



# **Greening Bathurst's Scenic and Natural History Tour 2 in the Bathurst Region**



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Author: David Goldney AM,  
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Greening Bathurst Inc  
PO Box 1469  
Bathurst NSW, 2795

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## Welcome to Greening Bathurst's Scenic and Natural History<sup>1</sup> Tour 2 of the Bathurst Region.

This tour traverses a small part of Wiradjuri Country that, before European settlement, had been managed by Wiradjuri for at least 22,000 years. This tour and other planned tours will allow you to understand this ancient Bathurst landscape, enjoy its scenery as well as becoming familiar with aspects of its human history, ecology, geomorphology, geology and hydrology.

This 18-site tour commences on the foot-slopes of Mount Panorama/Wahluu at the Boundary Road Reserve (**Figure 2**). The tour proceeds via Albens and Brookmore Reserves, the Great Western Highway to Timber Ridge Road, the Wambool Nature Reserve, and the Tarana Road. The scenic drive continues through the picturesque localities of Wambool, Locksley and Gemalla, eventually arriving at Tarana. From Tarana, the tour proceeds via the Rydal-Sodwalls-Tarana Road to Evans Crown Nature Reserve. The route continues a few kilometres further along Honeysuckle Falls Road to a high viewing point about 3.5 km short of William Cox's 1814/15 road, facilitating a spectacular view across to Evans Crown Nature Reserve and the upper Fish River Valley. We trek back to Tarana and take the picturesque drive along the Diamond Swamp Road to the Great Western Highway. We then visit Turners Plot and Eusdale Nature Reserve before heading back to Bathurst.

Period	Epoch	Age <sup>1</sup>
Quaternary	Recent	0.01
	Pleistocene	1.8
Tertiary	Pliocene	5.3
	Miocene	23.5
	Oligocene	36.7
	Eocene	58.0
	Palaeocene	66.4
Cretaceous		144
Jurassic		213
Triassic		248
Permian		286
Carboniferous		354
Devonian		410
Silurian		434
Ordovician		490
Cambrian		545

<sup>1</sup> Age: Millions of Years Ago (Ma)

**Figure 1: Geological time periods.**

The distance covered by this tour is about 125 km and will take around 4- 5 hours to complete depending on how long you choose to stay at each site, or approximately three hours if you adopt a 'whistle-stop tour' approach! 'Ma' stands for 'Millions of years ago'. The table on the left (**Figure 1**) lists the geological Periods. You will travel through 'deep -time' from the present (Anthropocene), stand on or view ancient volcanic flows (12 – 18 Ma), spend the most time on the Bathurst granite (310 Ma) and visit deep ocean sediment elements of the Devonian period, now metamorphic rock (350 Ma).

Toilet stops are available at the Bathurst Tourist Centre, Tarana Village and the Yetholme Caltex Petrol Station. Otherwise, there are natural bush stops along the way!

<sup>1</sup> Natural History in the 18<sup>th</sup> and 19<sup>th</sup> centuries was the observation of nature in all its forms including geology, flora and fauna and astronomy. It was often synonymous with museum and personal collections of natural objects e.g. butterfly collections. Outstanding Natural Historians such as Charles Darwin were also scientists, men and women who sought to see patterns and processes at work in nature rather than just objects in a collection. Practitioners like Darwin were the first professional scientists.

Good mobile phone coverage is available throughout the route. Remember to take a first aid kit with you, food and water and please heed safety warnings provided in the notes below.

Morning tea or lunch can be purchased at various locations in Bathurst and Tarana. Tarana Pub is not always open, but Mamma Snow's Country Kitchen opposite is usually open seven days a week, closing at 3 pm.

These tour notes have been prepared in good faith. However, the onus for safely navigating the route is entirely in the hands of the car driver and passengers who choose to traverse the suggested path. Neither Greening Bathurst nor Bathurst Regional Council accept any responsibility for any adverse outcomes suffered as a result of participating in this tour.

The tour traverses only public roads. However, many of the sites described are on private land adjacent to suggested roadside stops. This guide does not provide permission to trespass onto private land or climb over fences onto private areas, however enticing that possibility. Please be mindful and view sites safely from a publicly owned property or safe roadsides. Tours 1-3 are like pieces of a jigsaw; each contributing to a better understanding of the Natural History of Bathurst and can be undertaken in any order.

## **Useful Apps**

### ***Bird Identification***

A pair of binoculars and a bird ID book would also be helpful to have on hand. Alternatively, download onto your phone from the App Store: "Michael & Stewart Guide to Birds of Australia" @ \$29.99, or the 'lite' version with only 59 listed species: "The Michael Morcombe eGuide to the Birds of Australia" for free.

### ***Geoscientific data***

If you have an iPad/laptop you might like to download for free the package 'MinView' from <https://minview.geoscience.nsw.gov.au> (version 2).

It is also possible to download MinView to an iPhone, laptop or iPad so that no Wi-Fi or mobile reception is required for use once downloaded. One can also access base maps, aerial photography and satellite imagery within MinView. These interactive geology maps display a range of information. Touch the screen to reveal the name, description, age, lithology and environment of formation of the underlying rock type.

### ***Eucalyptus identification***

The 'Euclid' App was produced by CSIRO and enables users with little botanical training to readily identify Eucalypts, including species from the recently split-off *Corymbia* genus. The App also includes those species in the *Angophora* genus. The App uses readily observable characteristic of each tree species and can be downloaded from either GooglePlay or Apple App Store for around \$20 for iPad or mobile.

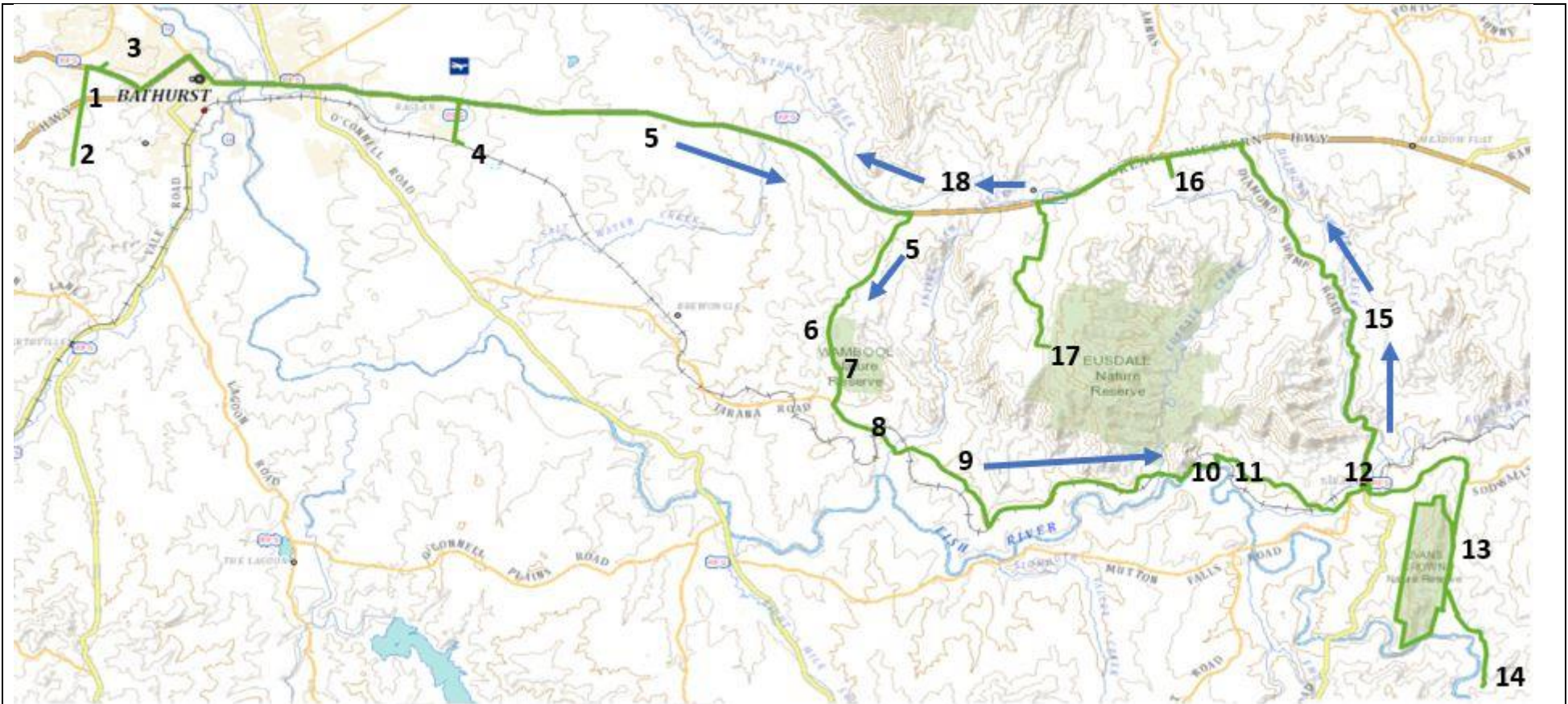


Figure 2: Route of Natural History and Scenic Tour 2 in the Bathurst Region with approximate location of Sites 1 – 18. The distance from the Bathurst PO to Tarana is about 45 km.



## Site 1: Boundary Road Reserve

**Northings:** 6298388; **Eastings:** 736923; **Elevation:** 803 m.

### Directions

Take the Mid Western Highway towards Blayney, turning left onto Boundary Road, driving about 0.85km to the entry gate and sign of the Boundary Road Reserve.

### Site Description



**Figure 3: Boundary Road Reserve with Grey Kangaroos in the foreground.**

Boundary Road Reserve (80 Ha) protects a valuable remnant of critically endangered Box-Gum Grassy Woodland (**Figure 3**). This vegetation community formerly dominated the slopes and hills on the Bathurst Plains, which have now been mostly cleared. The dominant trees are Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*E. blakelyi*) and Apple Box (*E. bridgesiana*). The native ground cover has largely been replaced by introduced species and weeds. Still, due to the constant work of the Reserve's Landcare group, the understorey has improved significantly over the past 20 years.

The dominant trees here are around 10-15 m in height and range in age from saplings to 80-year-old trees. On better soils, Yellow Box and Blakely's Red Gum can grow to 35 m in height with tree girths at breast height of around 6 m. With some exceptions, many of these trees are not old enough to have formed hollows. The two dominant understorey trees are Hickory Wattle (*Acacia implexa*) and Silver Wattle (*Acacia dealbata*).

This woodland supports a diverse range of native birds (>90 species), including many threatened and vulnerable species. The larger the area of bushland remnant, the more vertebrate species it can usually support. The type specimen for Yellow Box (the first of its kind to be collected and described) was collected by Allan Cunningham north of Bathurst in 1825 and described by a botanist living in Germany from a pressed specimen provided by Cunningham. Cunningham would have recognised many other plant species from having examined pressed specimens held in locations such as the Kew Gardens before coming to Australia. By 1815 about 4,000 Australian plants, mainly on the east coast, had been described and named, dating from Captain James Cook's expeditions with Sir Joseph Banks and Daniel Solander. Many other botanists, such as Robert Brown, who accompanied Mathew Flinders in his ship 'Investigator', added to this knowledge base. Yellow and White Box trees quickly became essential resources for fencing, firewood, and construction work such as bridge-building. The Wiradjuri were also adept at recognising and naming the animals and plants they interacted with: Birri (White Box) and Baagang (Yellow Box) are two examples of hundreds of nature-based words. Make time to walk the track that loops through this remnant woodland, noting the bird species you observe as well as likely coming in contact with the predominant Grey Kangaroo mob (about 300 in 2021) that resides in this woodland. Kangaroo numbers at this level are causing significant overgrazing in the Reserve.

## Site 2: Albens Reserve on Foot-slopes of Mount Panorama-Wahluu

Northings: 6297077; Eastings: 736702; Elevation: 774 m.

### Directions

Continue south from Boundary Road Reserve, passing Hinton Road on your left until you reach the usually locked gates soon after the T intersection on The Barry Gurdon Drive with the Rifle Range is immediately to the west. Park your car and walk approximately 200 m south (up the hill) until you reach the gate of the Albens Reserve on the left, where you can readily climb through the fence.

### Site Description<sup>2</sup>

Albens Reserve (23.8 Ha) is a significant conservation and public open space asset for the city. The Reserve is a remnant of White Box (*E albens*), Yellow Box, Blakely's Red Gum Grassy Woodland (Box-Gum Grassy Woodland) in the Bathurst urban area (**Figure 4**). This vegetation type is listed as a Critically Endangered Ecological Community by the Commonwealth Government and in NSW as an Endangered Ecological Community. Of particular importance at this site is the dominance of White Box, which does not occur naturally at most of the peri-urban Box-Gum Grassy Woodland remnants around Bathurst. The nearest naturally occurring White Box woodlands are about 12 km north of Bathurst at Duranama along Turondale Road. Under ideal conditions, White Box grows to a height of 25 m, usually with the characteristic tessellated bark of the 'Box' grouping of eucalypts on trunk and lower limbs with smooth white bark above.



**Figure 4: White Box Tree (*Eucalyptus albens*).**

The Box-Gum Grassy Woodland community is currently in moderate condition throughout most of the Reserve, with some good grassy understorey displaying a wide diversity of forb species. The headwaters of one of the branches of Hawthornden Creek originate in Albens Reserve. Active erosion is present along the banks of the creek line, with active head-cuts present in the upper drainage lines. In terms of geodiversity, the Reserve is an inverted landscape. The contact between ancient Carboniferous Bathurst granite (310 Ma) and a much younger Miocene aged riverbed capped with basalt (19 Ma) from the Abercrombie lava fields is a striking feature.

This feature has been exposed in the excavation within the Reserve that may also have heritage value as an early instance of attempted gold mining the ancient river alluvials. This was likely part of the source of the alluvial gold that led to the short-lived Bathurst Goldfields, the associated diggings at Poor Man's Hollow and possibly the deep gulying of the original swampy meadows of Hawthornden Creek. Geological scale erosion has led to the ancient river and basalt being isolated as a capping of the granite cored Mount Panorama. As a result, the hill slopes and the eroded drainage plains and drainage lines within Albens Reserve are covered with a variable blanket of these contrasting eroded and transported materials,

<sup>2</sup> Mostly derived from the Albens Reserve Plan of Management with significant input from Chris Marshall.

creating a diversity of unique soil profiles. The unusual mix of soil materials and the northeast facing aspect and variable frost drainage in Albens Reserve has created the regionally significant instance of this White Box community.

Further to this has been the creation of an excellent example of an unusual topographic sequence over the length of the Reserve of Manna/Ribbon Gum (*Eucalyptus viminalis*), (White Box, Yellow Box, Blakely's Red Gum) and Apple Box (*E. bridgesiana*). The proportion and density of native grasses and forbs are very pleasing. However, exotic forbs are present at the site and, also the weed Serrated Tussock present throughout the Reserve in dense swathes in some sections. Woody weeds are also present and require management to prevent their spread and providing rabbit harbour. However, woody weeds also provide a habitat for small native birds that nest in this exotic vegetation. White Box was first formally described in 1867 by George Bentham partly based on material collected by the botanist and explorer Allan Cunningham along the Macquarie River. The tree can usually be identified some distance away by its greenish-grey leaves and the standout whitish trunk. Kangaroo numbers are much lower in this Reserve than in Boundary Road Reserve due to spasmodic culling undertaken in neighbouring properties.

### Site 3: Brookmore Reserve

**Northings:** 6299955; **Eastings:** 737689; **Elevation:** 750 m.

#### Directions

Continue north along Boundary Road, cross the Mid Western Highway and continue on for about 1 km until reaching the Mitchell Highway. Turn right onto the Mitchell Highway/Vittoria Street, and after about 300 m, turn left along Alexander Street and stop at the reserve sign just before the Fire Brigade Station. You are free to wander through the Reserve.

#### Site description



**Figure 5: Brookmore Reserve with a supplementary nest box in a Red Gum.**

The Brooke Moore Reserve (4 ha) woodland protects another valuable remnant of the critically endangered Box-Gum Grassy Woodland. The dominant trees are again Yellow Box, Blakely's Red Gum and Apple Box. This patch retains much of its original understorey of native grass species, with fewer weeds present than in either of the previous reserves we have visited. Box-Gum Grassy Woodlands usually occur on deep, moist, relatively fertile soils and are characteristically very open with few shrubs. The Yellow Box trees at this site are possibly 60-80 years old.

These regrowth woodland trees are relatively small in height and girth, compared to old-growth Yellow Box trees with the potential to reach heights of 30m+ and girths of 6m.

Trees here are likely nearly fully developed, limited by the impoverished and gravelly soils. They will eventually form small hollows in their upper limbs. Some supplementary hollows have been placed in various trees by Greening Bathurst (**Figure 5**). The poor soils are likely due to past sheet erosion associated with overgrazing, and the likelihood that this Reserve sits on the ancient bed of the Macquarie River, the latter now at 650 m. The Macquarie River may



well have been running through this site around 120, 000 years ago. Look for the scattered river pebbles that are abundant in the reserve at the top of the hill near the back of the fire station.

In the space of 3 km, we have visited three quite different Grassy Box-Gum Woodland sites, with deeper granite derived soils in the Boundary Road Reserve, nutrient-enriched soils of the Albens Reserve due to volcanic activity and now the impoverished soils of the Brookmore Reserve. All have been impacted by European farming practices, nevertheless, each adds to the diversity of habitats available for vertebrate and invertebrate species, creating various niches for a range of fauna. These three Reserves help us to visualise the ecological footprint that was present in this landscape in 1815.

When a track was being forged by settler or explorers in colonial times, the likely method would be to stick to the ridges, avoid swampy valley floors, and blaze the route. The first cart would leave clearly defined wheel tracks in soils relatively high in organic matter and not yet compacted by sheep and cattle trampling. This small remnant woodland has few hollows and relatively few vertebrate species present but is an example of a habitat stepping-stone, connecting this remnant patch with others in this area.

#### **Site 4: Raglan Decomposing Granit Soil Profile<sup>3</sup>**

**Nothings:** 6296697; **Eastings:** 748173; **Elevation:** 759 m.

##### **Directions**

Return to the Mitchell Highway and take the Great Western Highway across the Macquarie River, travelling east from Evans Bridge approximately 5.6 km. Turn right at Eugenie Street Raglan. Travel south to the end of this street, turning left onto the all-weather dirt road running parallel with the railway track. Travel 1.7 km to the bridge overpass and park on the side of the road. Walk from your car to the bridge and view the railway cutting, exposing the deep soil profile at this location (**Figure 6**).

##### **Site Description**



**Figure 6: Railway cutting Raglan. Photo Col Bembrick.**

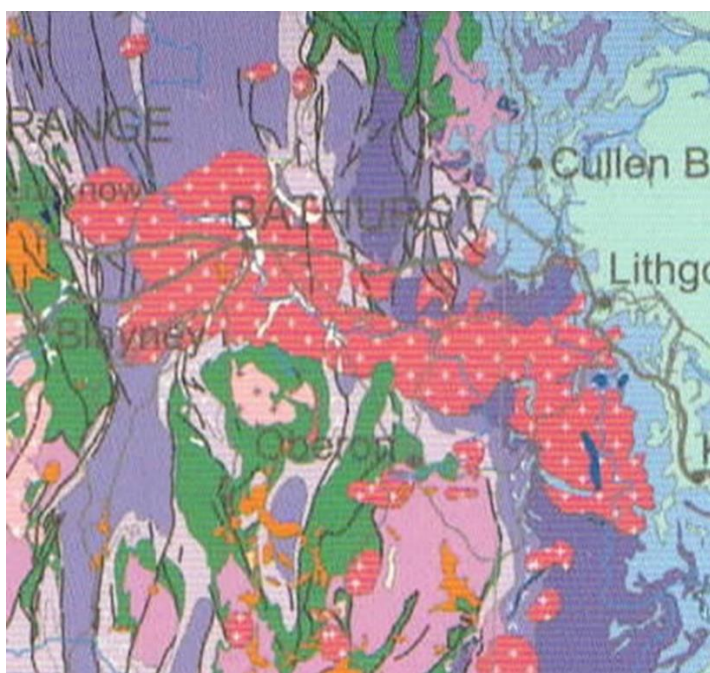
This site provides a unique 15 m soil profile of Bathurst granite derived soils in the 1870s in the Raglan grasslands. The railway cutting was hand-dug, and the fill probably taken away by railway trucks for use at other locations. The land use before creating the cutting was likely intensive agriculture from around 1815, including cropping and grazing. The Raglan Plains were likely an extensive tract of treeless native grasslands in 1815. In early colonial times, Bathurst was a significant grain growing area, supplying the Sydney market.

<sup>3</sup> I am indebted to Chris Marshall for suggesting a visit to this site.

Possibly the track was fenced out soon after the cutting was completed. The rich 5 - 10 cm black topsoil pre-1815, often referred to as 'mouldy soils' likely disappeared in the first two decades of European settlement. This soil layer provided the illusion of long-term fertility, so admired by the early explorers and settlers. Periods of drought, overgrazing and rabbit plagues have all contributed to a significant loss of topsoil over 206 years of European land management. The Bathurst Plains soils are primarily derived from the breakdown of granite. The landscape is characterised by undulating small hills and lowlands around 730 m. The soils are highly erodible and usually described as red duplex (contrasting textures between horizons) or red chromosols.

### Site 5: The Scenic Drive between Site 4 and Site 6 on Timber Ridge Road

Return to the Mitchell Highway, turning right and continuing to Site 6. Many of the sites that you will visit today are located on granite-derived soils. Let's take a moment to consider the processes at work over long periods that created these soil landscapes. **Figure 7** illustrates the massive granite batholith that stretches some 80 km from Bathurst through to the sandstone country of the Blue Mountains. As we drive across this landscape today, we are on the Australian Tectonic Plate, floating on molten magma and moving northward about 6 cm per year, with a slight clockwise rotation. Australia was once part of the ancient continent of Gondwana, with Australia and Antarctica beginning their separation about 85 Ma. This part of the world wasn't above sea level until about 355 Ma.



**Figure 7: Massive dumbbell-shaped granite country stretching around 80 km from just west of Bathurst through to the Sandstone of the Blue Mountains.**

There was once about 5 km of varying geological layers above where we are now travelling. Over millions of years, these layers were eroded by water and wind erosion. The sheer weight of these layers resulted in massive forces changing sedimentary layers to rock. The force of gravity also ensured that the elevation of the surface was likely not much higher than it is today, as the plate sank in the magma to accommodate the enormous weight above, like an iron ship at sea. It's a much more complex story than we can capture here. Granite intruded as a molten magma 5 km under the surface in the Carboniferous period (312 – 330 Ma) in a series of sequential upwellings of slightly different ages from east to west.

These upwellings were confined underground since, despite the enormous pressures, could not break through to the surface. Over immense periods the overburden above the Bathurst Batholith was worn down by water and, to a lesser extent, wind.

Over millions of years, the Fish and Macquarie Rivers have carved out the Tarana and Macquarie River valleys, gradually exposing the underlying granite created over 300 Ma. From the top of Mount Panorama/Wahluu, protected from relatively rapid erosion by a layer of volcanic basalt flow 19 Ma, it has taken about two million years for the Macquarie River to reach its current elevation. Before the granite became exposed to surface forces, it was already decomposing from solid granite, fracturing and breaking into smaller pieces. Over time, it was breaking down as we saw in the Raglan railway embankment location (Site 4), into gravel-sized particles, sand and silt with some clay.

## Site 6: Geological Boundary

**Northings:** 6292254; **Eastings:** 756430; **Elevation:** 920 m.

### Directions

Continue east along the Great Western Highway for approximately 18.5 km turning right at Timber Ridge Road using the right turning lane. Drive 3.6 km to reach the property 'Macquarie Vale' on the right-hand side. Park your car in that area so as not to obstruct the entrance. Walk back along the road around 100 - 150 m to the location where **Figure 8** was photographed.

### Site Description



**Figure 8: Glenda Bembrick is standing on the contact between highly weathered Durandal Granite and the massive-bedded Bells Creek Volcanics. Photo: C Bembrick.**

This contact between two geological units is not as apparent as it once was. Erosion and weathering have taken their toll. On the left of Glenda in **Figure 7**, we have highly weathered Durandal Granite (325-330Ma), while to the right are massive beds of the metamorphosed Bells Creek Volcanics of Late Silurian age (425 Ma). The actual contact zone is covered by rubble. Note how severely weathered the granite is here.

Walk back along the road a further 150 metres to see the excellent exposure of granite in the previous cutting on the bend. Here the Durandal Granite is freshly exposed by blasting to widen the road. Notice the large pink feldspar crystals amongst the finer 'groundmass' of the granite, giving the rock a 'porphyritic' texture. These larger crystals show that the granite was cooled slowly (producing large crystals) and then more quickly – resulting in smaller crystals. The top of the cutting exhibits a near-horizontal joint in the granite – slightly downward curving. This is an 'unloading' joint, caused as the overlying rock is removed by erosion and the pressure is relieved. Notice this joint is sub-parallel to the ground surface.

This location also illustrates those changing geologies can be reflected in the surface vegetation. For example, the granite country supports the critically endangered Box-Gum Grassy Woodland community, whereas south of this boundary is a Western Scribbly Gum (*E. rossi*) woodland. (see Site 7 description).



## Site 7: Wambool Nature Reserve, Entry Gate, Timber Ridge Road

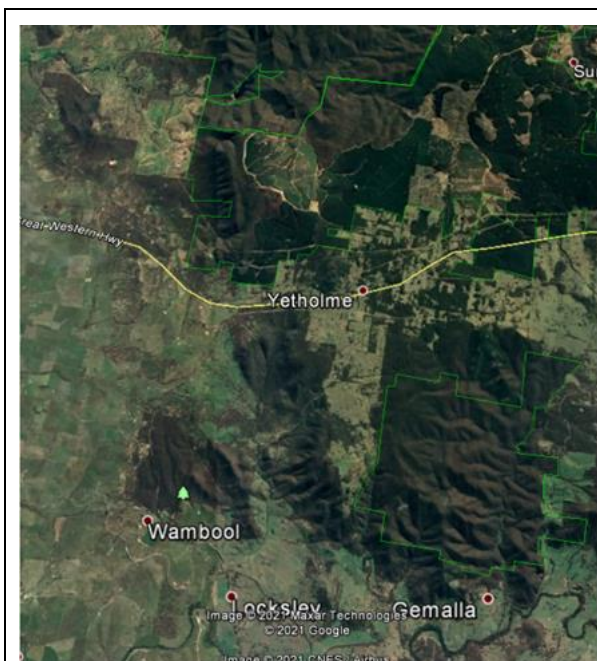
Northings: 6291343; Eastings: 756277; Elevation: 939 m.

### Directions

Continue travelling south about 800 m until you reach the locked gate of Wambool Nature Reserve.

### Site Description<sup>4</sup>

**Figure 9** below identifies the location of the Wambool Nature Reserve (180 Ha) within the local context. The name Wambool is a Wiradjuri word meaning ‘meandering’ and is also the same word used to name the Macquarie River. In this context, it designates a locality. Timber Ridge Road in Figure 8 is not visible as it heads south from the Great Western Highway. Immediately apparent in the Google Earth clip is the patchwork of remnant woodlands and forests running north-south that have survived European clearing on the more rugged and hilly country.



**Figure 9: Timber Ridge Road runs from the Great Western Highway west of Yetholme past the Wambool Nature Reserve marked by the green arrow.**

The first 3.5 km of Timber Ridge Road is underlaid by granite geology. The Reserve is mainly on Bells Creek Volcanics, ancient marine sediment (Silurian Period), dated about 430 Ma. Until about 1974, the site used to be the location of the local Shire tip - values can change. If possible, take time to walk along the main fire trail within the Reserve. Shallow skeletal sands and loams dominate the southern part of the Reserve. The landscape is characterised by rolling to steep hills. These soils, if cleared of vegetation, are subject to severe sheet and gully erosion. The open grassland and scattered trees of the Bathurst Plains and associated granite country are replaced at this location by stunted woodland trees with a wide variety of flowering understorey shrubs and herbs. The low shrub density allows this ecological niche to favour a diverse array of terrestrial orchids.

The vegetation within the nature reserve is very homogenous in structure, composition and distribution and consists of Open to Low Open Woodland communities. Two communities have been described for the Reserve, the most dominant (70%) being Western (Inland) Scribbly Gum<sup>5</sup> (*Eucalyptus rossii*) and Brittle Gum<sup>6</sup> (*E. mannifera*). A few mature specimens of Brittle Gum grow near the entry gate – rubbing the trunk will leave characteristic whitish deposits on one’s hand. The second community (27%) consists of Long Leaved Bundy Box (*E. goniocalyx*), Scribbly Gum and Brittle Gum. Several other tree species also occur at low density

<sup>4</sup> This description is very dependent on the NPWS management plan – see references.

<sup>5</sup> Take time to check out the characteristic scribbles on the Scribbly Gums – is there a pattern to be observed? The larvae/caterpillar of a moth produces the scribbles as it eats its way through the surface cambium. The distinctive scribbles can be seen once the bark drops off. There are a number of moth species, and each has a distinctive ‘scribble’.

<sup>6</sup> Timber fractures easily and not suitable for building works.



in association with the dominant species. These include Blakely's Red Gum, Tumbledown Red Gum (*E. dealbata*), Yellow Box and Apple Box. Two hundred and twenty-six (226) native plants have been recorded in the Reserve. These include one regionally restricted species, Snowgrass *Poa sieberiana* var *cyanophylla*, and one species considered to be at its western geographical limit, Early Wattle (*Acacia genistifolia*).

The Reserve is considered an orchid "hotspot", with 48 species (17 genera) of orchids recorded. The Wambool Nature Reserve reminds us that country unsuitable for European agriculture can have very high conservation values, and in this case, is an orchid paradise. Changing geologies often result in different vegetation communities being present.

Sir Edward Hallstrom, one-time Director of the Taronga Zoo, owed a property adjacent to the Nature Reserve where he bred white (albino) Wallaroos and Red-necked Wallabies. Some of these were introduced to the Sir Joseph Banks Nature Reserve in the 1970s on the foot-slopes of Mount Panorama and later released into the general Mount Panorama area when the Reserve was closed in the early 1990s.

### Site 8: Gully Blowout on Tarana Road

**Northings:** 6288982; **Easting:** 756831; **Elevation:** 797 m.

#### Directions

As we travel southwards along Timber Ridge Road towards the Tarana Road, the deep ravine and creek on our right marks the faulted boundary between the Bell's Creek Volcanics and folded sediments of the Hill End Trough.

Continue driving south to the Tarana Road junction, and then turn left. Continue along the Tarana Road, where you will soon pass the T-junction with the Wambool Road. Less than 200 m from the T-junction, you will come to a deep gully on the left-hand side of the road. This is a first-order tributary of Frying Pan Creek. Stop at this location and park your car safely on the grassy roadside verge.

#### Site Description



**Figure 10: Frying Pan Creek tributary blowout on Tarana Road.**

Before turning onto the Tarana Road, the route passed over Bells Creek Volcanics for about 2.7 km and then for the last 20 m, passed over the Durandal Granite (325-530 Ma). We have also entered the northern side of the Fish River Valley carved out over millions of years by the Fish River, a tributary of the Macquarie River. The tour continues via the river valley to Tarana, running more-or-less parallel with the Great Western Railway line. On the other side of the valley is the Muttons Falls Road, also known as Lockyers Road.

The dominant woodland is again the critically endangered Box-Gum Grassy Woodland community, mostly confined to valley floors and up to the mid slopes. Whilst a significant amount of clearing has been undertaken, the pre-1815 woodland footprint is readily recognisable.

The canyon-like gully is a relatively common phenomenon in the easily erodible granite country (**Figure 10**). This small tributary of Frying Pan Creek has a relatively low incline and was very likely a series of swampy meadows before European settlement. The then narrow adjacent floodplains would usually have been kept well hydrated by water stored in accumulating peats and other sedimentary layers and were likely very productive landscapes. Significant overgrazing of these landscapes occurred during the Federation drought around 1900, facilitated by stock and rabbits. Overgrazing left this landscape devoid of understorey vegetation and very susceptible to erosion. At the break of drought, heavy rains likely carved out this gully, perhaps in a matter of days or even overnight. Growing in the gully are the tree species that dominate the surrounding woodland but are absent in the base of the creek line where it is likely too wet. These trees are in the order of 60-100 years old, which helps to date this widespread landscape folly as having occurred around the time of the Federation Drought. These gullies can be repaired and brought back into productive and functioning landscapes. However, implementing a restoration strategy requires a lot of thought, planning and careful groundwork.

### Site 9: Locksley- Gemalla Scenic Drive



**Figure 11: Aerial view of railway brick buttress location & Site 10 where it is safe to stop.**

From Site 8, the road continues for approximately 12 km to the imposing rail embankment above the railway line (**Figure 11**). The Fish River drops around 5 m per kilometre of river length near Tarana to its junction with the Campbells River. Take time to enjoy this scenic landscape, again dominated by Box Woodlands on the valley floors to the break of slope. After the bridge crossing over the railway line, you soon come into the picturesque Locksley area. Cross the small bridge over Frying Pan Creek that rises north of the Great Western Highway.

The creek has undergone several name changes, including Dirty Swamp Creek and Badgers Creek. The former name suggests sediment-filled holes dominated by Bulrushes and the Common Reed. The second name indicates that it was a small valley where wombats (badgers) were prevalent. The origin of the current name is unknown.

At the junction with the Fish River, gold panning was common around 1850, eventually culminating in a large dredge being located in this reach of the river in the 1860s. Engineering ingenuity and risk-taking were often at the heart of colonial wealth creation. On your left pass historic Clifton and its two-storied convict quarters built around 1826 (**not open to the public**). The convict quarters were constructed a decade after Governor Macquarie proclaimed the Bathurst settlement in May 1815. Not all land grants came with convict workers attached, but

where that did occur, it gave the landholder a significant boost in building infrastructure and managing their sheep and cattle by having access to full-time shepherds. In the 1830s, convict labour became critical in facilitating the squatter process. Landholders moved west, north and south of the Bathurst settlement to illegally squat on land preferably with good water frontages. One significant driver of wealth production in the colonial Bathurst Region was the selling of wool to Great Britain. Continue past Kinghorne Falls Road that lies on a sharp bend abutting the railway line. In colonial times 'Falls' referred to a significant rapid in the river rather than a waterfall.

Immediately on your left, about 2.5 km north, Mount Tennyson heralds the beginning of a woodland forest block that reaches altitudes between 1000-1250 m forming part of the Great Dividing Range and includes the Eusdale Nature Reserve. Most of that Reserve comprises sedimentary siltstones, sandstones, and mudstones laid down in a marine environment in the late Devonian period 365 Ma (Gibbons Creek Sandstones). A small area in the north-eastern corner of the Reserve contains a coarse granite that is Carboniferous in age (320 Ma). The site around Mount Tennyson contains older sandstones from around 420 Ma - a complex mix of folded and faulted Devonian and Silurian aged geology with volcanic lava, tuff and rhyolite rocks but also includes sandstones, slates and shales.

You will soon come to several small bridges, firstly at Stony Creek and then Eusdale Creek in the picturesque Gemmala locality. The road now takes you across the railway line via a somewhat safe but rickety bridge to be replaced shortly. The Tarana Road (**Figure 10**) now nestles between the Fish River and the railway line some 30 m above the road, securely buttressed by an imposing, slightly sloping brick wall, built around 1870. While it may be tempting to stop in this visually pleasing domain, it is not safe to do so. Once the road turns east and separates from the railway line, find a safe place to stop on the roadside verge (Site 10) and take in the view.

### **Site 10: Scenic View on Tarana Road**

**Northings:** 6287758; **Eastings:** 766382; **Elevation:** 806 m.

#### **Site Description**

The expansive view takes in the Fish River floodplain to the south, the imposing Evans Crown Nature Reserve to the east, and to the north Mount Tarana at around 1300 m – see also **Figure 11**. The floodplain here is extensive but contained by the railway embankment on the northern side. Note the crowded fringing forest community of River She-oak (*Casuarina cunninghamiana*) on both riverbanks with most trees less than 80 years old, growing to about 25 m in height. Episodic flood events can rip out hundreds of metres of the treeline, suggesting that at this location, such a flood occurred around 1860. Historically River She-oaks would have spread out into pockets of the floodplains but have likely been cleared in those locations. River She-oak has both male and female trees, is a flowering species, the female flowers produced on small reddish cones. A further 4.2 km will bring you to the junction of Mutton Falls Road. About 600 m before the intersection, the road crosses Solitary Creek, now often significantly replenished by additional waters from Diamond Swamp Creek, the junction 2 km upstream.

## Site 11: Junction of Tarana Road with Mutton Falls/Lockyers Road



**Figure 12: Major Edmund Lockyer**

In 1828 Governor Darling appointed Major Edmund Lockyer (**Figure 12**) as Principal Surveyor of Roads and Bridges, a position abolished by the Secretary of State in 1829. Lockyer's workload was transferred to the Surveyor General. In 1828 Thomas Mitchell was Assistant Surveyor-General of NSW, becoming the Surveyor General on Oxley's death in 1828. In 1829 Mitchell became responsible for the survey of roads and bridges. Mitchell likely facilitated the removal of Lockyer from his then role, perhaps sensing that Lockyer was a rival better moved on. Lockyers Road is of great interest since its construction commenced from the west at the junction of the O'Connell Road and the Mutton Falls Road, rather than from the east, with the ascent to Mount York, the final challenge for the road builders.

The construction methods used were not too dissimilar to those used for constructing Coxs Road. However, convict chain-gangs were used, and convicts were locked up each night. Mitchells Road replaced both the unfinished Lockyers Road and Coxs Road west of Mount Victoria. Much of Lockyers Line of Road remains in use today. The scenic route along Lockyers Road is included in a separate tour (Goldney 2015).

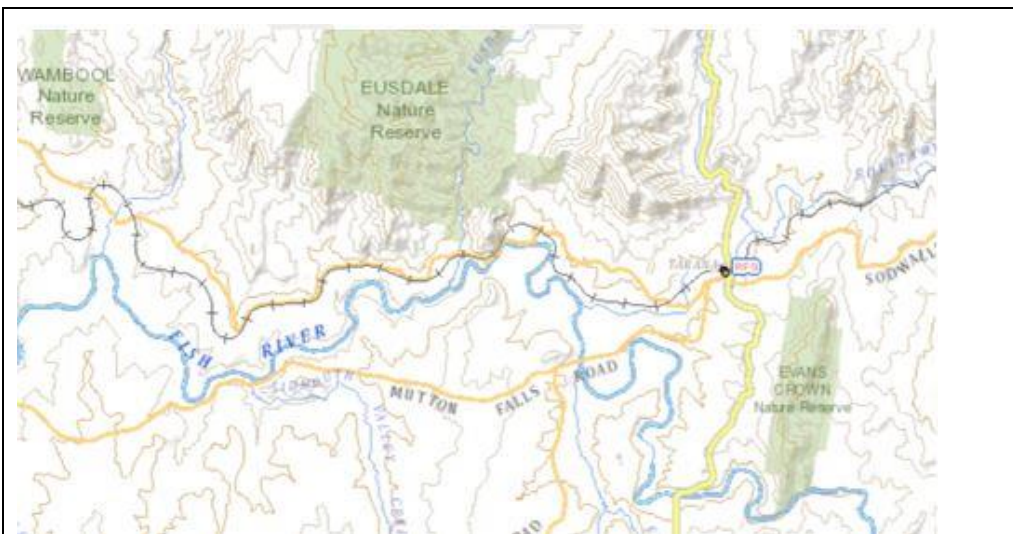
## Site 12: Tarana

**Northings:** 6286765; **Eastings:** 770086; **Elevation:** 814 m.

### Directions

When you arrive at the junction of Mutton Falls Road and the Tarana Road you are in the historic village of Tarana within the Lithgow Local Government area.

### Site Description



**Figure 13: Tarana (black dot) and the surrounding geography.**



Locals will tell you that Tarana is an Aboriginal word meaning 'water hole'. However, the Sydney Mail, 31st August 1932, suggests a different origin. In this telling, the wife of an early German settler, Anna, acted as his assistant during shearing, generally carrying the tarpot. When a sheep was slashed or cut, he would call out to his wife, 'Tar Anna, Tar Anna' - and so the village obtained its name! Perhaps. Take time to visit the heritage-listed Railway Station that opened in August 1872. It's also time for a break at either the Tarana Pub or across the road, at Mamma Snow's Country Kitchen and General Store (closes between 3-4 pm). Both have toilet facilities.

Make a note to visit the Bathurst Railway Museum whilst you are in the Bathurst district and be mesmerised by the most extensive public HO scale (1:87) model railway in Australia depicting the Great Western Line between Tarana and Bathurst, complete with working locomotives. Finally, contemplate the geography of the landscape you have just traversed (**Figure 13**). You have driven through part of the Tarana/Fish River Valley. Note that the Fish River meanders through the landscape, indicating that it is an ancient river. Tarana Road more or less tracks with the railway line and the historic Lockyers Road/Mutton Falls Road on the south side of the valley. We will soon visit the imposing Evans Crown Nature Reserve before heading back to Bathurst via Diamond Swamp Road, running directly north of Tarana to the Great Western Highway. The three reserves that we visit or pass by are all on rocky highland and mostly protected from past land clearing and agriculture pursuits.

### **Site 13: Evans Crown Nature Reserve**

**Northings at roadside:** 6285325; **Eastings at roadside:** 772417; **Elevation Roadside:** 970 m; **Elevation at high point of Reserve:** 1075 m.

#### **Directions**

From Tarana, take the Sodwalls Road about 3.5 km to the junction with Honeysuckle Falls Road, turn right and travel south approximately 1.7 km to the parking lot servicing the Nature Reserve. A well-maintained but steep track allows you to clamber to the ridgeline about 100 m above the parking lot. You can easily spend a few hours at this engaging site.

#### **Site Description**

From the top ridgeline of the Reserve, locate a position where you can observe Bathurst around 35 km to the northwest. From this location, George Evans had his first view of what he would name the Bathurst Plains. The surrounding farming lands are dominated by the now-familiar Box-Gum Woodlands. The vegetation of the Reserve consists of open forest dominated by Apple Box, Ribbon/Manna Gum, Candlebark (*E. rubida*) and Yellow Box. The readily observable 'crown' is made up of a series of tors. A tor (a Welsh word) is a large free-standing rock formation, in this case of granite origin, created by spheroidal<sup>7</sup> weathering and differential erosion (**Figure 14**). Different erosion rates can be due to factors such as variable hardness of granite across the landscape or by the width of the vertical joints, characteristic of many granite outcrop formations. The narrower the width between joints, the greater the rate of chemical weathering. These granite outcrop formations were once covered with an estimated 5 km of varying sedimentary rock, and other geological layers long since weathered away. As the massive weight above the granite was removed by water and wind erosion over millions of years, characteristic horizontal cracking (unloading joints) appeared due to

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<sup>7</sup> Spheroidal weathering is a form of chemical weathering that affects jointed bedrock such as granite, resulting in rock layers peeling off a bit like the layers of a peeled onion, often leaving the core rock as a freestanding boulder, sometimes in what looks like an impossible balancing act.

pressure release. Such cracking is commonly observed in above surface granite formations. In frost-prone areas such as in the Central Tablelands, the winter freezing and thawing of water in rock cracks also helps shape granite formations (frost heave).



**Figure 14: A finely balanced Tor on Evans Crown Nature Reserve.**

The tor formation so impressed George Evans that he named this series of three rocky hills after himself – hence Evans Peak (Crown). Viewed from a traveller's perspective using Coxs Road, Evans Crown commands one's attention in this landscape, more so than the relatively small hill that Evans named Mount Blaxland, 16 km east of this location. The tors are less susceptible to erosive forces than the surrounding landscape's granites, where broad valleys formed with granite derived soils. The Evans Crown Nature Reserve has two granite types of different ages belonging to the late Carboniferous Bathurst Batholith.

The dominant Evans Crown Granite is the youngest granite within the Bathurst Batholith (299 – 323 Ma) and the Bathurst Granite at ( 323 – 358 Ma).

Evans Crown Nature Reserve is also a significant place for Darug, Gundungurra and Wiradjuri people. At times they would gather there and go through their law/lore together. Up until 1900, a group of Aboriginal people lived on Evans Crown. A nearby property has a bora ring. Aboriginal people in the Oberon area accessed the coast via the Duckmaloi River (corrupted from an Aboriginal word Wan-dak-ma-lai to Duckmulloy/Duckmaloi), Jenolan Caves and Katoomba.

A necessary tactic in every explorer's repertoire is the climbing of suitable mountains to observe the lie of the land, the direction that rivers run, the relative distribution of woodland, forests and grasslands, as well as to enjoy the scenic vistas on offer. The experience of 'seeing the country in real-time' cannot be trumped by a virtual view. George Evans was greatly inspired by this view ('gives me great spirits'). Evans estimated that this view stretched for 50 miles (80km), a very good estimate on his part. His view to the east was curtailed by the Great Dividing Range 11 km due east. Looking south, he would have seen the route of what would become the line of Coxs Road. It is the view to the west, however, that would likely have been of most interest. Evans' background makes it unlikely that he would view the grand vista of the Macquarie River Valley as more than a static landscape, perhaps 8,000 – 10,000 years old.

The remarkably pleasing vista of the Bathurst Plains, 40kms away, would be named by Evans within days, and even more satisfying to him was their superficial similarity to English parklands. The volcanic mountain we now know as Canobolas is 91 km directly west, and the Three Brothers and the dominant Mount Macquarie, 70 km to the south-west. The first European map of this area was a simple line transect prepared by Evans himself on his return journey. He perambulated and chained his return trip from the Bathurst Plains to Emu Ford, recording the numerous compass readings capturing the many changes in direction. John Oxley would use the accumulating European data in his 1815 map of the 'Country to the Westward of the Nepean'. Within Evans' view was the Fish River, the basis of an imaginative

mapping system beyond his understanding – one of many Aboriginal Dreamtime story strings. Wiradjuri and Gundungurra people would follow this river to its source via the Duckmaloi River and cross over the high range to Binomil (Jenolan Caves), from non-eel country to eel country.

### Site 14: Lookout on Honeysuckle Falls Road

**Northings:** 6280575; **Eastings:** 772819; **Elevation:** 870 m.

#### Directions

On route to Site 14 is a more or less continuous corridor dominated by a range of trees, including the white-barked Ribbon/Manna Gum, Apple Box and Candlebark. From the Reserve, drive south for 2.3 km to the junction with the signposted Charltons Lane directly under the powerline. Continue on about 2.8 km through the gate numbered 288/290 and turnaround at the cattle yard. Take in the spectacular view of Evans Crown and the upper reaches of the Fish River. Whilst this is a public road, do not travel further south from this point.

#### Description



**Figure 15: John Lewin's watercolour of Evans Peak, 1815.**

John Lewin sketched a view of Evans Crown (Peak) in 1815 (**Figure 15**), but, based on the perspective of the painting, likely 3.6 km south-east on the original line of William Cox's 1814/1815 road on the northern boundary of Hampton State Forest. The 'Crown' stands out from this viewing point much more than it does when approached from the Tarana Road. Honeysuckle Road continues through to Coxs Road, but the old road and river are now impassable at this location.

Take time to contemplate this scene and to compare it with Lewin's painting. Lewin did not include the Mount Olive woodland complex (the fourth hill) at 1032 m that blocks the eastern view and is on the southern side of the gorge through which the Fish River flows.

1. How faithfully has Lewin reproduced this scene?
2. Why is the Fish River challenging to discern in the painting?
3. In what way has the valley floor woodland changed since 1815?
4. John Lewin was travelling with Governor Lachlan Macquarie's entourage and cross the Fish River by a wooden bridge built by William Cox's team. However, it was George Evans, in 1813, who first named the Fish River.

George Evans was not a member of Macquarie's party but was waiting at the Bathurst Plains camping site. If you were there, what questions would you want to put to George Evans?

George Evans may have often been tongue-tied, and indeed, he was not a wordsmith, but in naming Evans Crown, he seems to be sending Blaxland, Lawson and Wentworth a message, perhaps even the British Empire.

The elevation of the Fish River at the southern end of the Reserve is around 830 m. About 6.5 km upstream, the river is coming off the older and harder metamorphosed/lithified sandstones and marine sediments. From there, it commences its more rapid cutting down of the downstream granite country to create the broad Fish River/Tarana Valley. The Fish River is eventually subsumed within the Macquarie River Valley.

One other matter deserves our attention. Immediately above the gorge, the fringing forest of River She-oak is absent. Why? There is no sign of tree colonisation, suggesting that tree clearing is not an issue or any sudden geological change. River She-oak can grow at this altitude at other locations. One possible reason is the cold air from the Duckmaloi River headwaters on the Great Dividing Range. The author carried out a platypus study on the Duckmaloi Weir for 15 years. Winter temperatures there would sometimes cause the weir to freeze over and temperatures to plunge to -16°C. Cold air at this temperature flowing down the Fish River would likely kill germinating seedlings of River She-oak upstream of the Reserve. Whilst this icy air would continue to flow slowly through to the Bathurst plains, the air mass would warm gradually but remain sub-zero. Could there be other plausible reasons for the sudden absence of River She-oak at this location?

### **Site 15: Scenic Drive - Diamond Swamp Road to the Great Western Highway**

Drive back towards Tarana, turning right onto Diamond Swamp Road at the junction with the Hazelgrove Road. Diamond Swamp Road is wholly contained within the Diamond Swamp Creek Valley, with the road crossing the creek at several locations. From Tarana, the road climbs 200 m to its junction with the Great Western Highway. The underlying geology along this 12 km stretch of road changes from metamorphosed marine sediments (370 – 380 Ma) to Eusdale granite (325 – 330 Ma) and then to metamorphosed early Devonian marine sediment (390 – 420 Ma) at the Great Western Highway. The term 'Swamp' in the creek's name suggests that swamps were a common feature along this creek. However, the altitudinal fall is too steep to enable swampy meadow formations to occur. The creek drops down in stepwise formation. It is primarily a bedrock stream with shallow pools and riffles, often located on elongated rocky platforms. This environment allows sediment build-up in pools, facilitating wetland plants to thrive. These include significant continuous clusters of bulrushes and common reeds that trap sediments. The roadside tree verge is discontinuous and is dominated by Manna Gum and Applebox, with Mountain Gum (*E dalrympleana*), and Snow Gum (*E pauciflora*) found at higher elevations.

### **Site 16: Turners Plot (Disneyland) – Sunny Corner State Forest, Yetholme**

**Northings:** 6296114; **Eastings:** 764751; **Elevation:** 1174 m (at the intersection of the Open Forest and Pine plantation).

#### **Directions**

From the intersection of Diamond Swamp Road with the Great Western Highway, turn left and stay in the left lane for about 2.2 km. At about 2 km, the left lane merges with the right lane but stay left as the zebra stripes appear, turning left onto a dirt track through a forest wire



gate. Turn right onto the narrow bitumen road, part of the Great Western Highway in the 1960s! Continue on about 200 m where you can park your car. Walk down the badly eroded track between the pine plantation and the farmland to the west (450 m). There you will come to the junction of the pine plantation and the Tall Open Forest. Take some time to walk the easterly track, which soon turns in a southerly direction through the centre of this forest remnant.

If you miss the gate on the Great Western Highway, continue west to Eusdale Road just before the Caltex petrol station, which will take you back to Diamond Swamp Road. You can then attempt a second entry to Site 16. Eusdale Road is a 13 km circuit detour through this high country dominated by regrowth Brown Barrel (*E fastigata*) Tall Open Forest.

### Site Description

Site 16 is (**Figure 16**) located immediately south of the Great Western highway, some 30 km east of Bathurst, in the Sunny Corner State Forest. The area consists of a second rotation 20-year Monterey Pine plantation separated from an island of Tall Open Forest by a logging trail about 5 m wide. The open forest is dominated by Brown Barrel, Manna Gum, and Mountain Gum, to a height of about 40 m with scattered Snow Gum and some Scribbly Gum.



**Figure 16: Turner's Plot (Disneyland) within the Sunny Corner State Forest.**

The well-developed understorey has saplings of the canopy species (two scattered wattle species, Green Wattle and Hickory) and the parasitic Native Cherry. The relatively thick ground cover is dominated by Bracken, Tussock Grass, and the perennial herbs Mountain Fireweed and Common Storks-bill.

The island forest resembles a moderate example of the high conservation vegetation present before the widespread planting of Monterey Pine in the Sunny Corner State Forest (mostly north of this location) in the 1960s and 1970s. Site 16 was selectively logged before 1972 and intermittently grazed. The forest is sometimes subjected to 'tree throw' - mature isolated trees randomly ripped out by localised high winds.

Several fire trails about 2.5 m wide run through this remnant. There has not been a hot wildfire for at least 50 years. However, some limited spot burning is carried out by the NSW Forestry Corporation. The open forest area is surrounded on the northern side by pine plantations, to the east and the west by cleared farmland and on the southern side by a substantial clearing associated with a major power line. The altitude of this site varies between 1100 – 1150 m across the gently undulating landscape. Maximum and minimum temperatures in adjacent farmland range from -7.5° C to 38° C. Frost intensity is greatly ameliorated within the pine plantation and the native forest compared to the surrounding cleared agricultural land.

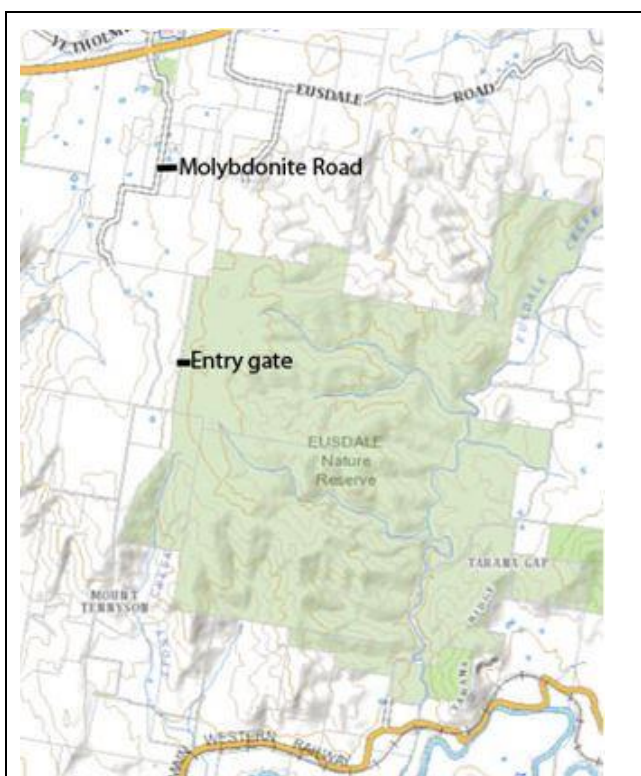
Summer temperatures rarely exceed 30° C. Mean average rainfall at the site is 1025 mm/year. Rainfall is higher in spring-summer and lower in autumn-winter. Snow falls occur on average about 5-8 days per year, are usually light but occasionally heavy enough to cause limbs to fall in both the native forest and pine plantations, with snow depth up to 30 cm sometimes recorded.

The site has been affectionately called ‘Disneyland’ by generations of Charles Sturt University students. Wiradjuri retreated to forest sites such as these during winter to escape the severe frosts on the Bathurst floodplains (John Bland pers comm 1980). The site was used as a control by the Australian Museum Curator, the late John Disney, to examine the impact of pine plantations on bird species diversity – hence the name ‘Disneyland’. A team of scientists undertook a long-term small mammal ‘mark, trap and release’ research program at this site for 15 years (Goldney et al., 2019).

### Site 17: Eusdale Nature Reserve

**Northings:** 6290167; **Eastings:** 761951; **Elevation:** 1174 m at the western entry gate.

#### Directions



**Figure 17: Eusdale Nature Reserve, bounded by The Great Western Highway to the north and the Tarana Road to the south.**

From Site 16, travel west along the Great Western Highway for 3.3 km and turn left into Molybdonite Road, an all-weather decomposed granite road (**Figure 17**). About 500 m before Molybdonite Road, the route crosses the boundary between the metamorphosed marine sediments of the Devonian period (420 Ma) and the Durandal Granite (325 - 330 Ma). From the Great Western Highway, travel south about 3.5 km and stop on the roadside near the property gate numbered 318. In the distance, looking slightly south of true west, is Mount Macquarie (60 km distance), elevation 1235 m, and east of Carcoar. Eighteen kilometres due east of Mount Macquarie are the Three Brothers (Little Brother, Middle Brother and Big Brother), about 40 km distant, all topping 1100 m, and approximately the same elevation as this lookout site at 1100 m.

These distant high points are on ancient marine Early Devonian and Silurian sediments capped with basalt flows from the Airly Province (34 Ma) that slowed the erosion processes at work in the landscape. Travel a further 1.8 km to reach the property ‘Shady Springs’ Number 320. Park your car off the road and walk 100 m east to the Eusdale Nature Reserve gate.

## Site Description

The majority of the Reserves contains Dry Open Woodland communities, typical of the Central Tablelands, dominated by the Inland Scribbly/Manna Gum, Long-leaved Box and Brittle Gum, which occur on often exposed, north-west facing slopes on shallow soils. This community is associated with typical dry sclerophyll shrub species, including Daphne Heath (*Brachyloma daphnoides*), Pink Five Corners (*Styphelia triflora*), Box-leaved Wattle (*Acacia buxifolia*) and Nodding Blue Lily (*Stypandra glauca*).

Spend some time walking the tracks of the Reserve.

### Site 18: Scenic Drive back to Bathurst<sup>8</sup>

Drive back to the Great Western Highway and turn left to head back to Bathurst. After driving about 1.2 km from Molbydonite Road you cross Flying Pan Creek. Within a few hundred meters the highway passes through a granite cutting. The fresh rock faces in the cuttings have good exposures of the “megacrysts<sup>9</sup>” in the Durandal Granite (**Figure 18**). Large (up to 7cm) feldspar crystals are common and represent an initial slow phase of granite cooling, followed by a slightly faster phase for final cooling, with smaller crystals. On this rock face can also be seen a basalt dyke, where molten lava has flowed vertically through cracks in the rock and subsequently cooled (**Figure 19**) to form sheet-like igneous intrusions.

**It is a very dangerous spot to stop to view the cutting and is not safe to do.**



**Figure 18: ‘Megacrysts’ in the Durandal Granite**

About 5.9 km from Molybdonite Road as the highway leaves the granite terrain. Two significant thrust faults cross the road near this location – one of which may be seen (with difficulty) in the cutting near the Napoleon Reef Road turnoff (**Figure 19**). These represent the southern end of the Wiagdon Thrust, which forms the major eastern structural boundary of the Hill End Trough<sup>10</sup>. As you pass over and descend Browns Hill, you are back on folded Silurian age (about 425 Ma) marine sediments of the Hill End Trough before we again reach the Bathurst Granite batholith.

<sup>8</sup> I am indebted to Col Bembrick and Peter Wilson for additional geological insights into this drive back to Bathurst.

<sup>9</sup> A megacryst is a crystal or grain that is considerably larger than the encircling matrix. They are found in igneous and metamorphic rocks.

<sup>10</sup> The Hill End Trough is a large and ancient geological depositional basin immediately north of the Bathurst granite with active sedimentary infilling and deformation around 380 - 359 Ma.





**Figure 19: Two thrust faults evident in this road cutting**

About 5.9 km from Molybdenite Road as the highway leaves the granite terrain. Two significant thrust faults cross the road near this location – one of which may be seen (with difficulty) in the cutting near the Napoleon Reef Road turnoff (**Figure 19**). These represent the southern end of the Wiagdon Thrust, which forms the major eastern structural boundary of the Hill End Trough<sup>11</sup>. As you pass over and descend Browns Hill, you are back on folded Silurian age (about 425 Ma) marine sediments of the Hill End Trough before we again reach the Bathurst Granite batholith.

Stunted woodlands characterise the tree-topped embankments along this section of highway. Once back on the familiar undulating country of the Bathurst Granite, the typical granite vegetation – the Box-Gum Grassy Woodlands – is again apparent.

At Yetholme, the climate is typically the so-called ‘mountain climate’. The rainfall is about 30% higher than at Bathurst, an example of a rain shadow. As Yetholme residents can testify, it is not uncommon for it to be raining in the Sunny Corner-Yetholme area whilst the sun shines in Bathurst. However, early morning fog can shroud the city and the Macquarie River valley in autumn and winter, whilst Yetholme is bathed in sunlight.

Take time also to consider that modern Bathurst intersects with deep time stretching back to the Big Bang some 13.7 billion years ago when space, time and matter were created in an instant. The light coming to us from the sun, 151 million km away, takes about 8 minutes to reach us, and from the nearest galaxy, Andromeda, some 2.5 million years. The vast universe is also expanding at around 73 km/second. Consider, too, that planet earth is moving around the sun once every year. The earth rotates once every twenty-four hours (about 1600 km/hr). Every day, we observe this rotation through the rising and the setting of the sun. The speed at which the earth is moving as it orbits the sun is around 90,000 km/hr. The earth’s distance from the sun doesn’t change enough to cause seasonal differences. Still, our seasons change because the earth is tilted on its axis, and the angle of tilt causes the northern and southern hemispheres to trade places throughout the year.

**Arriving back in Bathurst completes Tour 2.**

<sup>11</sup> The Hill End Trough is a large and ancient geological depositional basin immediately north of the Bathurst granite with active sedimentary infilling and deformation around 380 - 359 Ma.

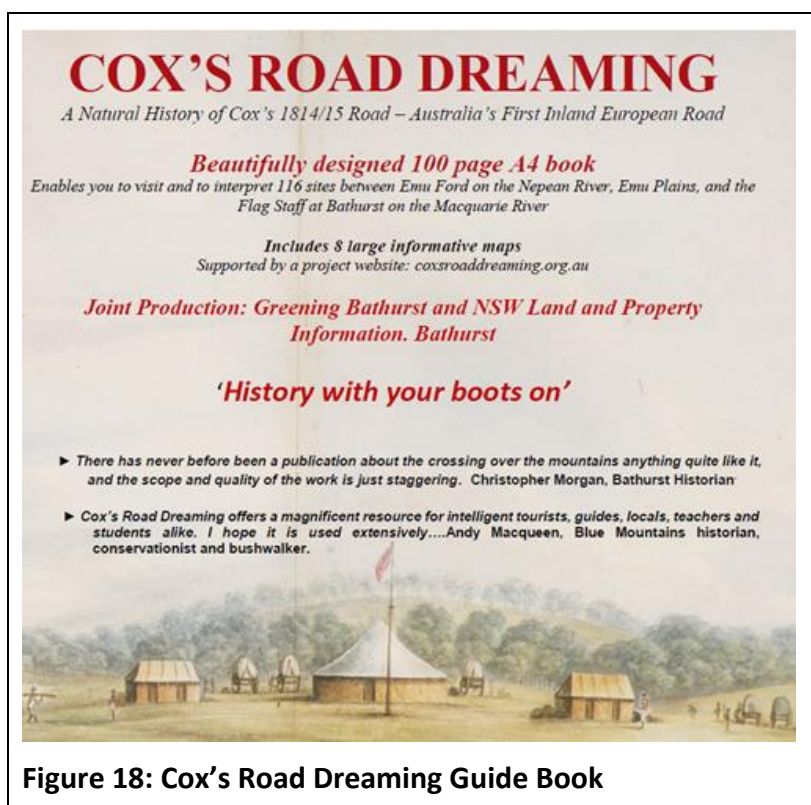


## Acknowledgements

I would like to thank many of my scientific colleagues, who have helped me better understand the genesis of the Bathurst Landscape over the years. These include Chris Marshall, Dr David McKenzie, Col Bembrick, Wyn Jones, Dr Johannes Bauer, Dr Barbara Mactaggart, Dr Anne Kerle, Dr Peter Wilson, Dr Colin Bower, Dr Richard (Dick) Medd, Professor Warren Somerville AM and the late Ernst Holland FAIHA. Hydrologist and engineer Norman Wise and I have enjoyed many long talks about water issues in Bathurst. I have also enjoyed and learnt much from talking with two farming friends, Peter Andrews and Paul Newell from Canowindra. In the 1970s, Peter Andrews first brought to my attention the importance of swampy meadow formations in the landscape and their almost universal loss across the tablelands of New South Wales. Peter's insistence that understanding the processes of swampy meadow formation and destruction were at the very heart of landscape restoration has been vindicated. Two Wiradjuri men have become close personal friends, Ian McArtney and Gavin Waters, and through discussions and fieldwork significantly increased my understanding of the flora and fauna and landscapes of the Bathurst Region. I remain indebted to the late John Bland, market gardener, a field-naturalist from Yetholme and a member of the now-defunct Bathurst Field Naturalists Society member. He mentored me when I arrived in Bathurst in 1972. The late Bathurst historian Theo Barker encouraged me in the 1970s to integrate my ecological understanding with human history. That only became possible after I retired from Charles Sturt University, nearly 30 years later! I have also enjoyed the friendship of many regional artists who capture the landscape in ways that scientists cannot.

## Additional Natural History and Scenic Tours of the Bathurst District

1. **'Australian Fossil and Mineral Museum'** -make sure you visit this world-famous museum in Howick Street.
2. **Cox's Road Dreaming Guide Book**- Goldney, D.C. (2015) Cox's Road Dreaming Guide Book. A Natural History of Cox's 1814/15 Road – Australia's First Inland European Road. Land and Property Information, Bathurst.  
  
This book (**Figure 18**) can be purchased in Bathurst at Books Plus (\$30) in Howick Street diagonally opposite the Post Office. Pages 10-35 enables a self-guided tour of 30 sites along the *original* line of Cox's Road (1814/1815) between Bathurst and the Fish River Crossing.
3. **Scenic and Natural History Tour 2** - Goldney, D.C (2021) Greening Bathurst's Scenic and Natural History Tour 2 of the Bathurst Region. BRC. 30 p booklet. Available Bathurst Tourist Centre.
4. **Scenic and Natural History Tour 3** - Goldney, D.C (2021) Greening Bathurst's Natural History and Scenic Tour 3 of the Bathurst Region. BRC. 30 p booklet. Available Bathurst Tourist Centre.



**Figure 18: Cox's Road Dreaming Guide Book**

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