Geological Features of the Tasman Peninsula


Cape Raoul. Photo: Grace Cumming

Mineral Resources Tasmania
Department of State Growth

Tasmanian Government


Coal Mines Historic Site. Photo: Tourism Tasmania & Kathryn Leahy

Shelly Beach

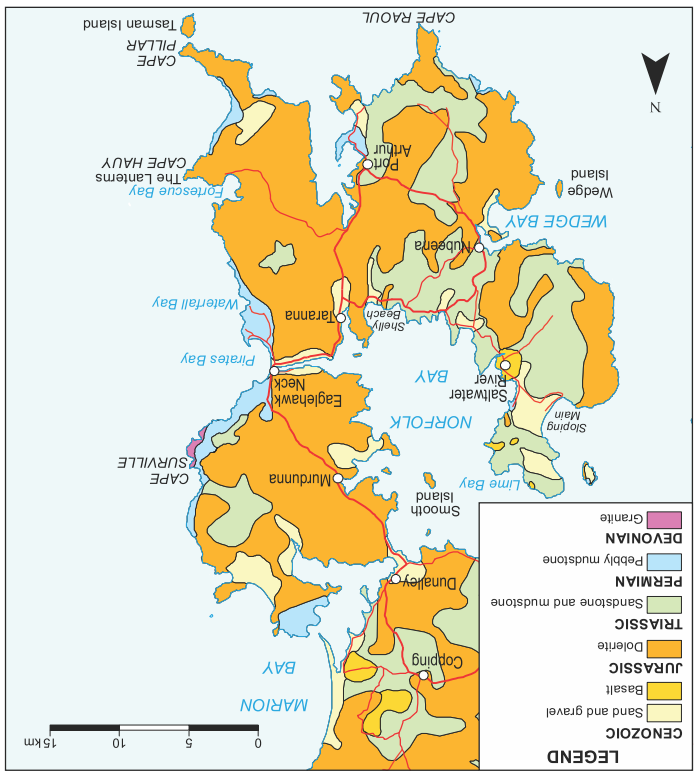
Shelly Beach is a picturesque location near Koonya where the top of a Jurassic Dolerite sill is exposed. The overlying Triassic sandstone outcrops either end of the beach. A short walking track leads to the eastern point where rocks display orange banding due to the precipitation of iron-rich minerals from groundwater. Shelly Beach was named after the recent shell deposits that occur at the western end of the beach. Deposits such as these were mined during the convict era as an alternative source of lime in the production of cement.

Saltwater River Coal Mines

Coal was discovered on the western bank of Norfolk Bay in February 1833 by two surveyors, Woodward and Hughes . In 1834 the Colonial Government started the first successful mining operation in Tasmania to extract the coal. The initial mine development was supervised by a convict named Lacey, as a means of achieving his freedom.

The workings of the Saltwater River coal mine are situated four kilometers north of Saltwater River. The mine was operated between 1834 and 1877. The coal sold for a lower price than that in New South Wales due to its inferior quality. Ladies particularly disliked it because the impurities spat sparks, spotting their crinolines with burn marks.

Coal at Saltwater River was formed in the Triassic, when Tasmania's climate was much colder. Broadleaf forests grew in swampy ground, which dried out from time to time. Wood, leaves and bark collected to form a layer of peat, which oxidised when the swamp dried out. When water later filled the swamp, silt and fine particles filled pores in the wood and were deposited in layers or bands now observed in the coal.



Sandstone, Sand and Sand Dunes

Most of the low-lying parts of the Tasman Peninsula are underlain by sandstone and mudstone. High sandstone cliffs can be seen along the eastern coastline of the peninsula at Shipsterns Bluff while lower cliffs occur along the sheltered bays of Norfolk Bay to the west. These cliffs are sculpted into shallow caves, low headlands and shallow, sandy bays.

The sand resulting from weathering of these rocks is washed into the bays. When sea levels were much lower during the Pleistocene ice age, these shallow bays were exposed and prevailing winds blew huge quantities of sand over the land and into dunes. These ancient dunes formed the white sandy soils that cover much of Nubeena and Taranna areas and at White Beach. Magnificent modern dunes occur at Roaring Beach, seven kilometres west of Nubeena.

Acknowledgements

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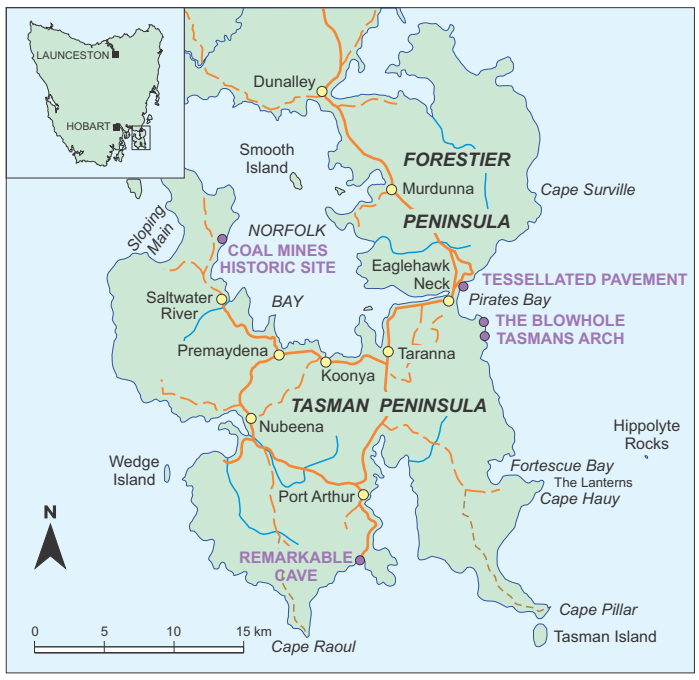
Tasman Peninsula Region

Southeastern Tasmania is largely underlain by horizontal to gently dipping beds of sandstone, siltstone, limestone and coal. These rocks, dating from the Permian and Triassic periods (298–201 million years ago), were later intruded (injected) by bodies of molten rock in the Jurassic Period (about 183 million years ago). The molten rock solidified to dark dolerite which formed sheets between layers of the sedimentary rocks, or bodies cutting across the sedimentary layers. Faulting in the Early Cenozoic (around 66 million years ago) affected the sedimentary rocks and dolerite, and produced several major down-dropped blocks (graben or rift valleys) with intervening uplifted areas. The Oyster Bay Graben, formed at this time, extends along the east coast from the Tasman Peninsula, north past Maria Island and Coles Bay, to St Marys. Basaltic volcanic centres in the Saltwater River area formed between 65 and 20 million years ago.

As sea levels fell during the glacial stages of the Pleistocene (125 000 - 20 000 years ago), rivers cut valleys to levels below the current sea level. The melting of ice sheets, about 10,000 years ago, resulted in a rise in sea levels, forming the current drowned coastline features of the Derwent Estuary, Frederick Henry Bay and the Tasman Peninsula. The sea has also built several major depositional features, including Seven Mile Beach, Long Spit at the mouth of Blackman Bay and the South Arm Neck, while parts of Tasman Peninsula are renowned for the excellent examples of coastal erosion landforms.




Aerial of Cape Hauy, Tasman National Park. Photo: Stu Gibson

Pirates Bay Lookout

A lookout above Pirates Bay, north of Eaglehawk Neck, provides a superb view of the eastern coastline of Tasman Peninsula south towards Cape Hauy. Notable features visible from this lookout include the Hippolyte Rocks, a Devonian (375 million year old) granite outcrop six kilometres offshore; the magnificent Jurassic dolerite stacks of The Lanterns at Cape Hauy shown above; and the spectacular Permian mudstone and sandstone sea cliffs south of Pirates Bay.

The bedded Permian rocks commonly develop shore platforms at the base of the cliffs, in contrast to the more massive dolerite. Submarine slopes are steep and terraced in Permian rocks, but are almost vertical or with a scree slope in dolerite.

Tessellated Pavement

An unusual wave-cut platform occurs on the shoreline below the Lufra hotel. The regular joints in this platform look as they have been man-made but they are entirely natural. The attractive pattern of the pavement was noted by Surveyor General George Frankland and Commandant O'Hara Booth. Sir John and Lady Jane Franklin visited the pavement in 1837, and the site has continued to fascinate visitors, artists and locals for many years. Some attempts were made to mine the pavement as ready-made building blocks, although luckily these were not successful.

The pavement here, and a smaller pavement near Clydes Island, are shore platforms formed since sea levels stabilised some 6 000 years ago. The Permian rocks which make up the pavement are interbedded pebbly siltstones and sandstones, which contain fossils and some dropstones.

The cracking that has resulted in the formation of the tessellated pattern is now thought to be due to unloading stresses, which are caused as the cliff line erodes and retreats. This retreat leaves the newly exposed platform rocks to be attacked by the action of wind, waves, rain and salt. Many interesting tessellations have developed, including round topped 'loaves' close to the sea, while hollowed-out pans with raised edges and others with hard, smooth edges and a pitted, almost spongy like interior occur further back in the intertidal zone.

During subsequent intertidal coastal abrasion, the squares are continually wetted and dried leading to the formation of salt crystals which further enhance erosion. As the beds differ in composition, containing varying amounts of sand and silt, there are a range of erosional effects simultaneously taking place across the surface of the "pavement".

Tessellated Pavement. Photo: Tourism Tasmania & Lee Henley

Eaglehawk Neck

A beach ridge and dune sand-covered neck, backed to the west by an extensive sand flat, connects the Tasman Peninsula to the south with the Forestier Peninsula to the north. Old dunes with deeply developed soil profiles can be observed at the junction of Blowhole Road and the Tasman Highway. The sand dunes developed as a result of rising sea levels 10 000 to 8 000 years ago.

Eaglehawk Neck Lookout towards Pirates Bay Photo: Michael J Dix

Eaglehawk Neck to Waterfall Bay

The spectacular erosional features along this stretch of coastline are a result of salt water and wave action on near-horizontal beds of Permian-aged sedimentary rocks. A variety of features can be seen in this area:

Notches

Small particles of rock are eroded as waves break against the base of a cliff. Water is driven into cracks and joints where salt crystals can form. These crystals can further weaken the rock. Eventually a notch forms at the base and overhanging layers collapse.

Sea Caves

In some places, possibly along a line of weakness, the notch deepens into a sea cave. If this occurs on both sides of a headland, the caves can join and form an arch. This in turn may collapse forming an isolated stack or a series of stacks.

Tasmans Arch and the Devils Kitchen

These two features, like The Blowhole, are formed by marine processes eroding along zones of close jointing in almost horizontal Permian rocks. Tasmans Arch is a superb example of a natural arch.

The Devils Kitchen is an excellent example of a geo — a straight, parallel-sided gulch formed by wave action. This feature may have started as a blowhole, become an arch and then collapsed. If sea levels were to fall this geo would slowly fill with sediment, fallen rocks and soil, and would become a fossil geo — such a feature can be seen at Remarkable Cave.

Blowhole, Pirates Bay. Photo: Tourism Tasmania & Kathryn Leahy

The Blowhole

Blowholes are formed by wave erosion extending sea caves along joints or cracks in the rocks until part of the roof collapses or the tunnel reaches the surface. The air in the tunnel is compressed by incoming waves, and water is forced into every opening and crack. As each wave recedes the compressed air suddenly expands with explosive force. The combined processes of abrasion and decompression quickly erode rocks which are divided into blocks by jointing and bedding.

The blowhole at Eaglehawk Neck was developed by waves compressing air into a zone of closely-spaced jointing in almost horizontal Permian siltstone and sandstone. These rocks contain abundant pebbles, probably ice-rafted, and some marine fossils. At high tide waves surge along the cave floor and break against the rocks that have fallen from the old roof.

Just to the north is a channel cut along a joint in sandstone which is deeply pitted by salt crystallisation. Beyond the channel is Fossil Island, where siltstone with fine examples of the fossil bryozoan Stenopora can be seen.

Safety Cove and Remarkable Cave

The road from Port Arthur to Remarkable Cave passes Point Puer, which is underlain by Permian mudstone. At Safety Cove an inland flat area, formerly a lagoon, is separated from the sea by a frontal dune formed on beach deposits. Tasman Island, a sea-stack of dolerite, and Cape Pillar, part of the Three Capes Walk, can be seen to the distant southeast from Safety Cove.

The Remarkable Cave area contains a number of geological features of interest, with some unusual contact effects between dolerite and sandstone and a spectacular sea cave. From the car park Cape Raoul can be seen in the distance to the southwest, while Tasman Island can be seen to the southeast. Both these features are composed of dolerite columns.

Remarkable Cave is a deep geo located close to the contact between the dolerite and sandstone. The area contains two intersecting sea caves. The main cave is noted for the view looking seaward through the cave, with the opening forming a rough outline in the shape of Tasmania.

The base of the cave can be accessed by steps, which lead to a viewing platform. This platform gives a view through the major cave, which has been formed by marine erosion along a fault plane in Triassic sandstone overlying dolerite. If the tide is low, the second cave can be seen coming in from the left. The two caves formed on either side of the headland and eventually intersected.

Another interesting feature lies immediately east of the cave. This is an old wave-worn sea inlet (a fossil geo), which formed during the last interglacial period (about 100 000 years ago) when sea levels were higher than at present. Part of the geo is still filled with rocks and soil washed in from surrounding slopes, although the inland end of the geo has been intersected by Remarkable Cave since the last postglacial rise in sea level. The geo also contains a beach deposit formed during a non-glacial period between glacial stages.

Remarkable Cave. Photo: Grace Cumming

Dolerite Intrusion

Dolerite forms much of the landscape in Tasmania. During the Jurassic period, about 183 million years ago, molten rock from deep within the Earth's crust intruded into overlying sedimentary rocks, squeezing upwards forming dykes and outwards between the layers of sedimentary rocks, forming sheets. In some cases the host rocks were deformed (folded) and in other cases the sediments were lifted hundreds of metres upwards by the intruding dolerite. Although a relatively uncommon rock globally, dolerite forms much of the landscape in Tasmania and also occurs in Antarctica, South America, Africa and India.

The coastline to the east of the Remarkable Cave car park shows a striking example of a dolerite contact with Triassic sandstone. The darker coloured dolerite is more resistant to erosion than the light coloured overlying sandstone, and in places the sandstone has been removed, leaving a wave cut platform in dolerite.

Deep Glen Bluff. Photo: Michael J Dix

North of Eaglehawk Neck dark grey dolerite (at sea level) intrudes lighter coloured sedimentary rocks (at cliff top) which overlie a pale-coloured granite. This is exposure, in the sea cliffs in the Cape Surville area, shows the major dolerite feeder cutting through the granite near sea level before intruding the sedimentary rocks.