The Geoheritage of the Atherton Tablelands, Queensland

A guide for visitors

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The Geoheritage of the Atherton Tablelands, Queensland. A guide for visitors.

Recommended citation: Gillieson, D. S. 2025. The Geoheritage of the Atherton Tablelands, Queensland. A guide for visitors. Footloose Publications, Kuranda, Queensland. 53pp.

National Library of Australia Cataloguing – in – Publication entry:

Gillieson, D.S. and Dungey, K.

ISBN: 978-0-646-71116-4 (e-book)

Includes bibliographic information

Geology – Atherton Tablelands, Queensland

Geological Heritage - Atherton Tablelands, Queensland

Maps by Kym Dungey

Cover image: David Gillieson

Layout and Production by: David Gillieson and Footloose Productions

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What is Geoheritage?

This book is designed to help visitors explore the Atherton Tablelands' rich geological heritage, its rocks of great age, its landscapes and their treasures. It should also help you to understand some of the events responsible for its formation through millions of years of Earth history.

Geodiversity refers to the variety of geological elements of nature, such as rocks and minerals, soils, fossils and landforms, and active geomorphological processes. The Atherton Tableland is a very geodiverse place, as well as an important place for biodiversity. Together they make up our natural heritage that is worthy of conservation.

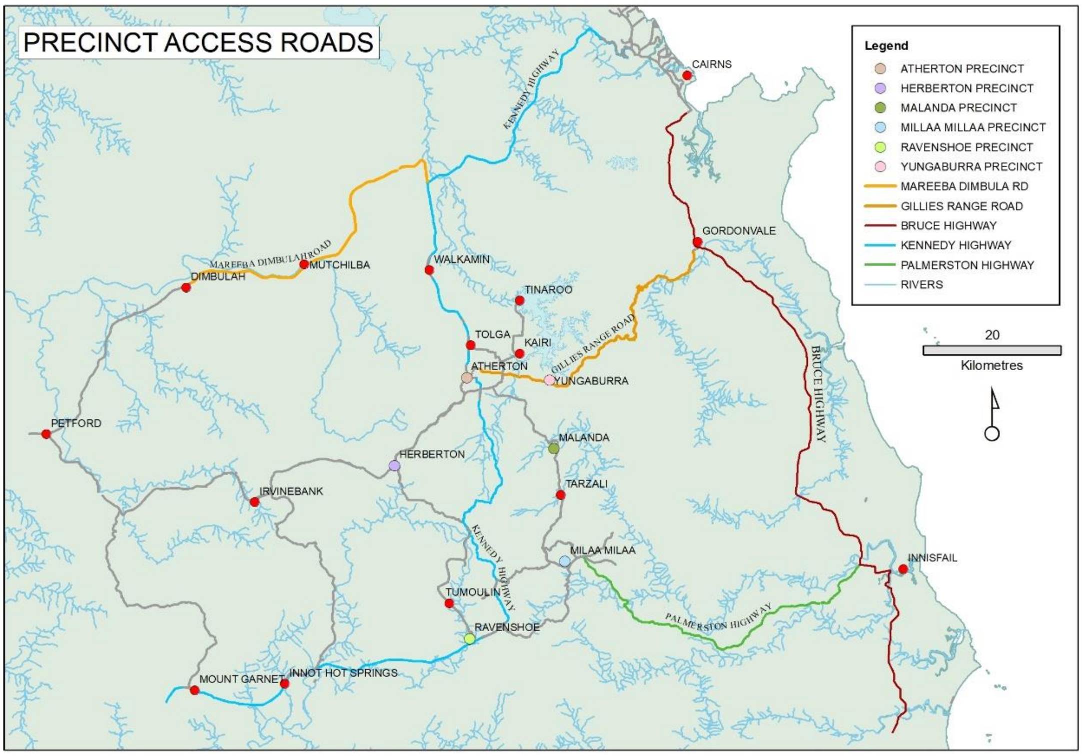
Geoheritage is made up of the elements of geodiversity which are of significant value to humans, for purposes which do not diminish their intrinsic or ecological values. This implies a distinction between the utilitarian resource values of rocks, landforms and soils, and their conservation values as heritage in their natural state.

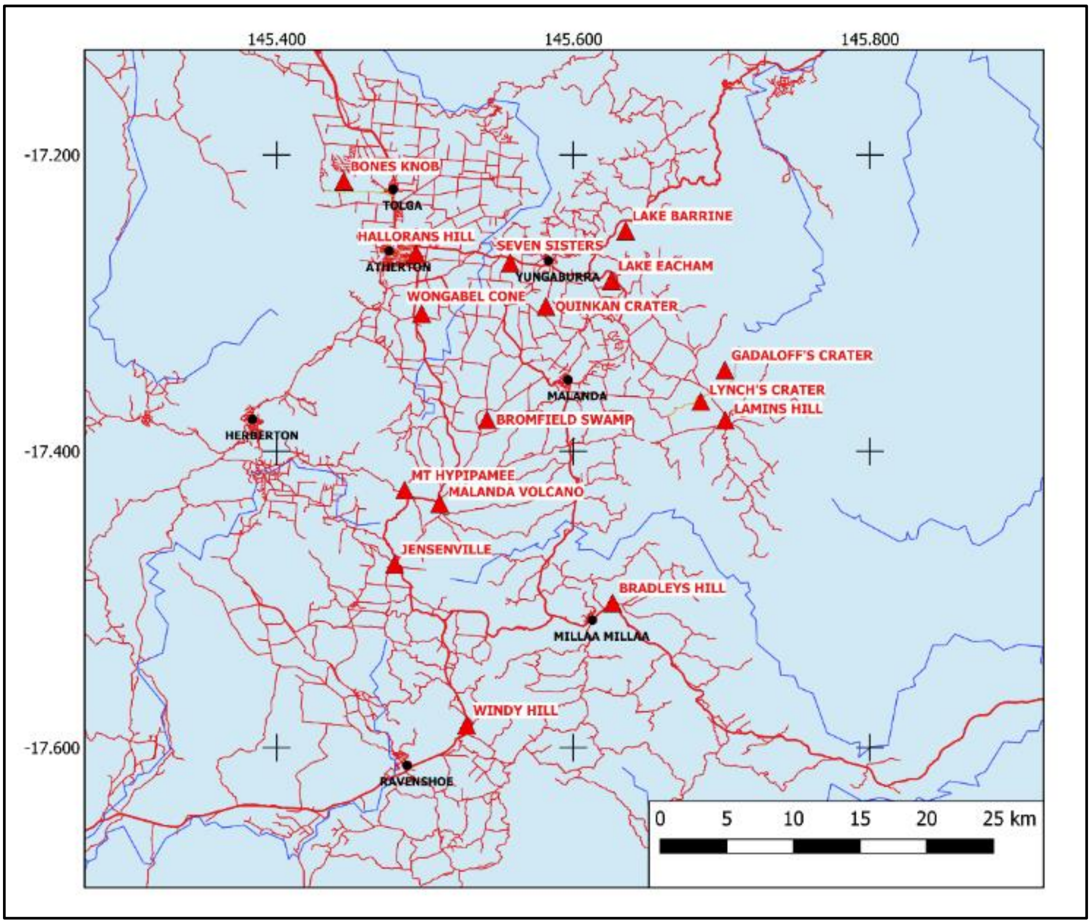
What is a Geosite?

A **Geosite**, or site of geological Interest, is an "area that is part of the geological heritage of a natural region as constantly shows one or several characteristics that are considered significant in its geological history" (García Cortés and Carcavilla, 2013). This book provides a description of a number of geosites on the Atherton Tablelands in non-technical language.

How to use this book

There are many geosites which you can visit easily by car, bike or on foot. For each site we provide a simple description of the geology and geomorphology. You can combine these sites into an itinerary over several days. The sites are organised by precincts based on the major towns of the Tablelands. Towards the end of this book there is a section on access instructions for individual sites, organised by precinct. There is also a list of accessible Further Reading if your curiosity is stimulated.





Locations of dormant volcanoes mentioned in the text

Geological Overview

Building the Framework

The geology of North Queensland is complex and has a long history. The oldest rocks in the region are the Dargalong Metamorphics, which are made of gneiss around 1.5 billion years old. They form the basement rocks and were exposed to erosion at the land surface between that time and the Palaeozoic (about 600 million years ago), when life emerged. In the Ordovician (about 470 million years ago) the region stretched as two big continental blocks pulled apart. A long narrow sea in a rift valley, similar to the Red Sea today, formed and marine rocks were laid down as sediments. The eastern edge of this may well have been the Kuranda Range. In the Late Silurian (about 420 million years ago) coral reefs grew on the rims of submarine volcanoes, eventually solidifying to form the limestones seen at Chillagoe. Shallow water limestone formation persisted almost continuously for about 40 million years, indicating a remarkably stable ancient environment.

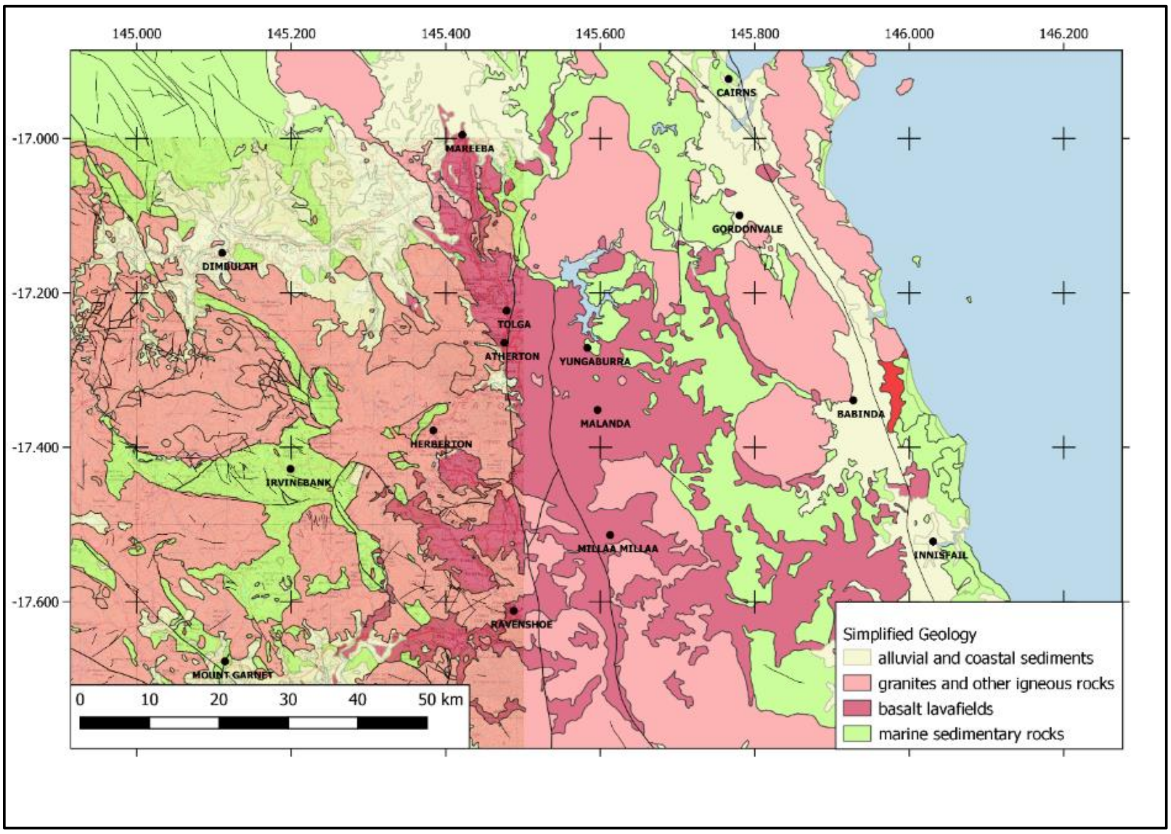
Between 370 and 325 million years ago, the continental blocks moved together again and squeezed the marine basin rocks. A range of mountains, akin to the Himalayas, formed along the north-trending Palmerville Fault. Originally horizontal bedded rocks were squeezed like a concertina and tilted almost vertically. A series of faults thus transformed the marine rocks from a horizontal slab 1km thick to a stack of rocks up to 10km thick. Deformation was so intense that bedding in the rocks is always very steep or overturned, and can be seen in road cuttings.

The region was again stretched and faulted in the Late Carboniferous (310-300 million years ago). The Palmerville Fault linked up to form a massive system 2500km long in North Queensland. The rotation of the entire continent in the early Permian (300-280 million years ago) created a series of twisting movements in the rocks to the east of the Palmerville Fault. Major volcanic activity continued with a huge crater forming the Featherbed Range between Chillagoe and Dimbula. Between 2000 and 3000 cubic kilometres of volcanic ash and lava was blasted onto the surrounding landscape.

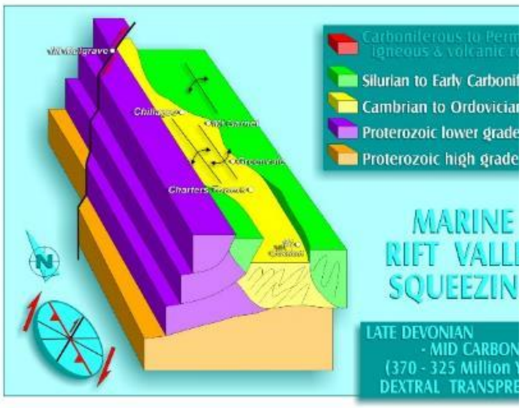
In the Late Permian (255-245 million years ago) the widespread continental glaciation produced extensive outwash deposits of sands, conglomerates and associated lakes due to blocked drainage. At Mount Mulligan, a shallow lake was surrounded by peat swamps and forest which eventually decayed and formed coal. Today the Permian sandstone and conglomerates form spectacular cliffs up to 200m high, with a coal seam mined until a major disaster in 1921.

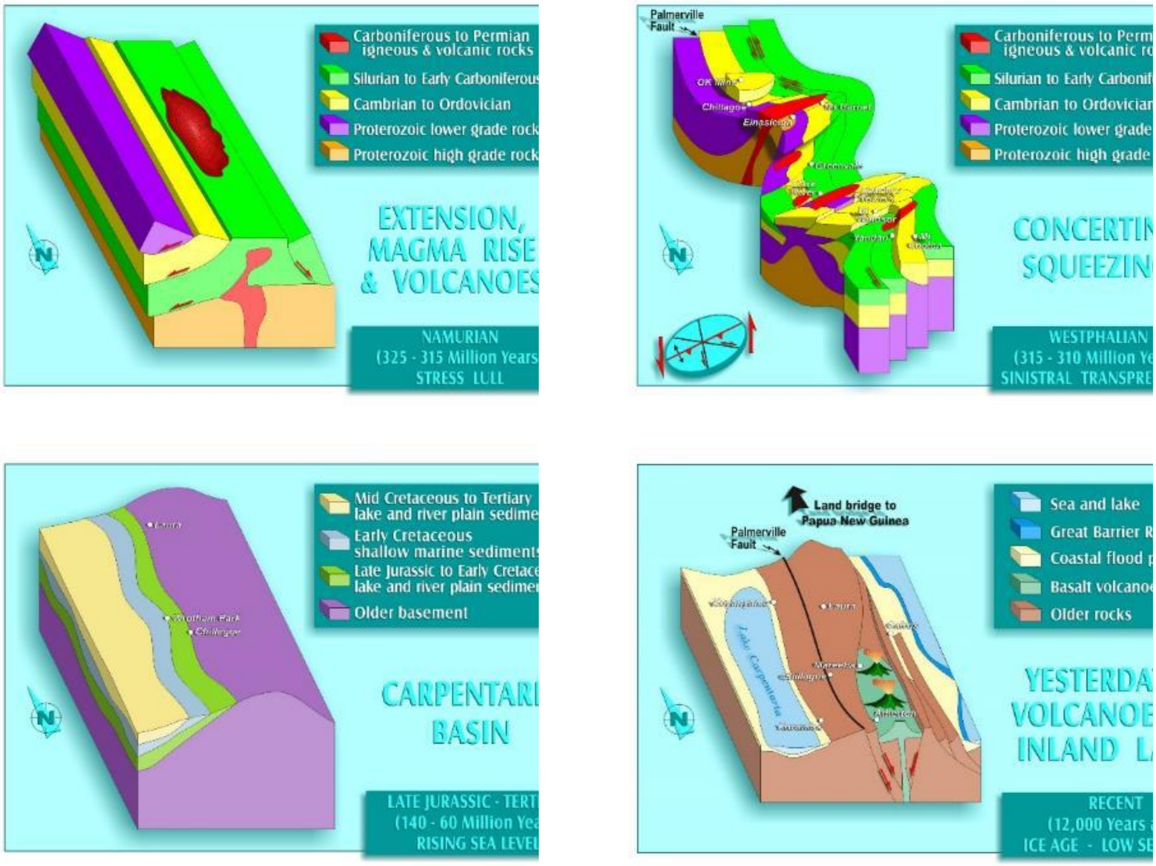
During the Late Cretaceous to early Tertiary (40-70 million years ago), the eastern margin of the Australian continent was uplifted and warped due to the splitting away of New Guinea, New Caledonia and New Zealand. The Great Divide was created by this rifting and it is likely that the pattern of rivers in the area have been stable since that time.

From the mid Tertiary to the Holocene (30 million years ago to 10,000 years ago) basaltic volcanoes developed in the region. The youngest of these, only 10,000 years old, are seen at Lakes Barrine and Eacham. Massive sheets of basalt flowed down the valleys on the Atherton Tablelands from several large shield volcanoes. During low sea levels associated with the Ice Ages over the last two million years, a land bridge to New Guinea allowed the immigration of plants, animals and people.



Simplified geology of the Atherton Tablelands

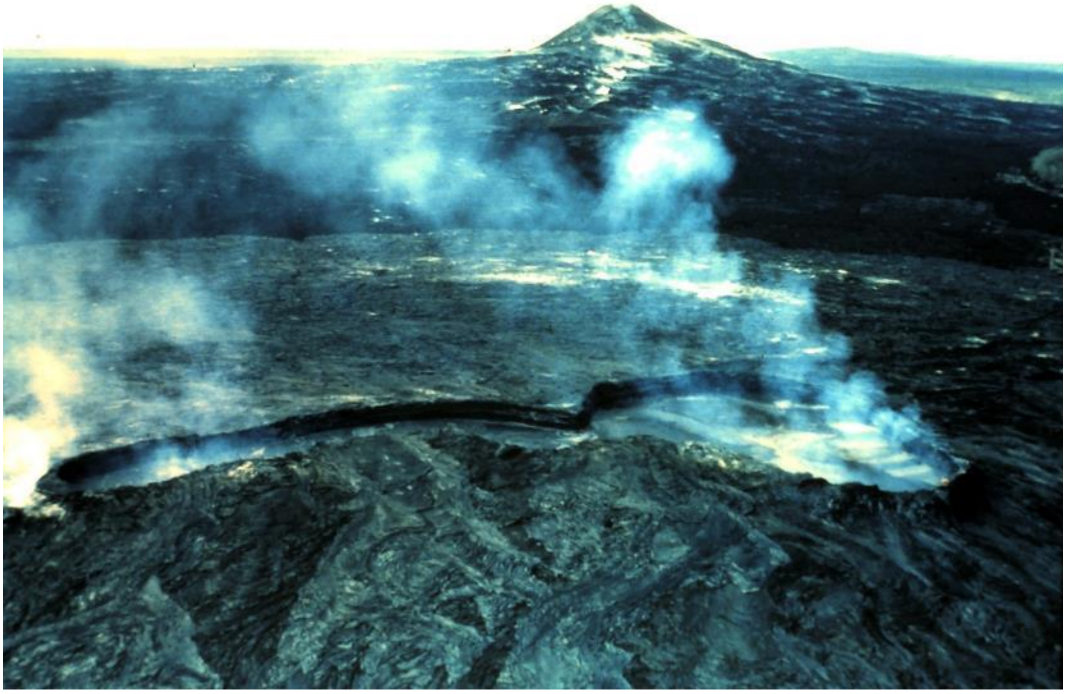




Schematic geological evolution of North Queensland. From Nethery (2003).

Fire from the Earth

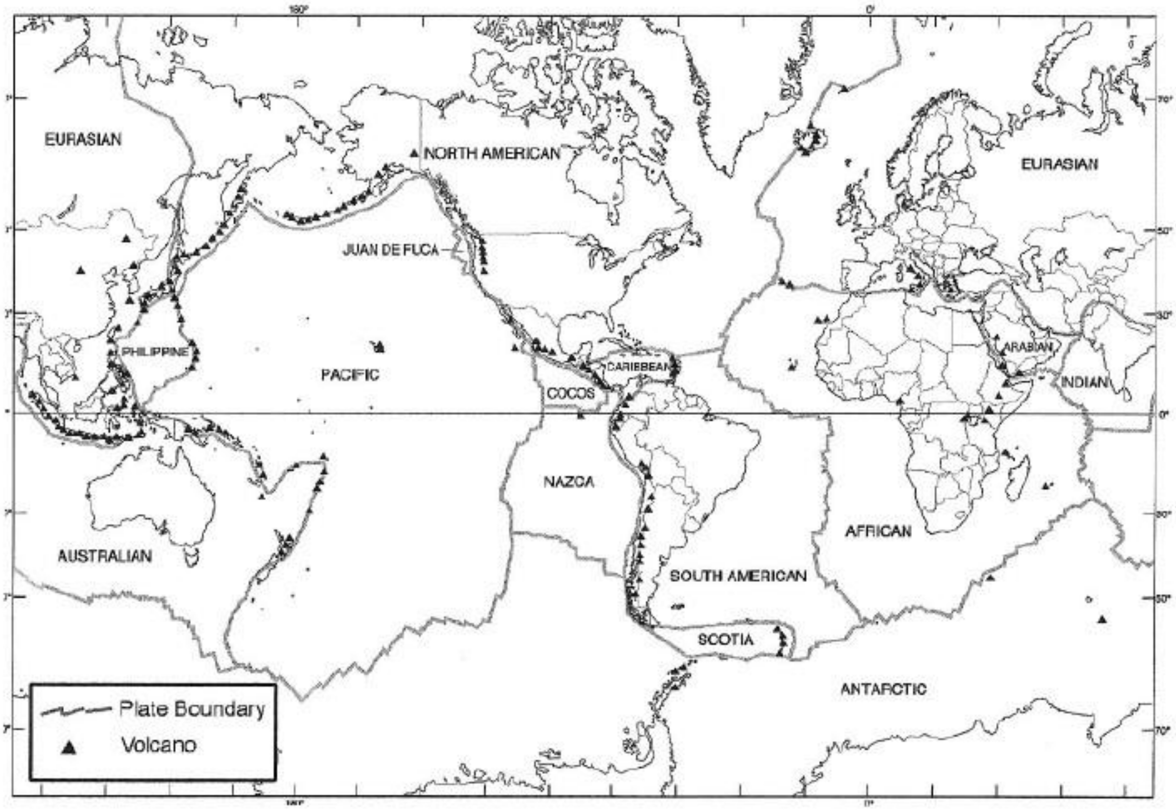
Volcanoes capture the public's imagination, not only as beautiful and fascinating landforms, but also features whose enormous power may threaten society. Not so widely appreciated is that the formation of the planet and the existence of life on it have been dependent upon the activity of volcanoes throughout geological time. If the ocean floors are included, over 80% of the Earth's surface is of volcanic origin, while the gases emitted from volcanoes over hundreds of millions of years were instrumental in forming the Earth's earliest oceans and atmosphere. These gases provided the ingredients vital to evolve and sustain life.



Crater of Kilauea volcano, Hawaii with active steam vents

Active lava flow at Kalapana settlement, Hawaii

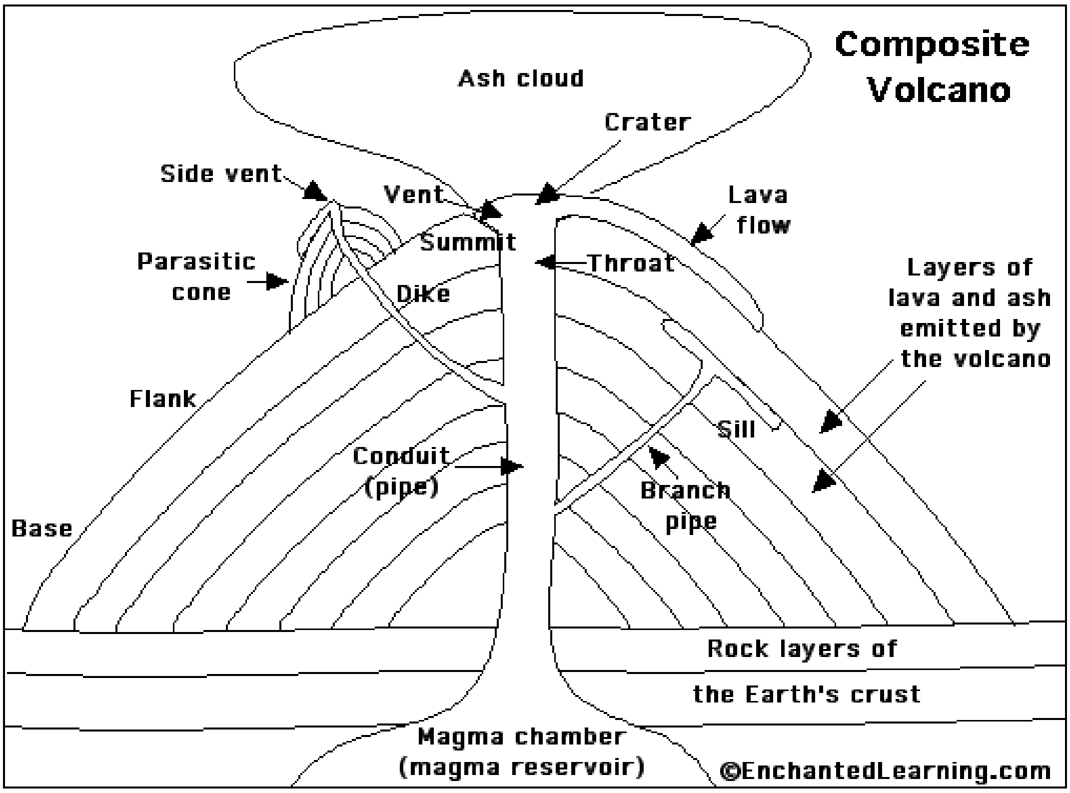
Volcanoes are not randomly distributed over the Earth, but are found over areas where hot liquid rock (magma) has been able to rise and escape onto the Earth's surface. As seen in the map, volcanoes occur mainly along the boundaries of the Earth's tectonic plates, or at places in the interior of plates where rising magma has punctured the crust (known as a 'hot spot'). However, it should be remembered that the present-day distribution of volcanoes is a reflection of the current arrangement of plates, and that in the geological past the pattern of plates and therefore the distribution of volcanoes changed constantly throughout time. This means that in addition to present day volcanoes, we also find evidence of ancient volcanism in the historical, or stratigraphical, record, at locations typically remote from any current plate boundary or hot spot.



Global distribution of volcanoes along tectonic plate margins.

Source: https://www.enchantedlearning.com/subjects/volcano/printout.shtml

Crucial to the behaviour of any volcano are the flow properties of the magma, the most important being its viscosity or runniness. Viscosity in turn is determined by the magma's chemical composition, gas content and degree of crystallisation. The more viscous (toffee-like) the magma, the more explosive the eruption, producing a higher proportion of ejected fragments of rock. If the magma is relatively runny (low viscosity), its outpouring will normally take place without significant explosive activity (unless water enters the system), which is a style of eruption that will form lava plains, lava fields and low-angled shield volcanoes like those on the Atherton Tablelands. If the viscosity of the magma is high, escaping gases are released explosively, blasting magma and fragments of the pre-existing volcano into the air, to fall back to Earth as bombs or ash, collectively known as pyroclastic material. Such activity, combining lava flows and pyroclastic deposits, builds steep conical mountains, known as stratovolcanoes, surmounted by one or more craters of different types. Well-known volcanoes of this type include Mount Fuji, Mount Etna and Mount St Helens.



Typical structure of a composite volcano.

Source: https://www.enchantedlearning.com/subjects/volcano/printout.shtml

Basalts come from the earth's mantle, about 35km down. The molten magma rises through the earth's crust and is erupted at a temperature of 1200-1300°C from volcanic vents. Most individual basalt flows are less than 10 metres thick so the valley fills of the Atherton Tablelands are made up of many layers or flows. Basalt contains a high proportion of iron. The iron-rich minerals oxidise to rust, forming the red colour of the soil.

There are two main styles of volcanoes on the Atherton Tablelands:

Shield Volcanoes are large features rising above the surrounding landscape and have low-angled slopes extending 5 to 15km from the vent. They may have secondary vents or craters on their flanks. Massive quantities of lava were erupted from the shield volcanoes. Their low viscosity, about the same as tomato sauce, meant that the lava ran for long distances and their flanks are low-angled. Subsequent weathering has changed the dark black basalt rock to red clay soils, and water erosion has cut deep gullies into the sides of the volcanoes forming characteristic radial drainage. Examples include the Bones Knob and Malanda volcanoes.

Cinder Cones and Maars – are relatively small volcanoes forming conical hills, usually less than 100m high and up to 1km in diameter. Very little lava was produced from these vents, instead ash and cinders were erupted. The maars, such as Bromfield Swamp, are vents located where there was abundant groundwater. Magma erupted and created steam, resulting in explosions which blasted out a shallow crater. A maar is typically broader with a less steep profile than the steep, conical cinder cones. The cinder cones and maars are much younger than the shield volcanoes. As a result they have rocky soils and have not been greatly eroded.

Lava columns result from slow cooling of liquid lava. They form at right angles to the cooling surface with five sided (pentagonal) cooling cracks developing downwards into the lava. Lava columns usually form at the top and base of the lava flow, and slow cooling results in larger columns. They are clearly visible at Millstream Falls and on the Waterfall Circuit at Millaa Millaa.

Rivers of Basalt

The basalt flows of the Atherton Tablelands cover nearly 2500km^2. Repeated flows of basaltic lavas have infilled valleys eroded into the basement rocks, resulting in a rolling landscape at several levels. Lavas also overflowed the great eastern escarpment and descended onto the coastal plain. There are also 14 eruption centres in the coastal lowlands between Cairns and Townsville.

On the Atherton Tablelands 65 eruption centres have been identified; of these 16 are shield volcanoes, 9 are maars, 35 are cinder cones and there is one diatreme (Mount Hypipamee).

Volcanic activity was concentrated in two main periods. A very large amount of lava poured out from two vents around three million years ago. Most of this basalt overflowed the escarpment to the east, partly filling the ancestral Johnstone River. This thick sequence of flows forms a gentle slope from the tablelands near Millaa Millaa down to Innisfail. To the west, another vent sent smaller basalt flows down the Wild River. A second major outpouring happened between 2 to 1 million years from several shield volcanoes. Reduced lava production in the last million years heralded a change from shield volcanoes to cinder cones and maars.

The Jensenville volcano was active between 3.9 and 3.3 million years ago. Basalt flowed southwest down the Wild River. These flows sealed deposits of alluvial tin in the river sands. Younger flows (2.8 to 2.6 million years ago) flowed more northwest and reached as far as the Wild River south of Herberton. Here the lava banked up to form a circular plateau.

The Malanda Volcano is the largest on the Atherton Tablelands and produced the largest lava flows. Th earliest flows are dated between 3.1 and 3.0 million years ago, with the flows extending as far as Mena Creek on the coastal plain. Thick lava flows were laid down in the Johnstone River valley. After a break, volcanic activity resumed between 2.2 and 2.0 million years ago. A flow from the top of the basalt sequence along the North Johnstone River is dated at 2.2 million years ago, and indicates that the flow down to the coast resumed about that time.

Roughly contemporary with this activity was that associated with the The Fisheries volcano near Bellenden Ker. The basalt backed up the Mulgrave River and there may be up to 60m of basalt flow underlying the coastal plain. At Atherton the Hallorans Hill shield volcano was active at 2.1 million years ago and extended as far as Mazlins Creek to the north. A small breached vent can be seen from the air and a walking track passes through it.

Basalts from Bones Knob flowed over 30km to the north, well beyond the town of Mareeba. Bones Knob is a shield volcano with a small crater on top, but has a secondary scoria cone located in a horseshoe shaped valley on the northwest side. The lava at Bones Knob is dated at 1.8 million years ago and the scoria cone at 1.6 million years ago.

Campbells Hill near Millaa Millaa is a small shield volcano close to the escarpment. A flow from this volcano about 1.6 million years ago created the ridge between Douglas Creek and the North Johnstone River, near Nandroya Falls. Flows from Lamins Hill, due west of Mount Bartle Frere, flowed east over the escarpment and filled in the Russell River valley to a depth of 50m. Finally the windfarm at Windy Hill, near Ravenshoe, sits on a shield volcano last active 1.2 million years ago.

Shaping the Landscape

The basalts of the Tableland volcanoes were extruded onto a landscape formed by the action of running water. To the east of the Tablelands are the rugged residuals of granite intrusions. Mount Bartle Frere, Queensland's highest peak at 1622m, is formed of deeply dissected resistant granite. So are Mount Bellenden Ker and the Lamb Range. Further north Mt Lewis is of the same origin. Between these high ranges are deep valleys cut into softer metamorphic rocks. To the west of Atherton lies the Herberton Range, also formed from granite. This forms the drainage divide between the Walsh and Mitchell Rivers, which flow into the Gulf of Carpentaria, and the Barron River, which flows into the Coral Sea at Cairns. Recent research suggests that the overall pattern of this drainage has remained the same since the Jurassic (about 160 million years ago). Granite weathers to produce prodigious amounts of sandy gravel as well as clays. Thus most of the rivers that drain the granite ranges have extensive sandy terraces and river bedload. This can be easily seen at Davies Creek National Park.

As well as stream erosion, the steep slopes can be sculpted by landslides and mudflows. Today these often follow periods of intense rainfall, such as those associated with cyclones. Along creeks the sheer weight of tropical rainforest trees can often cause the banks to collapse, partially blocking streams and diverting the water. During the ten thousand years leading up to the start of the Last Ice Age (about 30,000 to 20,000 years ago) the vegetation changed dramatically from rainforests to open woodlands and grasslands. This led to a loss of hillslope stability and the formation of landslips and debris fans along the base of many ranges. This can be seen along the base of the McAllister Range between Cairns and Port Douglas.

When the Tablelands volcanoes became dormant (see *Rivers of Basalt*) their basalt flows had infilled the Barron River valley and the Johnstone River valley. The basalt was more resistant to erosion than the softer sedimentary and metamorphic rocks in which the valleys were cut. This led to the creation of inverted relief, in which the Johnstone River split into a north and a south arm either side of the basalt flow. Today the Palmerston Highway runs down the surface of the flow with the deep gorges of the North and South Johnstone River on either side. This can be seen at Crawfords Lookout.

Looking down the North and South Johnstone Rivers to the coast, with the flat top of the basalt flow in the middle.

The older flows to the south and east of Malanda are the most heavily dissected by running water, while the central and northern Tablelands retain much of their original character when vulcanism ceased. Overlying the older lava flows are deep red soil profiles formed from the weathering of basalt and volcanic ash. The Malanda Volcano (near Meeragallen Road turnoff) and Windy Hill on the road to Ravenshoe are deeply weathered and their original craters are not visible. In contrast the younger cinder cones of the Seven Sisters near Yungaburra and Mt Quincan may show the original vent, while at Lakes Barrine and Eacham you walk around inside the crater.

Atherton Precinct

The Atherton Precinct includes Bones Knob and Halloran's Hill shield volcanoes, the Wongabel cone and Mt Hypipamee. Mt Hypipamee, at the headwaters of the Barron River is possibly the result of the most recent volcanic event.

The countryside around Atherton is cut by the channels of Priors Creek and the Barron River, draining the deep red basaltic plains that are the weathered residue of volcanic flows. This country is arguably some of the most fertile agricultural land in the world.

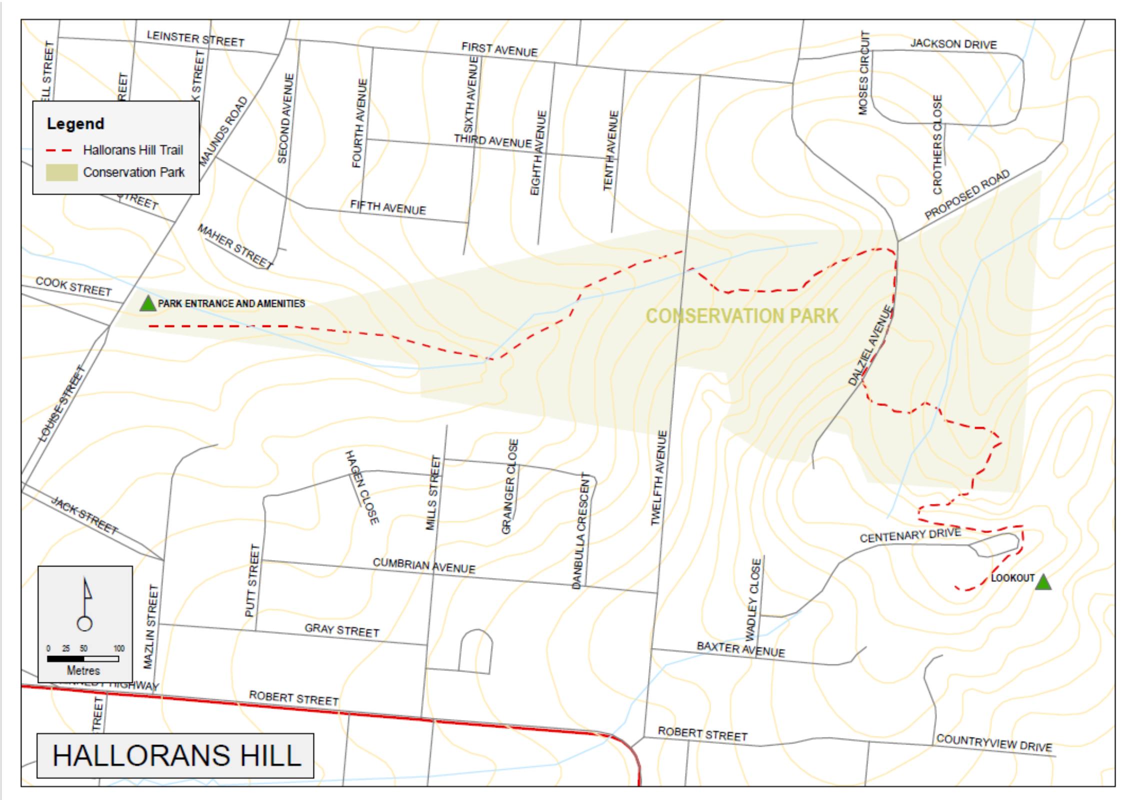
Bones Knob is the largest and least visually dramatic of the Atherton Precinct volcanoes. It can be seen from most places in the surrounding countryside but it is remarkably un-dramatic considering its contribution to the landscape. The road to the summit takes you to within a few hundred metres of the crater, but even at this point there is very little to suggest that a crater exists. The actual crater site is on private land and is inaccessible. However, there is a rough dirt road to the west of the volcano that can be utilised as a walking access trail to a point that affords a more satisfying perspective of the volcano. A map of this trail is available on the Bones Knob page.

The Wongabel cone is beside the Kennedy Highway, west of Atherton. The cone is on private land and not accessible, but a few hundred metres further along the highway there is an interesting walking trail through the Wongabel Forest. The track surface is composed mainly of scoria from the cone, and satisfyingly large vesicular basalt rocks are placed strategically to keep walkers on the correct course. The forest has conveniently placed information boards and helpful tree identification markers for those who like a little botany with their geology. A map of this trail is available on the Wongabel Cone page.

Mt Hypipamee lies about 20 kilometres further west along the highway. It has its own National Park status and is a short distance into the rainforest from the highway. A sealed road, a day user area and a very pleasant walk make this a rewarding stop off. A map of this trail is available on the Mt Hypipamee page.

Hallorans Hill

This shield volcano is on the edge of Atherton township, and you can drive to the summit lookout. This is signposted from the top of Robert Street, which becomes the Kennedy Highway. From the park on top a graded walking trail leads to the crater, which lies below and to the east of the summit. A sample of basalt from here was dated at 2.05 million years old. Boulders of vesicular basalt lie within the crater, which has a good stand of *mabi* rainforest. Tree kangaroos are occasionally seen in this forest, while many rainforest possums can be seen by spotlighting at night. The limits of the volcano are marked by Mazlin Creek to the north and much younger basalts associated with the cinder cones to the east.



The view from the summit lookout takes in Bones Knob, Mount Quinkan and the Seven Sisters, the Malanda Volcano and Mount Bartle Frere. About 4km south of town a small grassy scoria cone lies next to the Kennedy Highway. This cone is only 10,000 years old, and a small lava flow from its crater can be seen from the highway as a series of boulder strewn benches grazed by dairy cows.

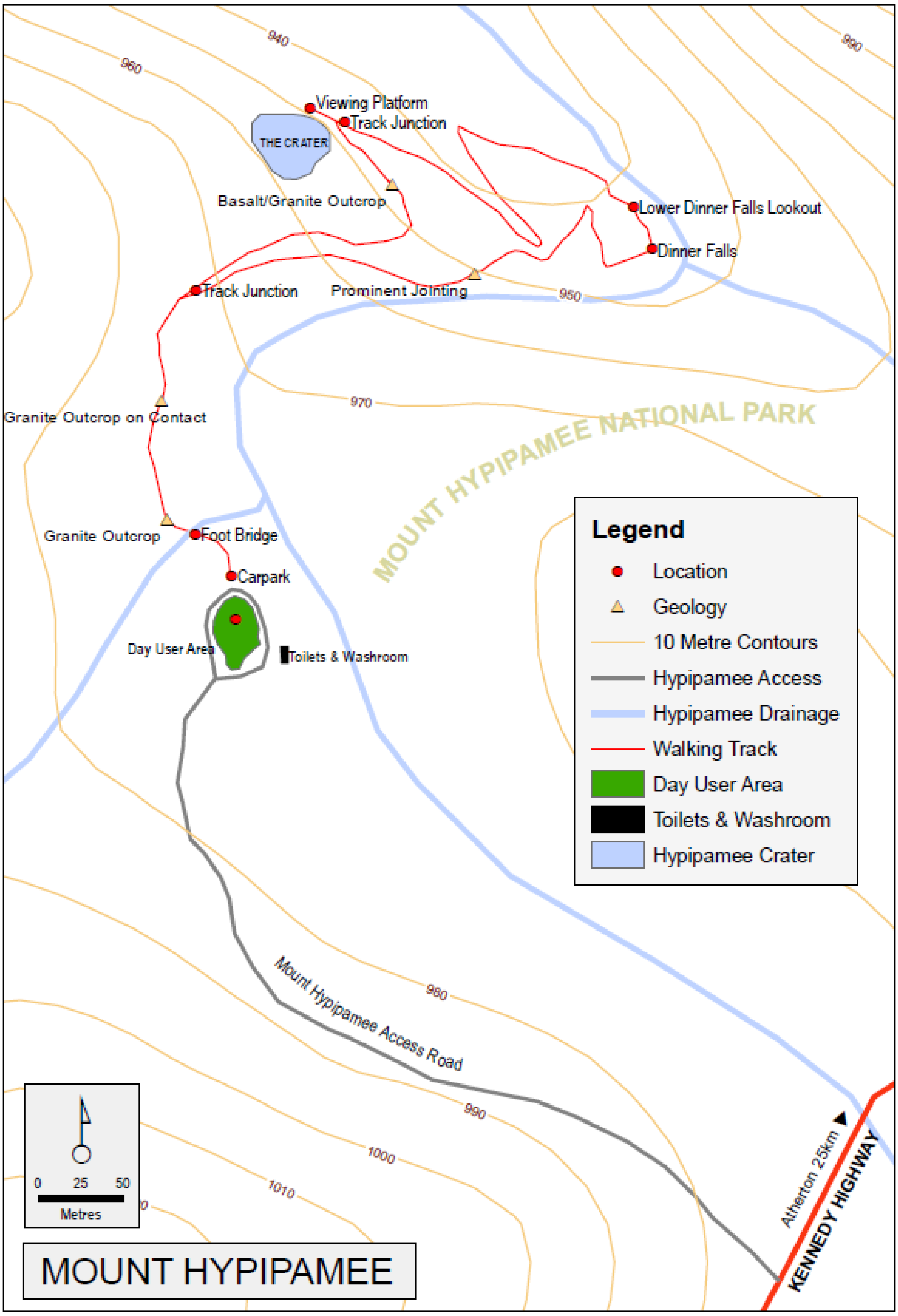
Hallorans Hill from the south. The shallow crater is behind the two large water tanks.

Mount Hypipamee

This is a steep sided crater in rainforest, close to the source of the Barron River. From the lookout it is 55m to the water, whose depth has been measured at 90m by cave divers in 2011. Superficially it resembles a limestone sinkhole, but in fact it was formed in granite by a violent explosion of steam when rising basalt magma and gases encountered groundwater. The rising gases and steam blasted up through cracks in the overlying granite. This volcanic pipe is close to the edge of the basalt lavas, which outcrop above the granite on the other side of the highway.

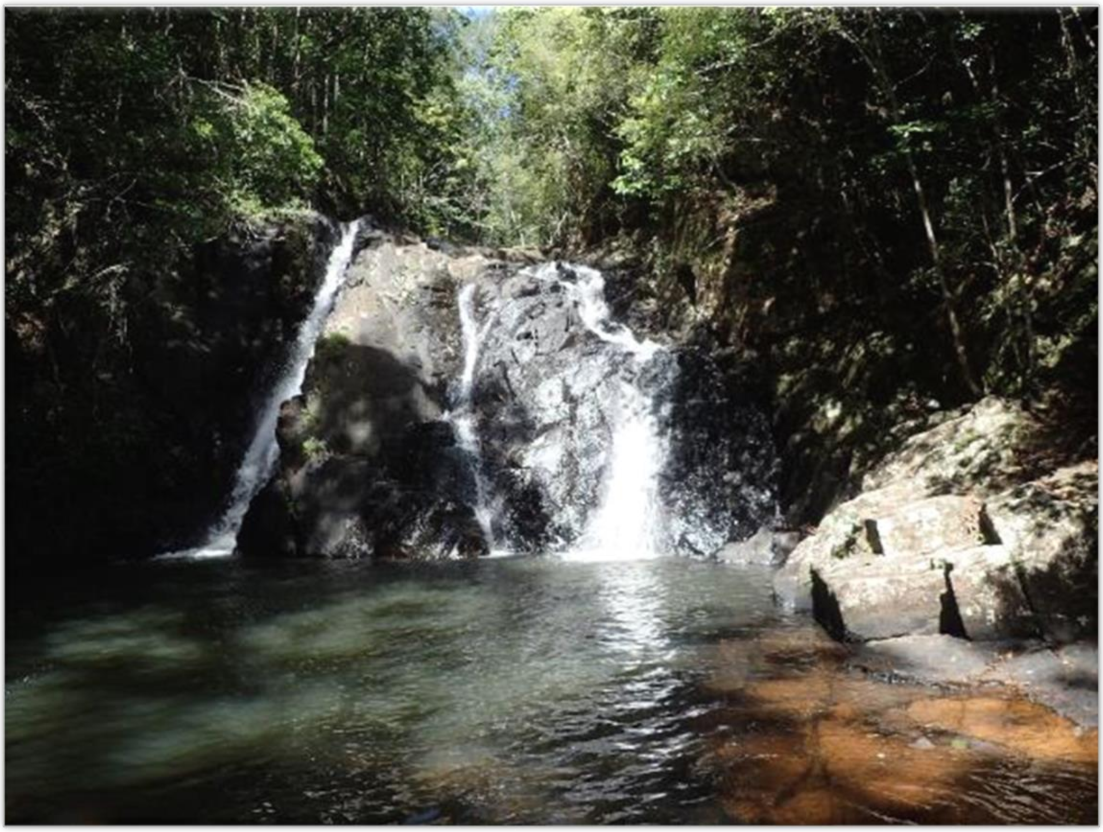
Mount Hypipamee National Park is on the Kennedy Highway, 24 kilometres from Atherton, towards Ravenshoe. The turn-off is signposted. At the park there is a day user area with picnic facilities, carpark and toilets. There is a map and interpretive signage at the start of the 800 metre circuit. From the carpark the level sealed path crosses a small bridge and heads into the rainforest, passing a map of the Barron River. The circuit junction is about 150 metres from the carpark; it is 300 metres to the crater along the left-hand path. There is a wooden viewing platform overhanging the crater’s sheer granite walls. A thick layer of weed covers the water trapped in the crater. To complete the crater circuit, follow the left-hand path down the hillside to Dinner Falls, a series of cascades in the Barron River that is accessible from the track. A small cement weir forms a reasonably deep pool, a pleasant place to relax on a hot day. Beyond the falls the path climbs steadily back to the circuit junction.

Mount Hypipamee crater from the viewing platform



Mt Hypipamee is a volcanic pipe or diatreme. The crater is formed in O'Briens Creek granite, which is mid to late carboniferous in age (315 to 310 million years old). The granite is quite resistant to erosion and is coarse grained with large crystals of quartz and plagioclase. It has well developed joints or cracks which guide the course of the stream above Dinner Falls and allow it to run in a series of zig-zagging clefts.

Rising basalt magma encountered groundwater and the resulting steam caused a violent explosion, similar to the formation of Lakes Eacham and Barrine. There is little evidence of the basalt itself, but rich red soil above the walking track is derived from it and supports diverse rainforest. The granite is relatively nutrient poor and only supports eucalypt forest with a grassy understorey. The pond in the crater is covered in duckweed and supports a colony of shrimps. Below the surface delicate tentacle-like stalactites were found from 28 to 70m depth.



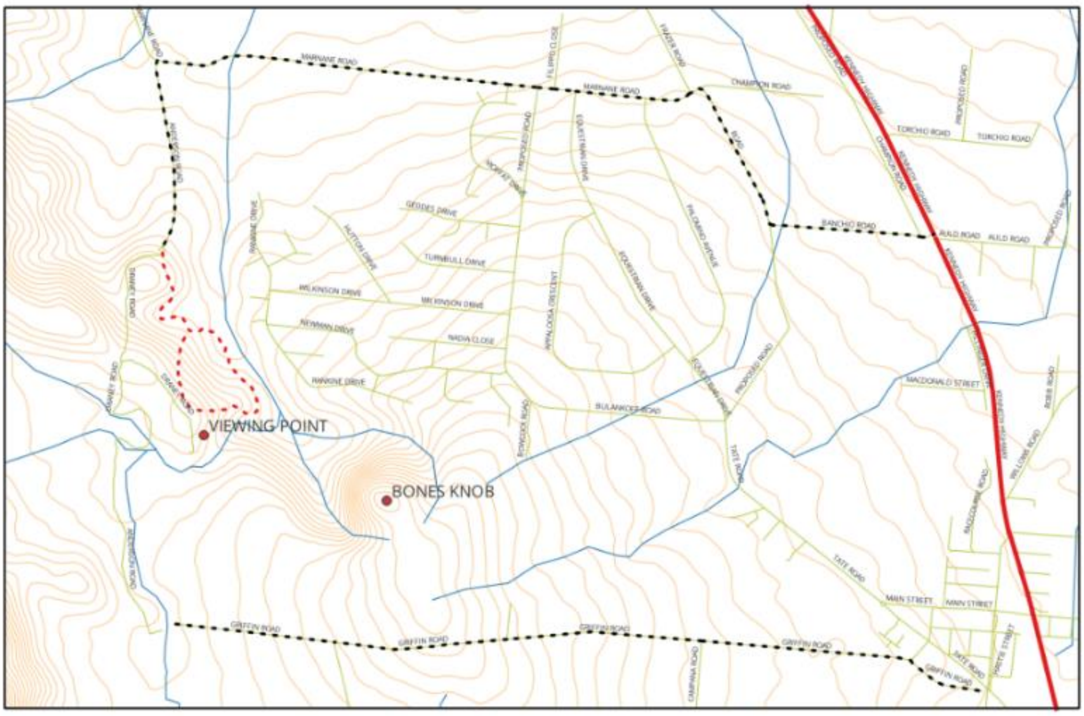
Dinner Falls

Bones Knob

Bones Knob dominates the skyline to the northwest of Atherton. Its gentle slopes are typical of shield volcanoes, and basalts from it flowed 30km to the north beyond Mareeba. There is a small crater right at the top which is on private property. A secondary scoria cone lies to the northwest of the shield volcano, next to Mount Emerald. This can be seen as a horsehoe shaped structure with cliffs showing columnar jointing. The shield volcano has been dated at 1.79 million years while the scoria cone is dated at 1.66 million years. The scoria cone may have been much larger but blown apart by a steam explosion as a maar.

Bones Knob aerial from above Mount Emerald

Looking northwest towards the cliffs of the scoria cone.

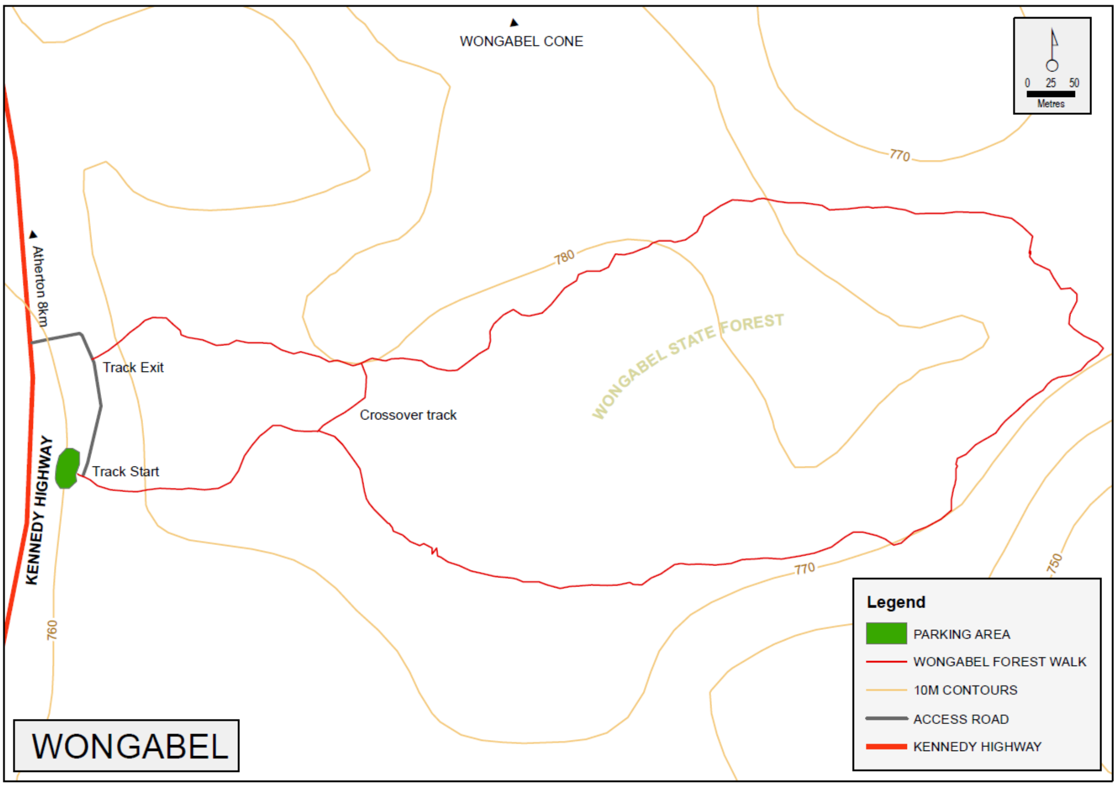


To get this view of the cone follow the map directions. You may need to walk up the unsealed track from the end of the bitumen to the vantage point as the track surface is unsealed and rough.

Wongabel Cone

The Wongabel Cone is partially covered in rainforest and is on private property. It can be viewed from the Kennedy Highway. The Wongabel cone has a single uranium series age of 80,000-110,000 years ago. There is a small lava flow at its base, and another is crossed on the Wongabel walking track.

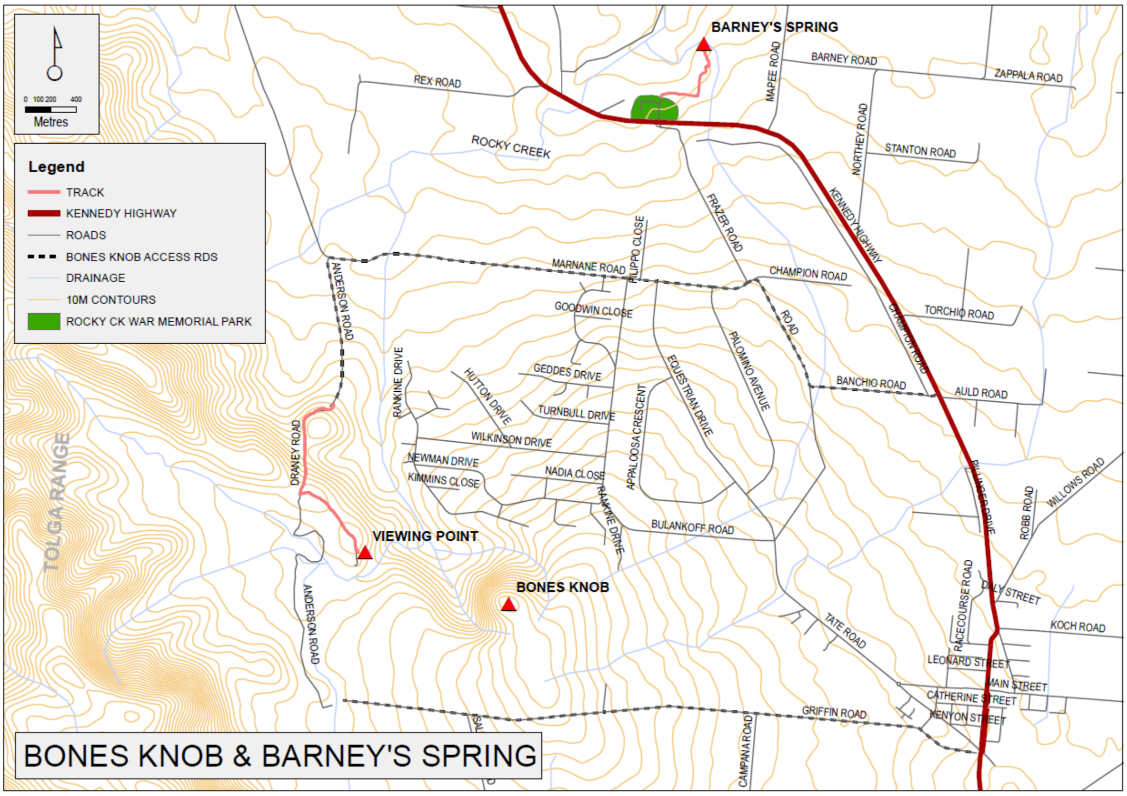
Wongabel forest and cone from the east



Nearby the Wongabel walking tracks (signposted from the Kennedy Highway) lie within complex rainforest known as Mabi Forest, which was once covered the Atherton Tablelands before clearing for agriculture occurred. Mabi Forest is a tall vine forest with a dense shrub zone below, occurring only on fertile basalt soils with rainfall between 1300 and 1600 mm per annum. Mabi Forest draws its name from the local Aboriginal name for Lumholtz‘s Tree-kangaroo (mabi or mapi). Predominantly a leaf eater, this species is found in rainforests and adjacent wet sclerophyll (eucalypt) forests of the Atherton Tablelands.

Barney's Spring

This spring is a little gem, reached by a short track from the Rocky Creek Memorial Park and caravan park. The shady pool is fringed by large fig trees and other rainforest trees. It seems that this forest has not burnt for a very long time, and it contrasts with the surrounding open eucalypt forest.



The spring emerging from under basalt boulders

Barney's Spring has a base flow between 54 and 62 litres per second, making an important dry season contribution to the flow of the Barron River. The spring is fed by a groundwater aquifer which lies above the bedrock of the metamorphic Hodgkinson Formation and below the more recent basalt flow, seen in the road crossing at Rocky Creek. This basalt from Bones Knob has many small cavities or vesicles, and layers of cinders as well.

Mature fig trees with buttress roots

The area around Barney’s spring is occupied by an unusual type of riverine rainforest, dominated by several species of figs with a very sparse shrub layer. The abundance and diversity of ferns in this forest remnant is remarkable with at least a dozen species of fern being present. This is also a habitat for the endangered nun orchid or swamp lily. Common species in the surrounding woodland are Molloy box and bloodwood species, together with Moreton Bay ash, narrow leaf ironbark, swamp mahogany and Persieh’s hakea.

Barney’s Springs is in the traditional lands of the Tableland Yidinji people, and is thought to have been an important meeting place for different tribal groups, as well as being held to have medicinal properties. It is named after Bernard “Barney” Hayes, a local identity who established a hotel and butchers shop at nearby Rocky Creek in 1882. The hotel was a change point and refreshment stop on the Cobb and Co. coach service between Herberton and Port Douglas. From October 1942 to September 1945 the water from the spring was piped to the nearby field hospital which provided medical care for about 60,000 allied soldiers, sailors and airmen during the New Guinea campaigns and the Battle of the Coral Sea. Records state that the army pumped around one million gallons (approximately 4.5 million litres) per day to supply the field hospitals and other facilities as far away as Tolga. The hospitals provided medical treatment using new treatments and technology, and carried out research into the treatment of malaria.


Looking downstream to weir pool and farm pump

Herberton Precinct

The Herberton Precinct contains the rich mining heritage around Herberton, with several good walks and a great mining museum and visitor centre. The nearby granite mountains of the Mount Baldy forest park provide sweeping views to the west and an alternative drive back to Atherton for 4WD vehicles. This area includes the beautiful headwaters of the Walsh River, which runs into the Gulf of Carpentaria.

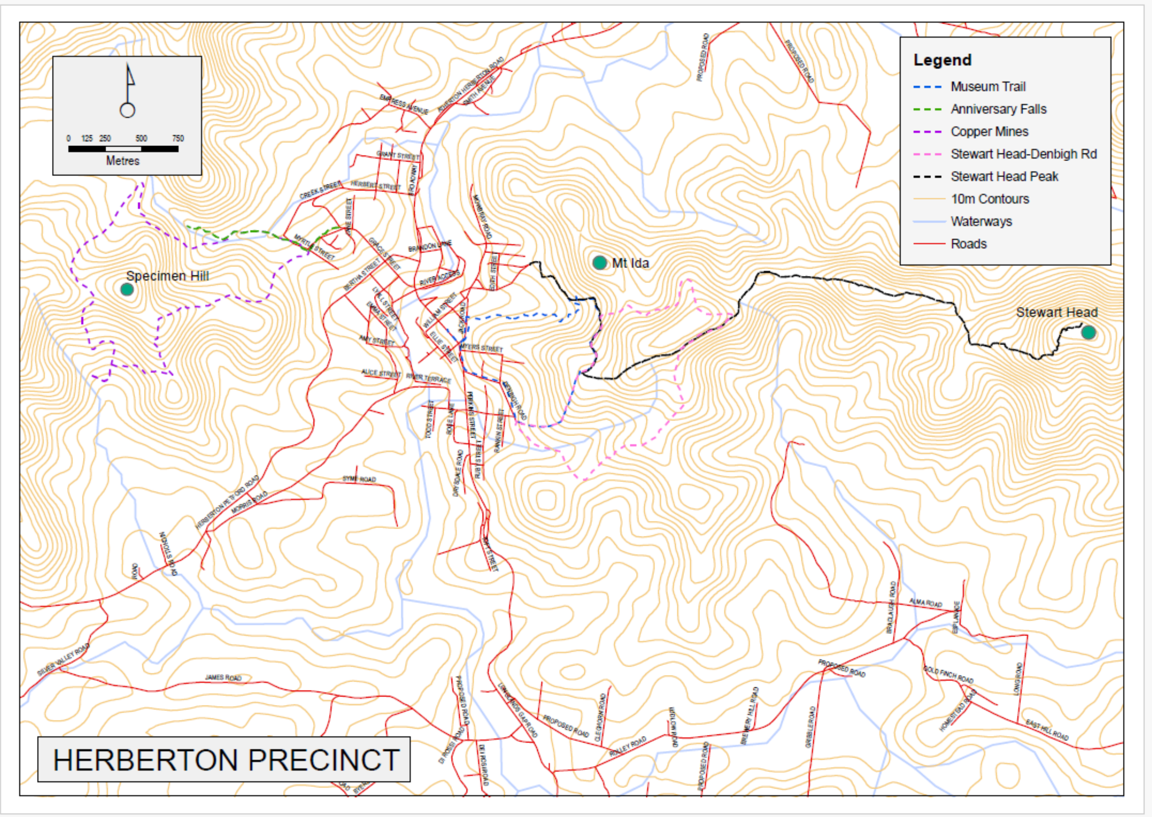
The oldest rocks in the area are Precambrian schist, amphibolite and granite outcropping near Mount Garnet. These rocks are faulted against the Hodgkinson Formation, which is folded and steeply dipping, and consists of sandstone, siltstone, shale and some limestone. The Hodgkinson Formation rocks are themselves intruded and thermally altered by tin-bearing granites. Younger volcanic rocks formed from rhyolite lavas and tuffs overly the granites. Finally, the youngest rocks are basalt that were erupted as lavas from shield volcanoes near the eastern margin of the area.

The O'Briens Creek granite is the dominant igneous rock in the Herberton area and outcrops over an area of at least 2500 square kilometres. Some of the granite plutons cover more than 200 square kilometres. The rocks are pink to red biotite leucogranites and microgranite, with medium to coarse crystal sizes. There is a wide range of accessory minerals such as zircon, ilmenite, monazite, topaz and fluorite. The O'Briens Creek granite is 300 to 320 million years old.

The deposition of the Hodgkinson Formation rocks continued through the Silurian and Devonian Periods, resulting in deep water turbidites (gravity flows from a continental shelf into a deep water basin) and some shallow water coralline limestones. By the end of the Devonian period thousands of metres of sediments had been laid down. During the Lower Carboniferous, a major mountain building episode folded and faulted the Hodgkinson Formation rocks as they were uplifted. Subsequent erosion created a relatively flat landscape.

Tin was first discovered in the area in 1874, when James Venture Mulligan found tin in the headwaters of the Wild River. Tin deposits in the Herberton area fall into three categories. Tin vein deposits, containing quartz, cassiterite (tin ore) and wolframite (tungsten ore), form fissure fillings associated with granites. The Cornish tin deposits, worked since Phoenician times, are of this type. Tin skarn deposits form where granites are emplaced next to calcium rich sedimentary rocks, such as the limestones at Chillagoe. The reaction of the hot granite and the sedimentary rocks creates new mineralisation in the contact zone, which may be tens to hundreds of metres wide. Finally, alluvial tin deposits occur where hillslope erosion has released tin ore, which is then transported by streams and tends to concentrate in hollows and pools due to its high density. The alluvial tin deposits along the Wild River at Herberton were sealed in by later basalt flows that passed along the channel. These are known as Deep Leads and produced large quantities of high-grade tin ore.

The Herberton Deep Lead extends from Herberton for 13 kilometres to the junction with Basalt Creek, and was one of the richest leads in Australia. The deposits are now almost completely exhausted, although very low-grade tin ore can be found on mullock heaps and around the old workings. Most of the shafts and tunnels used to extract the ore have collapsed and are certainly not safe to explore.



Great Northern Mines

Starting at the Great Northern Carpark, besides the Herberton Mining Visitor Centre, this walk will take you past three mineshafts responsible for tin ore production, the mainstay of the Herberton economy. This trail will take you to Prospectors Gully, where ore was discovered by John Atherton in 1881 at the Gully shaft; the Eastern shaft (1883, 200 m deep) and other sites. The New Gully or No. 3 shaft and building (1904) was the last producer of the Great Northern Mining Claim in this area. From 1880 to 1956, when mining ceased at the Great Northern Mine, over 5,000 tonnes of ore worth $200,000,000 had been produced. This walk of about 1.5 km should take about 45 minutes and is suitable for everybody.

Specimen Hill Lookout Walk

From the far end of Grace Street on the west side of Herberton, the Specimen Hill Lookout Walk leads along a gravel bush track out over a shoulder of Specimen Hill. The track finishes at a tunnel driven into the hillside with other mines visible below. Good views of Herberton can be seen all along the walk, but undoubtedly the best ones can be obtained from the top of the Specimen Hill. Be aware that although it is an easy walk, the track can be steep in some places. Allow around 90 minutes for the walk.

Copper Mines Walk

This walk leaves from the junction of Grace and Jane Streets, following a gravel bush track along the sides of a little stream with a rocky bed. The Copper Mines Walk will take you to the base of a hill where you can spot evidence of mining. Copper was the main mineral here, responsible for the strong discolouration in the soil. Up to here the walk is easy, however the adventurous might be tempted to follow the faint Bridle Trail to the right. This trail finishes at Anniversary Falls, used as a retreat in the early days. Allow around 1 hour for the 1.5 km trail.

Mount Ida firetrail

This walk is an extension of the Great Northern Mines walk, following the trail up to the Herberton firetrail. If this walk is too long for you, at the top of the trail there is a turn to the left that will lead you to a shorter return path, known as the Magazine Escape Trail. If you want to go up to Mount Ida, continue past this turnoff. The Mount Ida Loop offers magnificent views across Herberton and the surrounding valleys. To go back, continue on the fire trail up to Mowbray Road, returning you to town. This trail is strenuous and you should allow around 2.5 hours to complete the 6 km trail.

Stannary Hills – Lady Duff mine

Stannary Hills is about 29km west of Herberton and lies to the north of Irvinebank. Mines in the Stannary Hills have been worked for tin, tungsten, copper, silver, lead, and fluorite. In this area steeply dipping greywackes, sandstones and shales of the Silurian to Devonian Hodgkinson Formation are overlain in the west by bedded tuff of the Featherbed Volcanics, and are intruded in the northeast by the Elizabeth Creek Granite of Carboniferous age. Several large and many small faults occur in the area. Mineralization is confined to the Elizabeth Creek Granite, the Hodgkinson Formation, and the Featherbed Volcanics. Tin deposits were discovered at Stannary Hills in 1884, and a battery erected on Eureka Creek began crushing ore in 1888. The boom period for the area was between 1900 and 1910, when Stannary Hills had a population of several hundred people. During this period tramways connected Stannary Hills with Boonmoo on the Mareeba-Chillagoe railway and with Irvinebank. The battery on Eureka Creek ceased working in 1893, and another battery, the Rocky Bluff battery, was built on the Walsh River and operated between 1903 and 1925.

Old mine workings on Eureka Creek at Stannary Hills

Walsh River natural bridge

This interesting feature is located north of Watsonville on the Walsh River. Watsonville is a small settlement 13km west of Herberton on the road to Irvinebank. Part of the flow passes under a large natural bridge, formed where a thick slab of granite has detached from the underlying massive rock. This is known as an exfoliation flake, and is very common in granite terrains where valley deepening has released inbuilt pressure in the granite rock. Smaller flakes like this can form after bushfires or when granite rocks are heated by the tropical sun and then rapidly cooled by thunderstorm rain.

Walsh River natural bridge, near Watsonville

Malanda Precinct

The Malanda Precinct contains the Malanda shield volcano, Lynch's Crater and Bromfield Swamp (both maars), as well as the Malanda Falls. The Malanda Volcano dominates the skyline to the west and Upper Barron Road provides a drive up the flank of the old volcano. Unfortunately the original vent cannot be seen due to long-term erosion. Lynch's Crater has yielded the longest continuous vegetation history in Australia from its ten metre thick peat deposits. It is located near to Butchers Creek on the Topaz Road. It dates back more than 200,000 years and documents the alternate open eucalypt forests and rainforests that cloaked the area in the glacial and interglacial periods. During the glaciations sea level was lower by at least 120 metres, so the site would have been well inland. Another long vegetation history has been gained from Bromfield Swamp, which can be viewed from a platform on Upper Barron Road. Brolgas and Sarus Cranes can easily be seen at the swamp. Malanda Falls has two walking tracks and a swimming pool located below the edge of a basalt flow on the North Johnstone River. The Malanda Falls Visitors Centre is well worth a visit, with interactive displays on geology, wildlife, rainforest ecology and cultural heritage.

Malanda Volcano (Gentle Annie)

In the Malanda Precinct the skyline is dominated by this shield volcano, which was active about 3 million years ago and produced streams of basalt which covered 800 square kilometres. Since then its flanks have been eroded by streams to produce a radial drainage pattern, which today are followed by many roads. Lava from the Malanda volcano poured over the coastal escarpment to form a broad ramp descending to the coast down the valley of a past Johnstone River. Today the Palmerston Highway follows this remnant of the original volcano's slope. The basalt was very runny due to its chemistry and flowed easily downhill while it cooled from about 1200 degrees Celsius, and so the side slopes of the shield volcano are very gentle.

The Malanda shield volcano formed between 3.4 and 3.1 million years ago. Subsequent weathering and erosion have obliterated any trace of the main vent, but radial drainage is splendidly displayed. The volcano has an average radius of 7km and a height of 220m. The basalt lava is a dark grey to green, glassy to fine grained rock. Minerals present typically include green crystals of olivine, black pyroxene and light coloured feldspars. Most of the Malanda basalts contain small cavities or vesicles, where gas bubbles were trapped as the rock cooled. Deeply weathered basalts, forming fertile red soils, are well exposed in road cuttings along Upper Barron Road and East Evelyn Road.

Looking west along Upper Barron Road up the slope of the dissected Malanda volcano

Lynch's Crater

Lynch’s Crater has been a very important site in understanding long-term changes in rainfall, temperature and vegetation in Australia’s tropics. The crater is about 500m in diameter and formed as a maar following an explosive eruption that created a crater 80m deep. Since that time the crater has been accumulating lake and swamp sediments to a depth of 64m. The surface has been lowered in recent years due to local agricultural activity and some peat mining. Although the site was instrumental in the Wet Tropics World Heritage nomination, it remains unprotected in the face of further proposed peat mining.

The past climatic record from Lynch’s Crater is unmatched for any other site in Australia. The lake has been the focus of numerous scientific studies, starting with those of Peter Kershaw in 1974 and continuing to the present. The current record of vegetation change from pollen analysis extends over the last 230,000 years and covers the last three Ice Ages or glacial periods and the intervening warmer interglacials. The record covers the likely period of human occupation of Australia, the extinction of the marsupial megafauna such as Diprotodons, and the major changes in the last Ice Age. The warm and wet interglacials (in which we now live) show a vegetation dominated by rainforest flowering plants, while the cool, relatively dry glacials are dominated by open eucalypt woodland and kauri pine (Araucaria) forests. There have also been major changes in the composition of the rainforest throughout this long period and one time (roughly 40,000 years ago to 10,000 years ago) when it was replaced by open eucalypt woodland. Rainforest, similar to that found on the Tablelands today, occurred only during the last interglacial around 125,000 years ago. The major causes of these changes are thought to be temperature and precipitation shifts An increase in fossil charcoal in the sediments from 40,000 to 26,000 years ago is accompanied by the demise of Araucaria forest; it remains unclear whether the increase in burning was due to climate change or human intervention.

Volcanic ash or tephra layers in the lake sediments have been dated at between 75,000 to 80,000 years ago and their source identified as New Guinea volcanoes. This demonstrates that volcanic ash in the western Pacific can be transported over several hundreds of kilometres to Australia and be preserved in tropical environments for at least 75,000 years.

Lynch's Crater, partially obscured by bamboo plantation and tree crops.

Bromfield Swamp

Bromfield Swamp is an explosion crater or maar about 1500 m wide. The crater rim is at an altitude of about 800 m above sea level and the sedge swamp within, which is about 500 m in diameter, lies 45 m below the rim. The crater wall has been breached on the east side and water drains through this to form a tributary of the north Johnstone River.

The sequence of vegetation changes shown in the pollen record from Bromfield Swamp is similar to those from previous scientific studies at Lynch's Crater, Lake Euramoo and Quincan Crater. The beginning of organic sedimentation in the crater lakes signifies the establishment of a permanent lakes due to increased effective rainfall. The oldest radiocarbon date from Bromfield Swamp is 10,630 years ago. Initially the swamp was surrounded by open eucalypt forest due to drier conditions, but by 8400 years ago there was a transition to rainforest. Throughout the succeeding rain forest phase, precipitation was higher at Bromfield Swamp than at the other sites suggesting that the steep rainfall gradient across the Tablelands has remained fairly constant. There has been a great deal of erosion and modification of the vegetation of the surrounding hillslopes so the swamp vegetation is more complex today than in the past. Seasonally Bromfield Swamp is an important feeding site for Sarus Cranes and Brolgas.

Bromfield Swamp from the southeast

Bromfield Swamp panorama

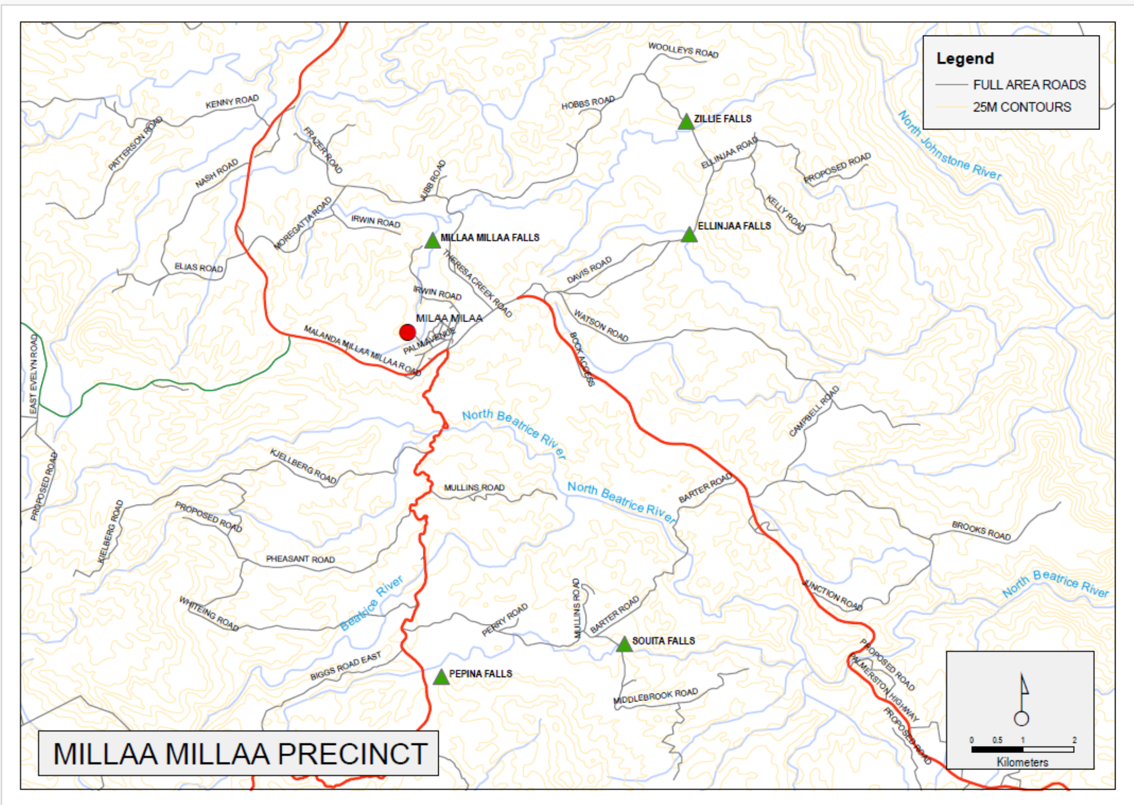
Malanda Falls

These falls are easily accessible off the Atheron-Malanda road, on the edge of Malanda town. The North Johnstone River runs under the road bridge and then tumbles over the edge of a basalt flow from the Malanda volcano, some three million years old. A swimming pool has been constructed below the falls. A loop walking track across the road follows the river for a few hundred metres. Basalt columns can be seen in the bed of the river upstream of the bridge, while vesicular basalt boulders can be seen on the return loop track. The nearby visitor centre has excellent displays of the Tablelands volcanism, ecology and wildlife.

Millaa Millaa Precinct

The Millaa Millaa Precinct lies at the southern extent of the Atherton Tableland Geopark. Volcanic activity occurred about 3 million years ago and the basalt flows that were laid down by the eruptions have given rise to a number of waterfalls, as subsequent stream erosion channelled the basalt and carved some picturesque cascades. The most accessible of these can be reached in two notable areas - Wooroonooran National Park and the Millaa Millaa Waterfall circuit.

Theresa Creek Road, which heads east from the Palmerston Highway a little south of the township of Millaa Millaa, offers a circular access route to each of the Waterfall Circuit sites. The road is also a panoramic treat, offering great views over the southern tablelands whenever it crests a ridge. The drainage channels between these ridges are thickly rainforested, and there are waterfall viewing sites beside the road on three of these watercourses. The main sites are Millaa Millaa Falls, Zillie Falls and Ellinjaa Falls. At each of these sites a short path leads from a parking area to the waterfall.



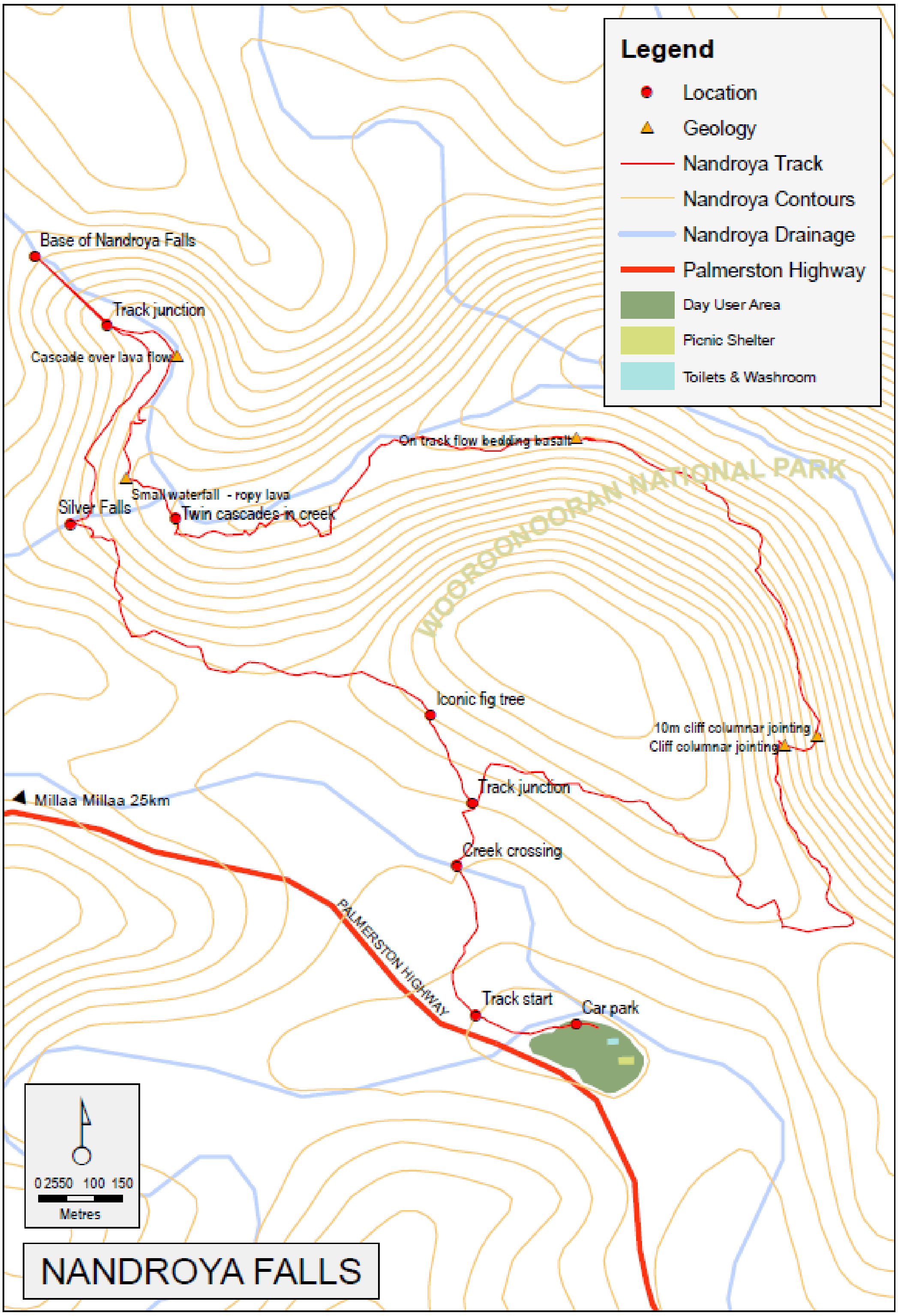
Twenty five kilometres east of Millaa Millaa on the Palmerston Highway there is a National Park camping area, Henrietta Creek, in Wooroonooran National Park. This area offers a more dramatic but less easily accessible volcanic landscape, as visiting all of the falls will take about five hours. The circuit path to Nandroya Falls, which takes about two and a half hours, is just north of the campsite and day user area. Although this is the most spectacular of the falls in the Henrietta Creek area, there are a series of falls downstream from the campsite that are accessed by walking trail. The most spectacular of these are Tchupala and Wallicha Falls, both of which display columnar jointing.

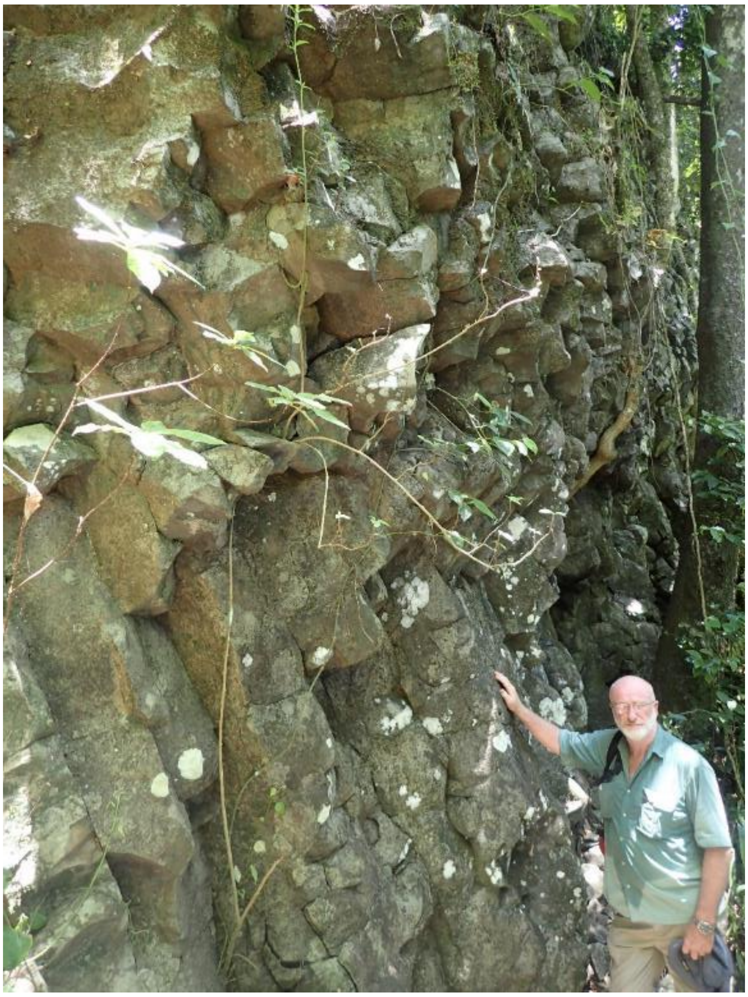
Nandroya Falls

The track to Nandroya Falls runs in rainforest along the top of an old lava flow before descending into the valley of Douglas Creek. Silver Falls is formed on top of one lava flow some 1.6 million years old. The spectacular amphitheatre of Nandroya Falls shows several lava flows in section. Two of the upper flows show well-developed columnar jointing like organ pipes. The lowest flow is probably 2.2 million years old, while the subsequent flows above it infilled the channel at least twice.

Just before Nandroya Falls is a track junction with a return loop to the carpark along the creek, passing small waterfalls marking the tops of successive lava flows. Several lava flows form steps and cascades in the channel. As the track climbs back out of the valley it passes two fine basalt cliffs showing basal columnar jointing (cooling cracks) and cross-jointing due to more rapid cooling at the top of the lava flow. This return loop is well worth the effort involved.

Lava flows at Nandroya Falls, with age of basalts.


Legend
Location
Geology
Nandroya Track
Nandroya Contours
Nandroya Drainage
Palmerston Highway
Day User Area
Picnic Shelter
Toilets & Washroom
Base of Nandroya Falls
Track junction
Cascade over lava flow
On track flow bedding basalt
WOOROONOORAN NATIONAL PARK
Small waterfall - ropy lava
Silver Falls
Twin cascades in creek
Iconic fig tree
10m cliff columnar jointing
Cliff columnar jointing
Track junction
Millaa Millaa 25km
Creek crossing
PALMERSTON HIGHWAY
Track start
Car park
0 25 50 100 150
Metres
NANDROYA FALLS



Columnar basalt on the Nandoya Falls track

The Waterfall Circuit, Millaa Millaa

This pleasant drive of 9km leaves the Palmerston Highway, just east of the town on Theresa Creek Road, and rejoins 2km east of Millaa Millaa. There are three falls – Millaa Millaa, Zillie and Ellinjaa – all formed where a creek flows over the edge of a columnar basalt flow. At Millaa Millaa falls two separate flows can be seen, the upper one having a different columnar pattern. There is a viewing platform at the base of dramatic Zillie Falls, which is undercut due to water erosion of the cliff base.

Crawfords Lookout

This geosite is in Wooroonooran National Park and is situated on the Palmerston Highway, midway between Innisfail and Millaa Millaa. There are a series of connected walks between Crawfords Lookout on the eastern edge and Henrietta Creek, some 5 km west toward Millaa Millaa. The lookout is above the North Johnstone River, which carries most of the water draining the southern tablelands to the coastal plains. For the energetic and curious there is a rough trail which extends from the lookout down to the river. It is a steep descent and the return walk will take you about two hours. There are impressive lava flows and a view back up the river to the conjunction of Douglas Creek and the Johnstone River.

The Mamu Rainforest Canopy Walkway is also situated on the Palmerston Highway, midway between Innisfail and Millaa Millaa. The Waribara Clan and Dulgubara clans of the Mamu people who live in and near the Palmerston area have a special connection to this area. Wooroonooran National Park includes Queensland's two highest mountains, Bartle Frere (1,622 m) and Bellenden Ker (1,592 m). These are made up of granite which intruded older rocks between 330 and 255 million years ago. They have been deeply weathered and sculpted by running water over millions of years. The area receives more rainfall than any other place in Australia. An annual average rainfall of 6,411 mm has been recorded at the weather station on Bellenden Ker, with 11.85m falling in 1999.

Mount Bartle Frere summit from an ultralight

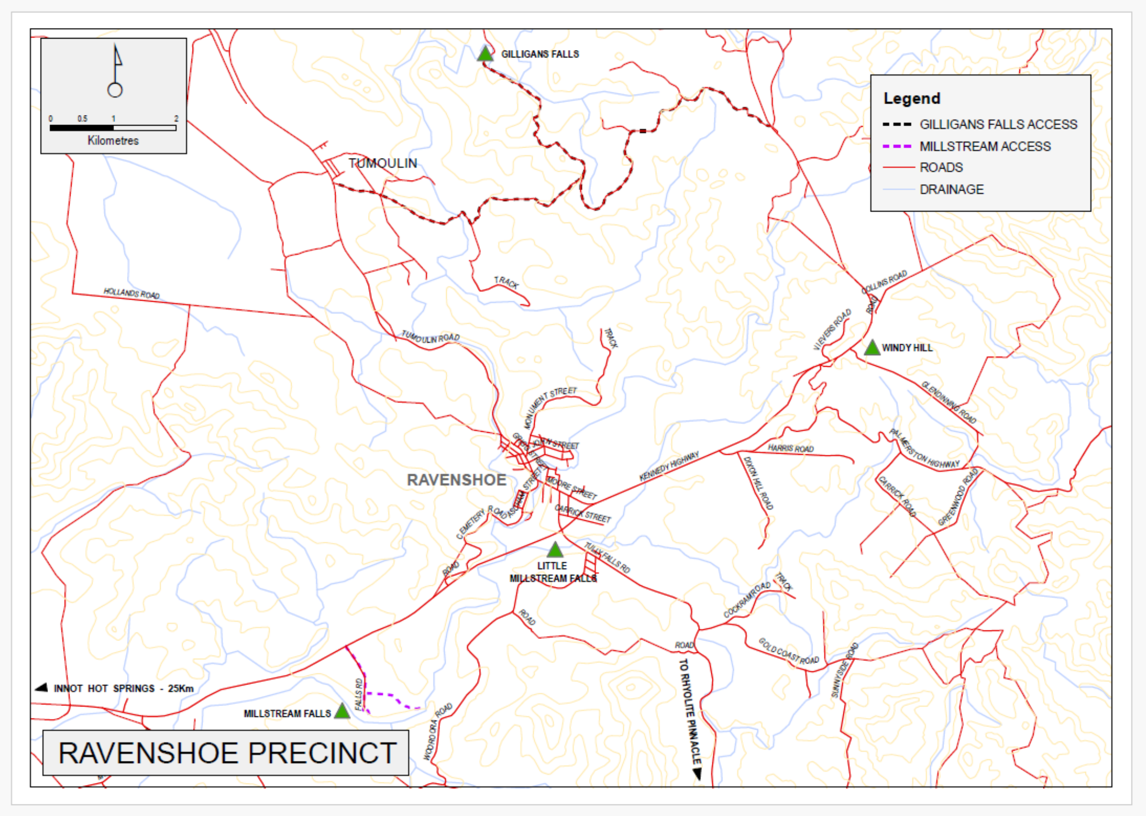
Ravenshoe Precinct

The Ravenshoe Precinct lies at the southwestern extent of the Tablelands. At an elevation of 930 metres, Ravenshoe is the highest town in Queensland. It is at the centre of an area of volcanic activity that is bordered by dry savannah country and dense Tableland rainforest. Two river systems, the Tully and the Herbert, drain the area and eventually empty into the Great Barrier Reef lagoon. The Tully River flows east and has carved deep gorges through the Hodgkinson basement rocks as it descends to the coast. The Herbert River follows a more southerly path through drier landscapes and another deep gorge, finally forming a large fertile alluvial delta on the coast where Ingham now lies.

There are three distinct sites of historic volcanic activity in this precinct. Rhyolite Pinnacle, in the Misty Mountains National Park, is on a trail that forms part of the extensive Misty Mountains walking trail network. Closer to Ravenshoe there are andesitic exposures and on the eastern outskirts of the town there is a basaltic shield volcano, appropriately named Windy Hill. This volcano lies next to the Malanda volcano and is easily identified from the road by the wind turbines at its summit.

Gilligans Falls are in a forestry area that lies between the Kennedy Highway and Toumoulin Rd, north of Ravenshoe. It can be accessed from either road via rough forestry tracks. These access tracks are not suitable for two-wheel drive vehicles, but it is a pleasant 5 kilometre walk to the falls from Millstream, following Allen Road to the junction with Smiths Road, then descending along the forestry track to the falls. During wet weather the tracks are impassable to vehicles.

About 25km to the west of Ravenshoe on the Peninsula Development Road, geothermal springs bubble to the creek surface at Innot Hot Springs. Some of the springs are next to the road and there is a caravan park that has hot baths that can be used for an admittance fee. Innot Hot Springs borders the Mt Garnet mining area, where a variety of small mining ventures operate.



Windy Hill Shield Volcano

Windy Hill is notable as the site of a wind farm. 20 wind turbines, with a combined capacity of 12 Megawatts, utilise the relatively constant winds blowing over the low-angle slopes of the shield volcano. Lavas from Windy Hill flowed east then south to the headwater of the Tully River and south-west then west following the Millstream, south of Ravenshoe. Millstream Falls is reputed to be the widest waterfall in Australia, although it is only around 50 m wide. The columnar basalts that make up the falls are overlain by several metres of alluvium, then the surface basalts that were dated at 1.2 million years ago. The falls basalts must therefore be older than this and may be flows from Jensenville. No samples have yet been found that are suitable for dating.

Windy Hill volcano with wind farm

Rhyolite Pinnacle

The rhyolite pinnacle is the resistant remains of a volcanic ‘plug’ formed in the latter stages of a volcanic eruption. More resistant to erosion and soil formation, such plugs rise above surrounding country and form viewpoints. Other examples include the Glasshouse Mountains near Brisbane and the Warrumbungles in central New South Wales.

The Rhyolite Pinnacle trailhead is 12·5 kilometres from Ravenshoe along Tully Falls Road. At a signed junction two kilometres from the trailhead, turn right and follow the trail 4.5 kilometres to the Rhyolite Pinnacle. The trail passes through dense rainforest, crossing a few creeks along the way. After passing through a short section of low heath vegetation, the trail dips and crosses a creek at the head of some rapids, and then re-enters rainforest, crossing one more creek before climbing to the peak. A flat expanse of rock at the peak offers extensive views, but the Pinnacle is still 700 metres further on across a connecting saddle. About halfway along the cliff face at the base of the Pinnacle, a side track climbs 100 metres through a gap between the rocks to the highest point on the outcrop, where there is a spectacular view of the surrounding rainforest and mountain peaks. Beyond the Pinnacle the trail zigzags down to the Walters Waterhole Trail junction. It is about four kilometres from this junction to Tully Falls Road.

Millstream Falls

These falls are 4km west of Ravenshoe on the Kennedy Highway. At full flow they are 65m wide, reputedly the widest in Australia. The falls are at the end of the basalt flow from the Ravenshoe volcano. The bed of the Millstream River upstream of the falls is paved with interlocking basalt columns forming a mosaic of pentagons and hexagons.

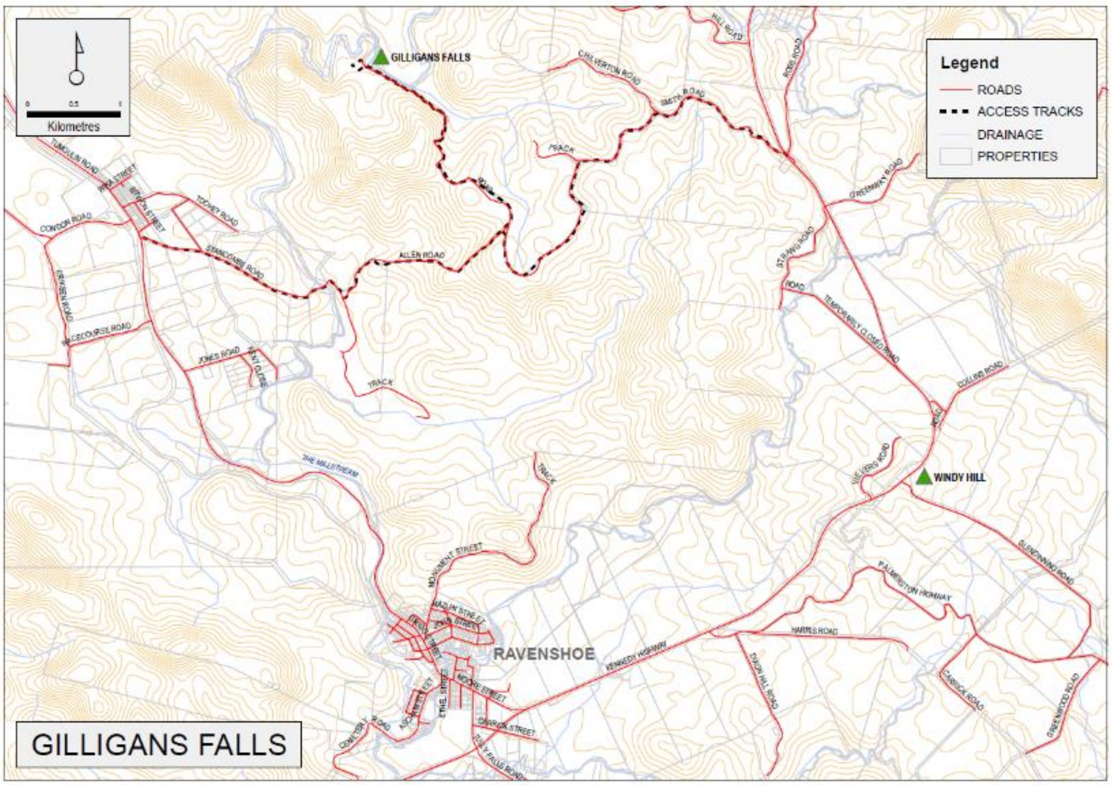
Gilligans Falls

The Gilligan's Falls area provides a good example of the control of rock type and structure on stream pattern and gradient. The rocks are volcanic and date from the late Carboniferous to early Permian (from 305 to 295 million years ago).

Gilligan's Falls in fine flow

In North Queensland there is widespread evidence of volcanism between 350 and 270 million years ago. These volcanic rocks extend from Torres Strait down through the western edge of the Atherton Tablelands and as far as Collinsville, inland from Bowen. Specifically here they are rhyolites and andesites of the Glen Gordon volcanics, the former being quartz rich and having a similar composition to granite, but much finer grained. Andesites also occur, are paler in colour and occur as bands in the rhyolite.

Layered rhyolite downstream of the falls



These hard rocks are very resistant to erosion, and the layering in them has created a series of steps in the creek. Major joints or cracks in the rocks have also guided the stream and created a zig-zag path in the valley, with a spectacular gorge and several falls and cascades.

Looking down the gorge with more cascades and pools

Innot Hot Springs

Innot Hot Springs is on the Kennedy Highway, 30 km west of Ravenshoe. Here spring water issues at a temperature of 74°C — the hottest measured natural spring water temperatures in Australia. The source of the heat is uncertain, although many of the Carboniferous granites in the region have high background values of Potassium, Uranium and Thorium and are thus potentially heat-producing. The hot springs are still commercially operated as a tourist attraction and there is a caravan park. Up until 1914 the mineral water was bottled and sent to Europe to be used for medicinal purposes. Mules hauled the water over the Cardwell Range to Townsville for bottling at the Innot Cordial Factory.

In 2010 a permit was issued to Gradient Energy Limited for electricity generation using thermal energy. While many geothermal projects use deep drilling into hot fractured rock, this will use a known geothermal spring similar to the Icelandic electricity generation. Temperatures in the range 144°C to 165°C are predicted at depth, meaning that off the shelf power plant technologies could be used.

Yungaburra Precinct

The Yungaburra Precinct contains the Seven Sisters, Mt Quinkan, Lakes Eacham and Barrine, Lake Euramoo and Mobo Creek Crater. Yungaburra provides a good base for visiting numerous volcanic features in the area. The Seven Sisters, also known as Big Brother and the Pinnacles, are young cinder cones. They are aligned along a fissure or line of weakness in the crust. Mount Quinkan rises 190m above the surrounding paddocks and contains a double crater; the largest is about 600m across. Analysis of the lake sediments suggest that the crater may have been active in the last 10,000 years. There is also a scoria quarry on the side of the cone.

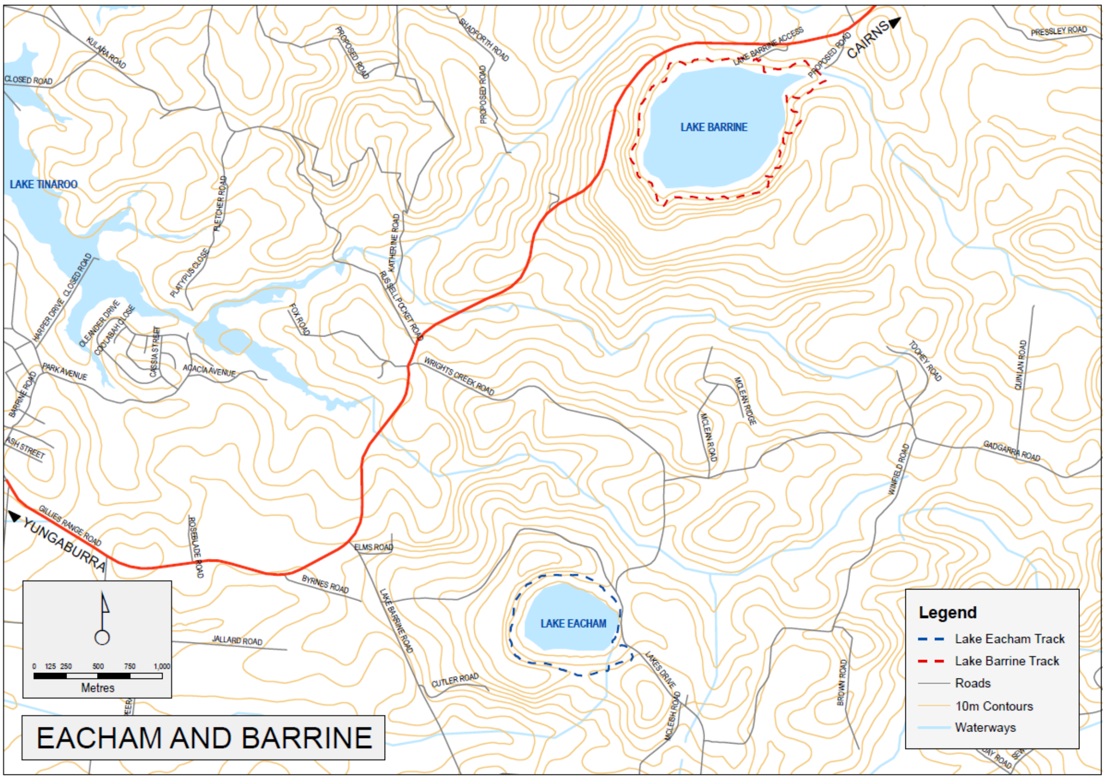
Lakes Eacham and Barrine are maars - volcanic craters formed by steam explosions when lava came in contact with groundwater. Each crater has a surrounding rim made up of blasted rock, lava and scoria. Lake Barrine is the largest with a depth of about 100m, and a circumference of 6.5km at water level. Lake Eacham is about 60m deep and 3.5km in circumference. Both lakes are cloaked in rainforest and have walking tracks.

Lake Euramoo and the Mobo Creek Crater lie to the north of the Gillies Highway on the Danbulla Forest Drive.

Lake Eacham

Lake Eacham is about 800m across and 60m deep. The 3km circuit track alternates between the interior slopes and th crater and the rim. The track cuts through layered tuff with pebbles, suggesting surges in the series of eruptions that formed the maar. Radiocarbon dating of the sediments suggests that the eruptions occurred a little earlier than 9100 years ago. At that time the crater was in open forest which was replaced by rainforest after 7600 years ago. Indigenous oral histories relate a story of the formation of the crater lakes and associated fires, well within the known period of settlement of northern Australia by Aboriginal peoples.

Lake Eacham is also a **maar**, or volcanic lake, formed by a steam explosion more than 10,000 years ago. It is fed by underground springs which enable it to retain a constant water level. The lake is isolated from any other water course making it an enclosed catchment, with water only lost through seepage and evaporation. The water level only fluctuates four metres between wet and dry seasons.



Lake Eacham aerial from an ultralight aircraft.

Lake Barrine

Lake Barrine is a popular destination for visitors to the Atherton Tablelands, with a 5.5km walking track and boat cruises which run from the cafe. This *maar* lake is about 1100m across and 65m deep, with very clear water and abundant aquatic life. The lake sediments are at least 17000 years old and their pollen reveals that open forest predominated at that time, close to the Last Glacial Maximum. A *maar* is a broad, low-relief volcanic crater that was caused by an explosion when groundwater was exposed to hot magma rising to the surface. The intense hot steam that results from the boiling groundwater was trapped underground, until massive explosions signalled its release. Huge cracks appeared in the ground and the trees that once covered the mountainside were levelled and burnt. Over hundreds of years, water filled the craters and the trees grew back, creating the tranquil lake we see today.

Lake Barrine from an ultralight.

Lake Euramoo

Lake Euramoo is a maar of special geological significance. Unlike other volcanic lakes, Lake Euramoo is unique because of its dumbbell rather than regular circular shape. This unusual formation is the result of two overlapping craters that were formed by double explosions, possibly at the same time. Lake Euramoo's steep sided rim forms a closed catchment. Lake Euramoo is one of the youngest geological features on the Atherton Tablelands, believed to be only 10,000 years old. Lake Euramoo is of high cultural significance to the Dulguburra Yidinji people.

The Seven Sisters

About 1 million years ago the style of volcanism changed from shield volcanoes with lava flows to cinder cones and limited lava flows. The Seven Sisters are relatively young scoria cones which form a line to the west of Yungaburra. A scoria cone in Yungaburra State Forest has an uranium series age of greater than 350,000 years. The grassy cone nearest to the Kennedy Highway is only 10,000 years old, and the road cuts through a lava flow from it.

The Seven Sisters from the north

Mount Quinkan

Mount Quinkan can be viewed from Ball Road to the south of the cone. It has a double crater (on private property) about 600m in diameter. The base of the lake sediments in the crater has been dated to 7250 years ago by radiocarbon.

Mount Quinkan crater and scoria quarry from an ultralight

Access Instructions for Geosites

Atherton Precinct

Hallorans Hill

Top entrance to the Halloran's Hill trail is via Centenary Drive, which is accessed from Robert Street, (a section of the Kennedy Highway through Atherton) turning into Twelfth Avenue, then Baxter Avenue, Wadley Close and Centenary Drive.

Mount Hypipamee National Park

Mount Hypipamee National Park is on the Kennedy Highway, 24 kilometres from Atherton, toward Ravenshoe. The turn-off is signposted. At the park there is a day user area with picnic facilities, carpark and toilets. There is a map and interpretive signage at the start of the 800 metre circuit.

Bones Knob

Turn off the Kennedy Highway onto Marnane Road opposite the Rocky Creek Memorial Park; follow Marnane Road to Anderson Road, turn left and drive to the end of the road.

Wongabel Cone

The Wongabel Cone and Botanical Walk are on the eastern side of the Kennedy Highway, 8 kilometres from Atherton, toward Ravenshoe.

Barneys Spring

Entrance to Barneys Spring requires navigating an unmarked walking trail from the Rocky Creek Camping site, which is on the Kennedy Highway between Mareeba and Tolga 6.12 before Tolga. The entrance to the track is not easy to find, as it has little use and passes through tall grass and low scrub. After a few hundred metres the trail passes through a fence, at which point turn you north along a rough vehicle track. Follow your nose to the large clump of trees surrounding the site. Barneys Spring can be found on Google Earth, and looking at it there might be helpful before you head out.

Herberton Precinct

Brochures describing all the walks in the area are available from the Herberton Visitor Centre. The brochure provides comprehensive track information about the terrain, vegetation, wildlife and a brief account of some old mines that you will pass on the walks. We have provided a basic map of the marked trails and a list of the walks. The Great Northern Walking Trails all start from the trailhead on John Street. Turn left off Grace Street at the Post Office and follow John Street to the carpark at the trailhead. A sign at the trailhead shows a map and a list of the walks with estimated walking times and level of difficulty.

The Great Northern Mines – 1 kilometre, 1 hour, easy

MacLeod Street Trail – 2 kilometres, 1 hour, easy to moderate

Magazine Road Escape – 3 kilometres, 1½ hours, moderate

Mount Ida Loop – 5·5 kilometres, 2½ hours, difficult

Denbigh Road Trail – 3 kilometres, 1½ hours, moderate

Southern Fire Trail – 6 kilometres, 3 hours, moderate

Stewart Head Walk – 15 kilometres, 6 hours, moderate to difficult

The Short Walks of Herberton brochure lists and describes the shorter walks into the bush, through riverside parkland and around the town centre. The long and short walks provide a wide range of walking opportunities in the area.

Photopost Walk – 100 metre, ½ hour

Heritage Buildings Walk – 800 metres, 1 hour

The Wild River Parkway – 1 kilometre, 1 hour

Upper Grace Street Lookout – 1 kilometre, ½ hour

The Copper Mines Walk – 1·5 kilometres, 1 hour

Specimen Hill Lookout – 1·5 kilometres, 1½ hours

Malanda Precinct

Malanda Volcano (Gentle Annie)

Gentle Annie Lookout, otherwise known as the Millaa Millaa Lookout is beside the East Evelyn Road, which joins the Kennedy Highway and the Malanda-Millaa Millaa Rd 3.2 kilometres from Millaa Millaa. The Lookout turnoff is 2.75 kilometres beyond this junction

Lynch's Crater

Lynch's Crater is on the southern side of Fisk Road. To get there, leave Malanda on the Malanda Millaa Milla Road, turning into Glen Allyn Road on the outskirts of Malanda, then turn right into Fisk Road 5.85 kilometres on. Travel 5.13 kilometres further along Fik Road to the crater, which will be on your right.

Bromfields Swamp

Bromfields Swamp lies alongside the Upper Barron Road, 4.8 kilometres from the Malanda-Atherton Road and 8.25 kilometres from the Kennedy Highway. It is signposted and has a viewing platform. The swamp is on private land.

Malanda Falls

Malanda Falls Conservation Park, recreation area and Visitor Information Centre are located on the banks of the North Johnstone River on the outskirts of Malanda via the Malanda-Atherton Rd

Millaa Millaa Precinct

Nandroya Falls, Tchupala Falls And Wallicha Falls

There are three walks offering views of past volcanic activity in this section of Wooroonooran National Park, starting at the Henrietta Creek Campground, 25 kilometres from Millaa Millaa on the northern side of the Palmerston Highway. Camping facilities are provided for those who want to stay long enough to do all the walks. The Nandroya Falls walk starts at the western end of the campground. Follow the signs down to and across the creek, or follow the road verge 300 metres across the bridge. The walk to Tchupala and Wallicha Falls starts at the eastern end of Henrietta Creek Campground, beyond the picnic shelter shed.

Crawfords Lookout
This lookout is located 27km from Millaa Millaa on the Palmerston Highway. It provides a fine view of the North Johnstone River far below.

Windy Hill Shield Volcano
The best viewpoint is at the Windy Hill wind farm, just off the Kennedy Highway 6km from Ravenshoe.

Gilligans Falls
From Ravenshoe drive north to Tumoulin for 5km and turn right onto Stancombe Road, follow this for 2.1km then turn onto Allen Road and follow this for 5km. Gilligan's Falls is also known as McKenzie Falls.

Souita Falls
Souita Falls walk is located southwest of Millaa Millaa, 5 kilometres from the Old Palmerston Highway along Middlebrook Road. It is a short, scenic creekbank walk to impressive waterfalls and pools.

Pepina Falls
From a parking area on the Old Palmerston Highway beside Middlebrook Creek bridge a set of rock pitched steps descends 75 metres to a pool at the base of Pepina Falls.

Yungaburra Precinct

Lake Eacham
Lake Eacham is about 6 kilometres east of Yungaburra off the Gillies Highway. Turn onto the Malanda road at the Lake Eacham Roadhouse, then turn left and follow the signs to the lake.

Lake Barrine
The lake is located next to the Gillies Highway about 8 kilometres northeast of Yungaburra. The entrance is signposted.

Lake Euramoo
Lake Euramoo is situated beside Danbulla Forest Drive, 20·2 kilometres from Tinaroo Falls township.

Mobo Creek Crater
Mobo Creek Crater is beside Danbulla Forest Drive, 25·4 kilometres from Tinaroo Falls township. There is a parking area at the start of the 600 metre circuit path.

The Seven Sisters
These cinder cones can be seen from the road between Atherton and Yungaburra, about 11km from Atherton.

Millstream Falls
The turn-off to Millstream Falls is 3 kilometres from Ravenshoe on the Kennedy Highway as you travel toward Mount Garnet. It is one kilometre from the highway to the picnic area and carpark at Millstream Falls.

Further reading

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Looking east from the Malanda Volcano