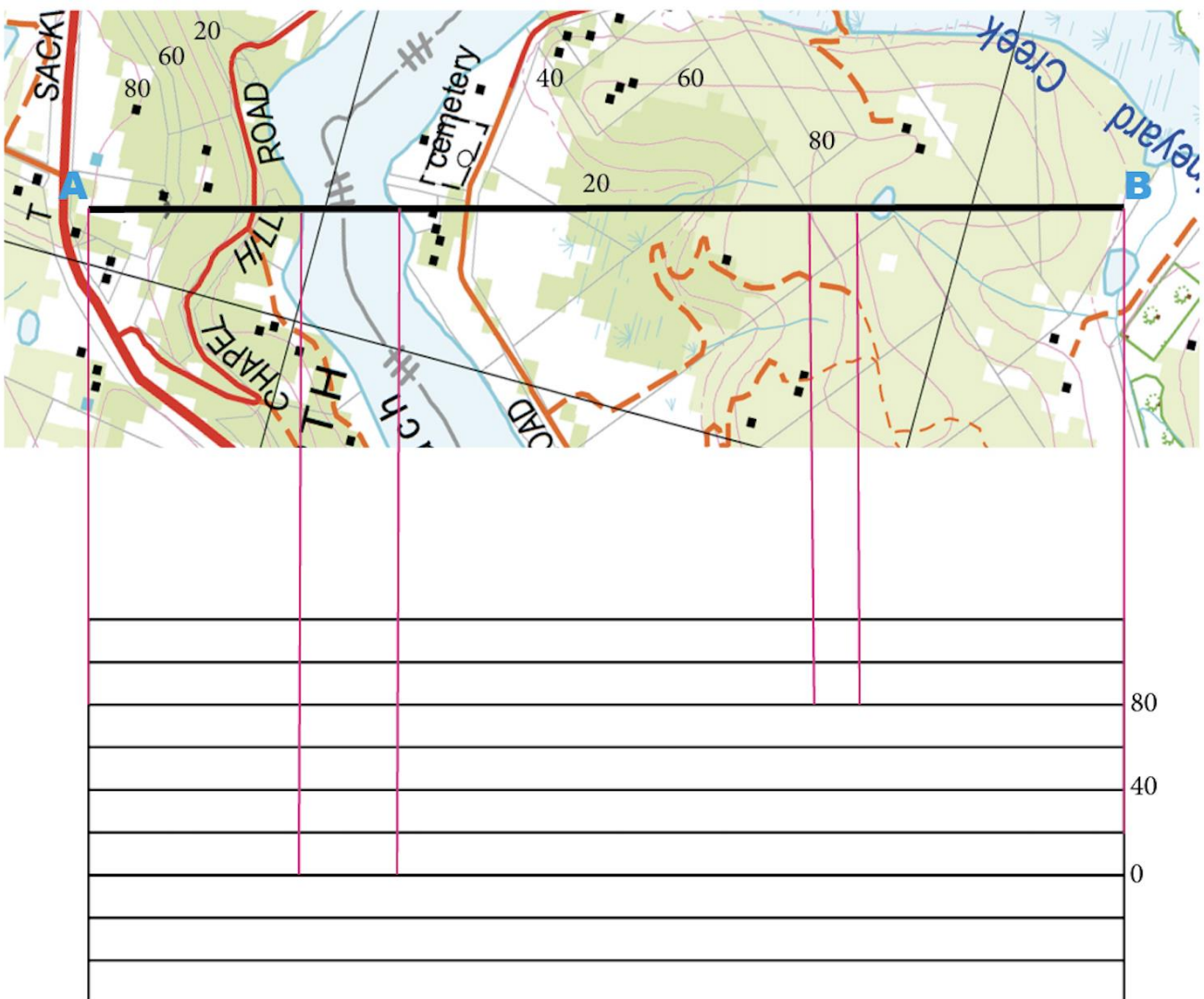
1. Use the map to give grid coordinates for the following (the first is done for you):

a. Brewongle	042893	d. Vineyard	
b. Chaple Hill Road		e. Sackville Ferry	
c. Cemetary		f. Kelso Park	

2. Use the Scale to work out the approximate distance of the Sackville Reach of the Hawkesbury River: \_\_\_\_\_

### Pre-visit activity five: Landscapes and landforms of the Hawkesbury River

1. Complete the cross-section by drawing lines from the contour interval to the corresponding graph line.
2. Use the word bank below to label the geomorphic features of the landscape into the cross-section
3. What are the heights of the contour lines (contour interval) \_\_\_\_\_m

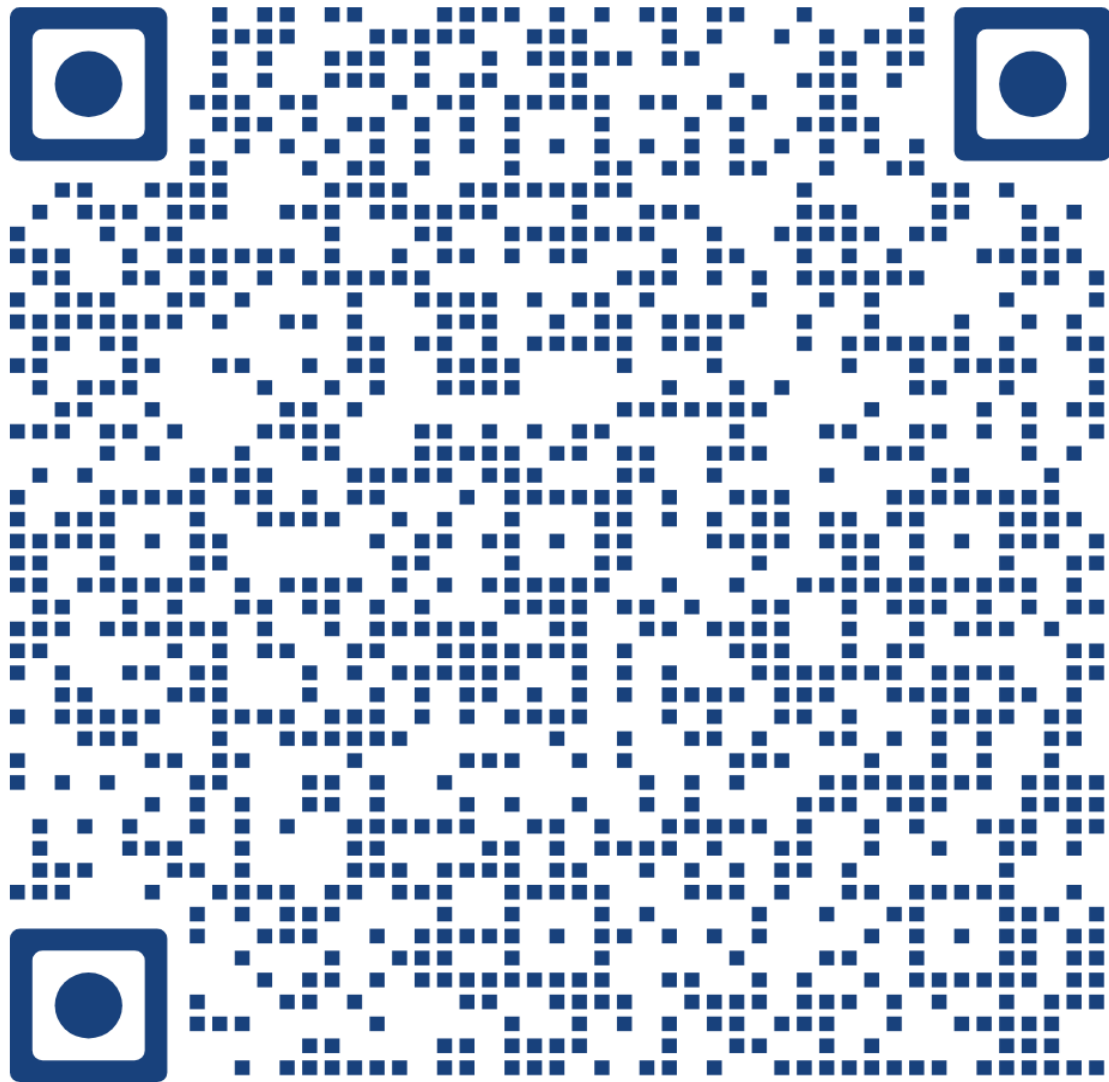


Brewongle Ridge  
Lagoon  
Floodplain  
Gully  
Cemetery  
River Road

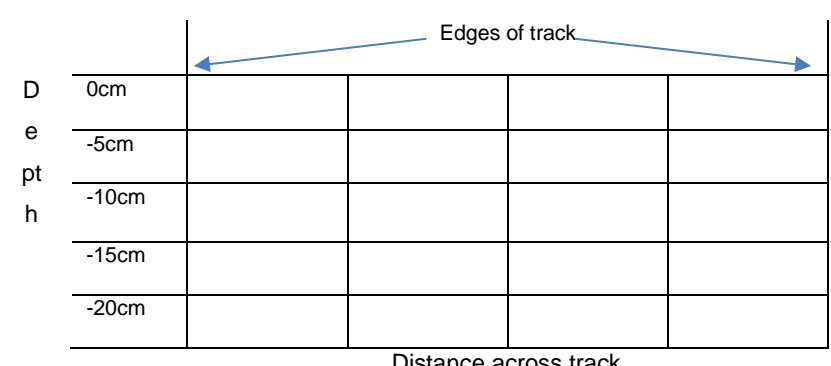


What do you already know about landscapes and landforms?

Scan the QR Code below and complete the quiz questions.



### Fieldwork activity one: Walking track erosion assessment

Fieldwork assessment	Equipment	Result
<p><b>Track erosion depth</b></p> <p>Place dowel across track, ensuring the ends of the dowel are level with the edges of the track where it meets the bush.</p> <p>Using a ruler, measure at 3 even spaces (a, b, c) across the track. Plot the depth across the cross-section graph.</p>	<p>1.5m dowel or strip of timber Ruler</p>	
<p><b>Soil compaction</b></p> <p>Insert wire probe into the soil applying a minimal and consistent amount of pressure.</p> <p>Ensure probe is entering soil and not hitting rock.</p> <p>Insert probe in the centre of the track and in the bush topsoil adjacent to the track.</p>	<p>Soil compaction probe</p>	<p>Compaction on track: _____</p> <p>Compaction in adjacent bush: _____</p>
<p><b>Infiltration</b></p> <p>Push the infiltrometer ring 2cm into the soil, avoiding cracks and other holes in the ground. The ring should be nearly level for accurate testing. Use your finger to gently firm the soil around the inside edge of the ring to prevent leakage of water here. Carefully pour 500ml of water into the ring and note the time. Stop timing when the surface is just glistening. A higher rate of infiltration will mean your soil will absorb rainfall more quickly, resulting in less run off and erosion.</p> <p>Complete this test on the track and in the bush topsoil adjacent to the track.</p>	<p>Infiltrometer Water Measuring jug Stopwatch</p>	<p>Infiltration time on track: _____</p> <p>Infiltration time in adjacent bush: _____</p>

### Erosion assessment questions

1. What effects are walking tracks having on the landscape at Brewongle EEC?

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2. Discuss evidence for your answer above.

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3. List the examples you saw of attempts to reduce the effect of walking tracks on the landscape at Brewongle EEC.

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4. Propose an innovative solution for managing the effect of walking tracks at Brewongle.

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### Fieldwork activity two: Vegetation

In your 10 metre quadrat:

Parameter	Units	Equipment	Result
Average plant height (Measure 5 random trees in the quadrat then work out the average height)	Metres	iPad App	
Tree abundance	Number of trees (more than 5m)		
Groundcover	% cover	Eyes	
Canopy cover	% cover	Mirrors and canopy cover charts	
Slope	Degrees	Clinometer	

1. Did you see any evidence of erosion at this site? If so, describe what you saw. (Hint: use page 4 to refresh your memory about erosion.)

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2. Why is there less erosion at this site as opposed to other sites you have visited while at Brewongle? (Consider the field work information you have collected above.)

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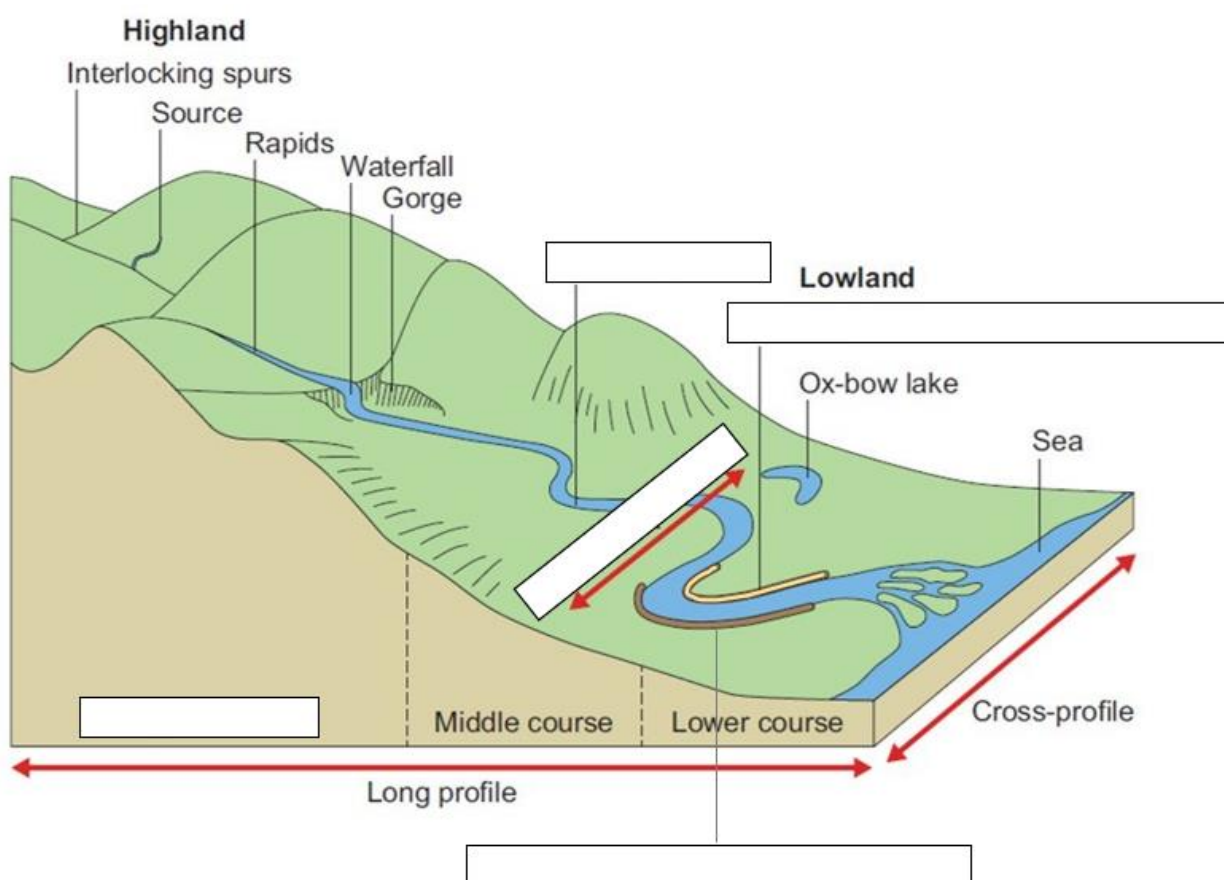
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## Fieldwork activity three: Geomorphology of the Hawkesbury River

- Using the words provided in the word bank, label the diagram of a river system.

### Word bank

Erosion on outside bend	Meander	Upper course
Floodplain	Deposition on inside bend	





2. Use the map below and a GPS (or app) to record your elevation at the following points along your walk.



A	m
B	m
C	m
D	m
E	m
F	m

3. Why does more erosion occur on a slope?

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4. At which part of a river's course does deposition occur? The **upper, middle** or **lower course**? Explain why this occurs.

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5. Examine the satellite image of the Hawkesbury River above. Explain why the river takes large 'meanders' (bends) instead of following the path of the arrows.

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### Fieldwork activity four: Indigenous landscapes

1. Sketch the cave you saw in the box below. Label interesting parts.



2. Describe your understanding of the value of landscapes and landforms to Aboriginal people?

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### Post-visit lesson one: Fieldwork summary

1. How does water influence geomorphology and what role does topography play in this interaction?

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2. Describe a human process that has changed the landscape of the Hawkesbury River.

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3. What role does vegetation play in forming and shaping landscapes and landforms?

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### Post-visit lesson two-three: Processing the data

Below is a list of geographical tools used to collate, review and evaluate data and information. Choose at least 5 of these tools to analyse and present your data in a word document.

The information you create here will be used in your documentary assessment task.

- Using ICT software, use a **topographic map** or **satellite image** as a base map, locate Brewongle and identify surrounding natural and man-made features.
- Collate data from your in-depth study into a **table** to summarise your findings.
- Create **flowcharts** to demonstrate your understanding of the ways the environment influences people and places.
- Assemble and annotate **photographs** to provide a visual representation of the site. Analyse and label interconnections.
- Develop **consequences charts** to explain human impacts (positive and negative). Show the impacts on [Google Tour Builder](#). Use photos taken on the day to match parts of the tracks we walked.
- Use a **T-chart** to represent data on advantages and disadvantages of population increases in the Hawkesbury Nepean River Catchment.
- Create a **mind map** summarising how different groups of people (stakeholders) value the area you studied. Include Traditional Owners, National Parks Rangers, Local Residents, Local Farmers, and any others you can think of.
- Construct a **flow chart** or **concept map** to explain the role of government, and other major stakeholders in sustainably managing the Hawkesbury Nepean River Catchment.
- Research floods of the Hawkesbury Nepean River and create a **poster** to educate local residents about flood mitigation.



### Assessment task: Communicating geographical information

Work in small groups to develop a 5-6 minute documentary on the environmental and human processes that form and transform landscapes and landforms of the Hawkesbury Nepean River, using Sackville North as a field study. Include Darug perspectives on landscapes and landforms. Your documentary should include:

- A clear description of the various land uses, geomorphology and other landscape features around Brewongle;
- An evaluation on how these features above are influenced by people, and how people can reduce negative impacts;
- Tools to support your information, such as maps, satellite images, graphs, statistics, flowcharts, labelled photographs, diagrams, illustrations/sketches and other labelled visual representations;
- Information on the traditional use of the place by Darug people;
- Information on the types of land use by early European settlers;
- A description of the role of government in organising or managing the place as well as the perspectives of other stakeholders, for example developers, conservationists, recreationists and local residents;
- An evaluation of the potential impact of flood on the local area;
- A description and justification of a course of action to decrease the impact of changes to the natural environment around Brewongle EEC.

What do you know now? Test your knowledge! Did you improve your score?

