



CAPRICORN HIGHWAY

ROCKHAMPTON TO BARCALDINE

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The 570 km long Capricorn Highway connects Rockhampton and western Queensland along the Tropic of Capricorn. As it cuts across the regional geological trend, it traverses a number of major geological environments and quite varied rocks.

Geological history

The oldest rocks along the route are the highly deformed metamorphic rocks of the *Anakie Inlier*, outcropping northwest of Emerald, which are over 500 million years old and form the regional basement. These *Anakie Metamorphics* were later intruded by granites which date back 380 to 350 million years.

A volcanic mountain chain, the *Connors-Auburn Volcanic Arc*, developed along the eastern side of the old continent between 375 and 320 million years ago, when an oceanic crustal plate was dragged down (subducted) beneath the continent. Sediments were deposited onto a shallow continental shelf (the *Yarrol Province* - exposed in the Gracemere area) and off the continental edge. West of the volcanic chain, the continental crust subsided somewhat to form the *Drummond Basin*, which drapes the western side of the *Anakie Inlier*. At first volcanic rocks were erupted - the *Silver Hills Volcanics* - about 360 million years ago, and then sediments were deposited for 20 million years or so.

In the early Permian (290-265 my), a number of elongate basins subsided behind the active continental edge, accompanied initially by volcanic activity. This marked the onset of the *Bowen Basin*, where the *Camboon Volcanics* and *Lizzie Creek Volcanics* were laid down, followed by major coal sequences. Unlike Northern Hemisphere coals, those of the Bowen Basin formed under cold conditions, as Gondwana was then in high latitudes. *Glossopteris* and *Gangamopteris* ferns dominated the landscape. Some of the Bowen Basin sediments spilled over to the *Galilee Basin*, which was to the west of the old Drummond Basin rocks. Coal formation ended about 250 million years ago but both basins were active for another 20 million years. One of the later units, sandstone of the *Clematis Group*, is an important aquifer in the area.

Major crustal compression in the late Permian to middle Triassic (265 to 235my) subsequently deformed many of these sediments, such as in the *Gogango Overfolded Zone*. Some granitic bodies such as the *Bouldercombe Complex* were also intruded further to the east around this time.

After a hiatus, extensive blankets of sands and finer sediments were deposited on broad interior river plains between 190 and 100 million years ago. These formed the rocks of the *Eromanga Basin*, and the *Surat Basin* to the south. In their later stages there were incursions by a shallow sea and marine sediments were also laid down.

About 120 million years ago in the early Cretaceous, a number of small basins subsided on the eastern side of the continent, and the *Stanwell Coal Measures* were laid down in one of these.

Widespread eruption of basalt lavas and intrusion of trachyte and rhyolite plugs occurred at the end of the Cretaceous (75 my), marking the earliest phase of the extensive basaltic volcanism that occurred in eastern Australia in Tertiary times. *Rhyolite and trachyte plugs* were intruded in the Mount Hay area near Wycarbah.

In the early Tertiary (65 to 55 my), a number of rift valley basins formed on the continent in response to tension in the crust associated with opening of the Tasman and Coral Seas. Thick sedimentary sequences (including oil shale) were deposited in the *Duaringa and Biloela Basins*.

There were later widespread eruptions of basalt from 34 to 27 million years ago in the Clermont, Emerald and Springsure districts, associated with the continental crust moving over a 'hot spot' in the Earth's mantle below. Later in the Tertiary the region was affected by deep weathering and laterite layers formed.

Much of the present landscape is dominated by broad alluvial plains, which have developed over the last 2 million years.

Points of interest

Rockhampton-Duaringa

The highway starts on the Fitzroy River floodplain, near Yeppen Lagoon, a large oxbow lake. A river cut-off suddenly occurred during a large flood in geologically recent times: the present course, through Rockhampton's town reach, may be less than 6000 years old.

The road then rises onto sedimentary rocks of the *Yarrol Province* and granitic rocks of the *Bouldercombe Complex*. A number of small gold occurrences are located at the contact between the granitic intrusion and the surrounding rocks. The Hector Mine, 8 km southeast of Gracemere on the Burnett Highway, was established in 1866 and was Queensland's first "hard-rock" gold mine. The contact is also responsible for a small deposit of magnetite near Kabra (formed by chemical alteration and replacement of limestone of the *Cargoogie Oolite Member*. "Gracemere Granite" (actually a quartz gabbro) has been quarried as dimension stone for many years, and it features in many historic Queensland buildings.

Sandstone from the *Razorback beds*, outliers of the Surat Basin, is also quarried as dimension stone at Stanwell. The Stanwell Power Station is a 1500 MW coal-fired facility, fed by Bowen Basin coal and Fitzroy River water. It is only coincidentally located beside coal outcrops of the *Stanwell Coal Measures*, which were mined to supply the local market in the 1800s. More recently, clay from the weathered coal measures supplied the Bouldercombe Brickworks.

The Mount Hay Tourist Park, about 40 km west of Rockhampton, is known for its thunder eggs, which form within spherulitic rhyolite. Mount Hay is one of the volcanic plugs of rhyolite and trachyte of late Cretaceous age, which include the distinctive twin peaks to the west of Mount Hay (north of the highway) known as The Sugarloaf or "Normans Head", and Mount Sebastopol, beside the road just west of Westwood.

A number of intrusions of gabbro (a type of granitic rock) are located in the Westwood-Dululu area. Layered gabbros host platinum group elements, notably palladium, and there have been several prospecting attempts.

The town of Gogango is at the northern extremity of the Tertiary Biloela Basin, the Callide Valley's groundwater source.

The highway then negotiates the foothills of the Gogango Range. The cuttings at the base of the range are in the *Camboon Volcanics* (mainly of andesite), which are the base of the Bowen Basin sequence. The Gogango Range is an expression of the *Gogango Overfolded Zone*, a thrust-faulted, disturbed sequence of sediments that followed the Camboon Volcanics, which have been deformed by later crustal compression. Cuts on the western flank of the range pass through alternating slivers of *Rannes Beds* (siltstone and fine sandstone with marine fossils) and a younger, terrestrial unit (coarser sandstone with plant debris).

The swampy north-flowing Wawoon Creek is met about 20 km west of the range on the floodplain of the Dawson River, which is 6 km further west. The

Dawson and Mackenzie Rivers join to form the Fitzroy about 20 km to the north.

Strata of the Tertiary Duaringa Basin are first encountered on the western bank of the Dawson River. The red lateritised soils of this basin blanket a large part of the eastern Bowen Basin. Kaolinite clay, which has a number of industrial uses, is mined from the lower part of the lateritic profile near Duaringa.

Duaringa - Emerald

The Blackdown Tableland, where the Dawson, Expedition and Shotover Ranges meet, rises up to 600 metres above the surrounding plain, with escarpments of up to 300 metres high. Access to the National Park is west of Dingo and information can be obtained at the Dingo Roadhouse. The tableland is formed by thick beds of sandstone of the *Clematis Group*. It is the northern apex of a great downwards buckle (or fold) in the rocks, the Mimosa Syncline, whose flanks to the south are outlined by the Dawson and Shotover Ranges.

Arthurs Bluff (elevation 648 metres), at the northern end of the tableland, gives the township of Bluff its name. Four collieries operated immediately north of Bluff in the underlying strata of the Bowen basin between 1905 and 1966. A total of 1.5 million tonnes were produced in that period. Yarrabee Mine's rail loading facility is located between Bluff and Blackwater. This colliery produces semi-anthracite, a very high grade of coal.

The old Rangal Mine, about 5 km west of Blackwater, produced 140,000 tons between 1923 and 1940. Equipment from the mine is displayed at Blackwater Airport. It now lends its name to the economically important *Rangal Coal Measures*. A number of mines are located along the north-south trending subcrop line of this unit, (which denotes the shallowest unweathered coal), including the Blackwater Colliery, which can produce over 140,000 tonnes in a week! Exploratory shafts from the late 1800s remain at Tolmies, where the road intersects the *German Creek Coal Measures*. This unit contains fossil tree trunks, predominantly of *Glossopteris* ferns. Examples can be found on some of the local ridges. A large fossilised tree trunk, excavated during construction of the Mackenzie River Rail Bridge, is located outside Emerald Town Hall.

"Comet Creek" was named by Ludwig Leichhardt in 1844 after his party spotted Haleys Comet in the night sky when camped at the junction of what is now Comet River and a river he named the Mackenzie (after one of his financiers), about 6 km north of Comet township. The Mackenzie was later renamed the Nogoia upstream of the junction. Leichhardt noted fragments of coal and petrified tree trunks in the alluvium. Tertiary sediments and basalts from the hot-spot volcanoes blanket the Bowen Basin west to Emerald, to provide rich agricultural black-soil "rolling downs" country. Fairbairn Dam (Lake Maraboon), on the Nogoia River 20 km south of Emerald, provides water for irrigation.



Northwestern edge of Blackdown Tableland. Blackwater town in low country to far right.

Emerald - Barcaldine

Sapphires were first recorded in alluvial wash in the Anakie region in 1870. The area subsequently became for a time the largest sapphire-producing region in the world. Some diamonds and semi-precious gems such as topaz are also found. Sapphires and rubies are forms of corundum, a mineral inferior in hardness only to diamond, hence its use as an abrasive. The sapphires originated from plugs of the *Mount Hoy Basalt*, which explosively brought material from deep within the earth's mantle. There are many of these plugs, which have intruded granites and metamorphics of the *Anakie Inlier*. The southernmost granites are exposed along the highway.

The lowermost unit of the *Drummond Basin* is the rhyolite-dominated *Silver Hills Volcanics*. This resistant unit outcrops in a narrow but well-defined belt that includes Borilla Hill, 10 km west of Anakie. The most extensively exposed unit of the Drummond Basin is the *Ducabrook Formation*, characterised by interbeds of massive sandstone and greenish, highly erodible mudstone. This mudstone is primarily responsible for the "badlands" near Bogantungan. Tuffaceous strata are also present, and zeolite (an absorbent industrial mineral) is excavated from a tuff bed east of Bogantungan. Plant fossils are common in this unit and fish fossils have been found at Hannams Gap north of the Drummond Range lookout.

The Drummond Range, at 555 metres above sea level on the highway, marks the divide between the Nogoia River (Fitzroy Catchment) and the Belyando River (Burdekin Catchment). Sandy "desert woodland" plains, traversed west of the Belyando River, cover strata of the *Galilee Basin* and *Eromanga Basin*. The Great Dividing Range, which separates easterly flowing coastal catchments from those of the Lake Eyre Basin, is a rather innocuous ridge 40 km west of Alpha. Sandstone of the

Clematis Group rises less than 100 metres above the surrounding plains. This ridge is the main recharge point for the Great Artesian Basin (a popular but vague name that encompasses a number of geological basins) in central-western Queensland.

The Back Creek Bore, 42 km east of Barcaldine, which was drilled in 1886 in the search for water for the advancing Central Railway, was Queensland's first artesian bore. Artesian pressure was low, however, and it soon required pumping. The Railway Department drilled the Town Bore a year later and free-flowing water promptly filled the waterholes of Lagoon Creek. The bore continued to be Barcaldine's source of water for over a century. Hundreds of bores have subsequently exploited the aquifers of the Great Artesian Basin.

Bore water is recognisable by its distinctive hydrogen sulphide odour. This gas, produced by anaerobic decomposition in the aquifer, can be unpleasant for some but it is harmless. The H₂S content is very low, but the odour is detectable at concentrations of less than one part per billion!

Further reading

'Rocks and Landscapes of the National Parks of Central Queensland' by Warwick Willmott. Available from the Society \$18.00 + \$3.00 postage.