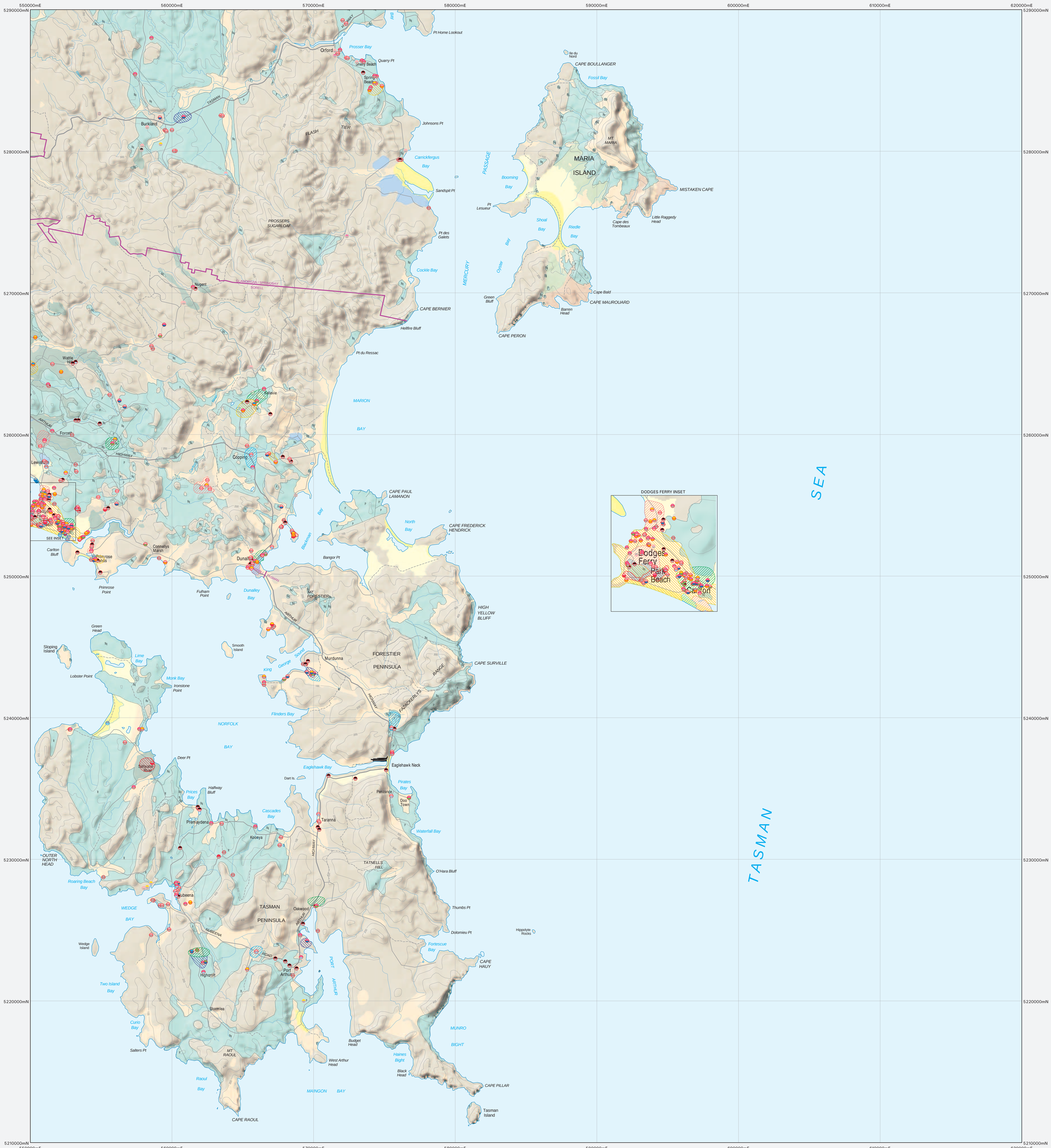
MUNICIPAL PLANNING INFORMATION SERIES
TASMANIAN GEOLOGICAL SURVEY
MINERAL RESOURCES TASMANIA

MAP 21 – HYDROGEOLOGICAL INVENTORY

MINERAL RESOURCES TASMANIA
Tasmania
ENERGY and RESOURCES
DEPARTMENT of INFRASTRUCTURE



These maps are complimentary to the 1:250 000 scale hydrogeological maps which use as a basis, a compiled 1:250 000 scale geology layer (derived from 1:25 000, 1:50 000, 1:63 360 scale geological maps together with some areas where only reconnaissance mapping is available). These 1:100 000 scale maps are easier to read and use the regional groundwater prospectivity boundaries from the 1:250 000 scale maps as background information in the absence of more detailed uniform hydrogeological coverage across the whole State. They should be used in conjunction with the 1:250 000 scale maps and other more detailed hydrogeological maps and site specific reports, if available, as a preliminary to more intensive groundwater studies in a particular area. If additional projects are undertaken in targeted prioritised areas of the State, these maps can be further developed and made more site specific.

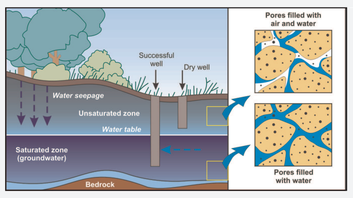
Boreholes shown on the map are those with locations mainly supplied by drillers and from location in the field by MRT staff. There are many spear bores installed for investigation and production purposes in coastal sand deposits in Tasmania that may not be shown on these maps at this stage. Boreholes with yields >0.03 L/s have been considered as successful bores. Outputs of bores are those supplied by drillers and are mostly the result of short term pumping measurements. Some bores have been successful but outputs have not been reported. Boreholes reported as dry holes usually have a small unreported yield (<0.05 L/s).

Small elevated areas of any hydrogeological unit will usually have lower prospectivity because of limited storage and high drainage rates. In areas where there is little or no water bore data (e.g. Southwest Tasmania), the groundwater prospectivity has been assumed to be similar to that in the areas where data are widely available. In areas of low rainfall, water quality can be poorer and water usage may be limited.

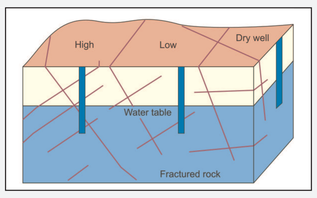
These maps provide some additional information to the 1:250 000 scale hydrogeological maps in that there are some subdivisions of Permian and Triassic age units. There is some difference in hydrogeological properties and prospectivity between these units. For example the Upper Triassic lithic sandstone, mudstone and coal measures has lower prospectivity and poorer quality groundwater than the Lower Triassic and Permian rocks in most locations. The three dimensional shade effect enables users to understand the spatial relationship between adjoining hydrogeological units shown on the map and in some cases their relative thickness.

There is usually a degree of vertical stratification in the groundwater quality within the aquifers and results presented represent a composite value of salinity from drill holes at a particular time. Natural groundwater quality is influenced by annual rainfall and the evaporation (e.g. high rainfall, low evaporation areas tend to have better quality groundwater then low rainfall, high evaporation areas), the composition of the rock types through which the groundwater passes and is stored in and by physical properties of the rocks such as permeability and porosity. Human activities such as extensive groundwater pumping, pollution from various waste disposal activities and use of chemicals (agriculture, forestry, industry etc.) also may have negative effects on groundwater quality.

The geology (including aquifer prospectivity), geomorphology and the inter-relation between surface water, groundwater and rainfall in a particular area are important considerations in resource and other groundwater/surface water studies. The attached average rainfall map can be used to make some general deductions about the possible links between the above-mentioned water balance factors. Climate has an affect on quantity and quality of both groundwater and surface water, as base flow in streams and spring water is largely, if not all groundwater derived under most conditions. In areas with unconfined shallow aquifers groundwater pumping near the rivers may result in the reverse water flow from the river towards the groundwater and result in decreased river flow. These maps provide preliminary information for more detailed groundwater and surface water studies.



INTERGRANULAR AQUIFERS



FRACTURED AQUIFERS

Diagrams used with permission of the Centre for Groundwater Studies

AQUIFER TYPE	PROSPECTIVITY (Whole of Tasmania)	ROCK GROUPS	VULNERABILITY TO POLLUTION
POROUS (INTERGRANULAR)	HIGH	Quaternary aeolian deposits marginal to the coast consisting of fine to medium grain size sand.	High.
POROUS (INTERGRANULAR)	MODERATE – HIGH	Quaternary coastal plain deposits consisting of sand, clayey sand, shelly deposits and gravel underlying areas near the coast. Probable marine origin.	Moderate to high. Depends on permeability of the material that overlies the aquifer.
POROUS (INTERGRANULAR)	LOW – MODERATE	Quaternary alluvium (clay, sand and gravel with varying clay content) and talus (boulder deposits). Sand, gravel and mud of alluvial, lacustrine and littoral origin. Minor windblown sands on sloping bedrock.	Low to high. Low where clay material overlies aquifer. High where there is no clay.
POROUS (INTERGRANULAR)	LOW – HIGH (High in NW Moderate – high in NE Low – high in SE)	Tertiary sediments: clay, sand and gravel of non marine origin (lacustrine alluvial deposits). Minor limestone (marine origin). Variable thickness up to several hundred metres.	Low to high. Low where clay overlies aquifers. High where gravel aquifers come to the surface.
FRACTURED ROCK (Intergranular on some horizons)	HIGH	Triassic, quartzose and lithic sandstones, mudstone, minor coal. Terrestrial origin (R, Rv, Rq). Permian mudstone, siltstone and sandstone (often pebbly), minor limestone, conglomerate and tillite. Mainly marine origin (P).	High –unless a layer of low permeability material overlies the aquifer.
FRACTURED ROCK	MODERATE–HIGH (Moderate – high in NW and SE. High in NE)	Ordovician to Devonian turbidite sequence of sandstone and mudstone (Malhinna Supergroup); Ordovician limestone, Cambrian volcanics and sediments. Precambrian mudstone, slate, quartzite and dolomite. Neoproterozoic sediments.	Very high –unless a layer of low permeability material overlies the aquifer.
FRACTURED ROCK	HIGH	Tertiary basalt.	High. Very occasionally deep clay soils may offer some protection and lower vulnerability
FRACTURED ROCK	MODERATE	Jurassic dolerite. Triassic basalt –Scottsdale, Ringarooma, Tamar and Bream Creek.	Moderate. Can be high if fractured zones are not overlain by low permeability material.
FRACTURED ROCK	LOW – MODERATE (Mainly Low Low – Moderate in NE)	Devonian granitic rocks. Cambrian mafic ultramafic complexes (peridotite, serpentinite, dolerite dykes). Precambrian granite.	Low to moderate. Can be high if highly fractured zones not covered by clay.

GROUNDWATER FEATURE

Feature type and accuracy — Yield — Salinity –TDS

GROUNDWATER FEATURE TYPE and ACCURACY

- Borehole location accuracy 1 ~ 500 metres
- Borehole location accuracy 500 ~ 2000 metres
- Spear point location accuracy 1 ~ 500 metres
- Spear point location accuracy 500 ~ 2000 metres
- Well, dug well location accuracy 1 ~ 500 metres
- Well, dug well location accuracy 500 ~ 2000 metres

BOREHOLE YIELD

Litres / second	Potential usage of groundwater based on borehole yield
Unknown	
0 (Dry)	
<= 0.05	Limited use for domestic and stock
0.05 ~ 0.5	Domestic, stock, garden
0.5 ~ 1.5	Domestic, stock, garden, limited irrigation
1.5 ~ 5.0	Domestic, stock, garden, small area irrigation
5.0 ~ 10.0	Domestic, stock, garden, moderate area irrigation, small communities
> 10.0	Domestic, stock, garden, large area irrigation, small towns, supplement to larger towns

Outputs of bores are those supplied by drillers and are mostly the result of short term pumping measurements. Outputs may not be sustained for long periods of continuous pumping.
Boreholes reported as dry holes usually have small unreported yields eg. <0.05 L/s.
The bores shown are those recorded in the Mineral Resources Tasmania groundwater database (BORIS).
BORIS data as at 19-SEP-2006

Conversion factors -
1 litre per second ~ 800 gallons per hour ~ 8.6 millimetres per hectare per day ~ 0.84 acre inches per day.

SALINITY - TDS

Milligrams / litre
Unknown
<= 500
500 ~ 1000
1000 ~ 1500
1500 ~ 3000
3000 ~ 7000
> 7000

POTENTIOMETRIC CONTOURS

- 170 — Potentiometric contours of deeper Tertiary Aquifers (5 m contour interval) Longford Area (Geological Bulletin 59)
- 60 — Potentiometric surface contours (10 m contour interval) Great Forester River Catchment (NE Tasmania)
- 130 — Potentiometric surface contours in Tertiary basalt (10 m contour interval) Great Forester River Catchment (NE Tasmania)
- Tertiary age deep lead – position approximate Great Forester River Catchment (NE Tasmania)

SALINITY CONTOURS

- 1500 — Salinity contours of deeper Tertiary Aquifers (500 mg/L contour interval) Longford Area (Geological Bulletin 59)

GEOLOGY (TRIASSIC / PERMIAN)

- Undifferentiated Triassic sediments (R).
- Upper Triassic sediments – dominantly mudstone and sandstone, lithic sandstone with felsic volcaniclastic sandstone and coal measures (Rv).
- Lower Triassic sediments – dominantly quartz sandstone (Rq).
- Permian sediments (P).

Scale: 1:100000

0 2 4 6 8 10km

AGD66 – AMG Zone 55
Contour Interval: 100 metres

GROUNDWATER QUALITY
Expressed as Total Dissolved Solids (TDS)

TDS in mg/L	Potential usage of groundwater based on water quality
< = 500	All purposes, domestic and irrigation
500 - 1000	Most purposes, general upper limit for irrigation
1000 - 1500	Most purposes, upper limit for drinking, limited irrigation
1500 - 3000	All livestock, very limited irrigation
3000 - 7000	Most livestock (not pigs or horses)
> 7000	Limited stock use (beef cattle, sheep)

Areas of similar groundwater quality across different rock types are shown by shading as above. Solid lines ———— indicate deep aquifers while broken lines – – – – – – – indicate shallow aquifers. Boundaries are approximate only.

These are general limits for the use of groundwater. The use of water for irrigation with the higher levels of salinity in the above table should only be considered on particularly suitable soil types with the adoption of specific management practices, or if the bore water is mixed with fresh water. For further information see Australian and New Zealand guidelines for fresh and marine water quality.

The data for this map were derived from the Tasmanian Geological Atlas 1:250,000 digital series and Mineral Resources Tasmania Groundwater data base (BORIS) and are based upon the potential for groundwater within broad rock groups.

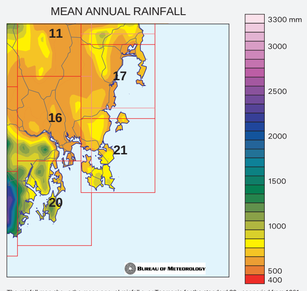
Other groundwater and hydrogeology maps and reports are available from Mineral Resources Tasmania. Borehole data is available from the Mineral Resources Tasmania web site -

www.mrt.tas.gov.au

This map is not the result of a concise survey therefore groundwater potential and salinity areas are indicative only. This map does not remove the need for site specific investigations.

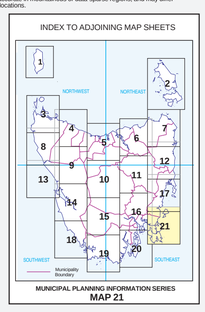
Groundwater potential data compiled by:
W.L. Matthews B.Sc. and M.Latinovic B.Sc.(Hons)

MEAN ANNUAL RAINFALL



The rainfall map shows the mean annual rainfall over Tasmania for the standard 30-year period from 1961 to 1990. It was derived by the Climate and Consultancy Section in the Tasmania and Antarctica Regional Office of the Bureau of Meteorology from a gridded analysis prepared by the Bureau's National Climate Centre. The procedure uses kriem blends, measured rainfall with topography to give estimates of rainfall for each area. The results will be less accurate in mountainous or data-sparse regions, and may differ from the observations at individual locations.

INDEX TO ADJOINING MAP SHEETS



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Base data from the LIST, © State of Tasmania

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Plotfile for this map generated from digital data: September 19, 2006