HYDROGEOLOGICAL MAP of the TINDALL AQUIFER at MATARANKA

THE TINDALL AQUIFER

The Tindall Limestone is an extensive sheet of limestone that formed in a shallow sea some 510 million years ago. In more recent times it has undergone weathering that has led to the formation of solution cavities ranging in size from millimetre to metre scale. These cavities form an interconnected network that permits the storage and movement of significant quantities of groundwater. It is known as the Tindall aquifer.

GROUNDWATER RESOURCES

Mataranka Water Allocation Planning Area

Groundwater Levels (m AHD) September 2008

150 - 155 | 120 - 125
145 - 150 | 115 - 120
140 - 145 | 110 - 115
135 - 140 | 105 - 110
130 - 135 | 100 - 105
125 - 130 | 95 - 100

Water Resources Features

- Tindall Limestone, confined by Jinduckin Fm
- Tufa Aquifer.
- Tindall Limestone absent
- Cretaceous sandstone clay
- Daly Basin margin
- Groundwater divide
- Groundwater flow direction
- Barrier to flow
- Major Spring
- G9030176 Gauging Station
- 014641 Rainfall Station
- Limit of mapping

Bore Use (within the planning area)

- Public Water Supply
- Agriculture
- Industry
- Monitoring
- Stock / Investigation

Cross Section Features

- A — B Line of cross section (map)
- 31483 Registered number of bore
- Natural surface
- Standing Water Level
- Total Depth

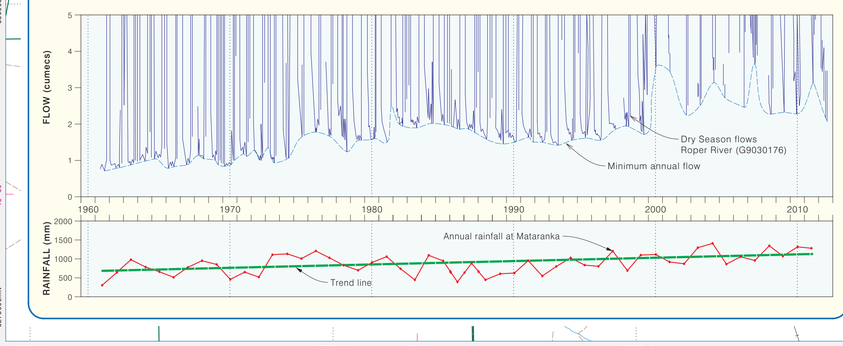
The groundwater level map shows the regional pattern of groundwater movement. Groundwater moves through the aquifer under the action of gravity, so water flows from areas where the watertable is higher to where it is lower. Flow is therefore normal to the watertable contours and from high to low values.

The contours are derived from measurements of depth to water in a network of monitoring bores. The watertable is dynamic, fluctuating with the seasons. It can also be affected by human activities such as groundwater pumping and changes to the recharge regime.

Note that in the stippled area immediately south of the Roper River in the Elsey National Park the Tindall aquifer is absent but the groundwater flowing from the south passes into an aquifer in tufa deposits. The tufa is limestone precipitated by spring waters rich in calcium carbonate. It is cavernous like the Tindall Limestone.

ROPER RIVER BASEFLOW

The Roper River flows throughout the year. By the end of the Dry season all of the water is derived from groundwater either from springs or through seepage into stream beds (base flow). Comparison of Dry season river flows, from year to year give a good indication of long term changes in the water balance. Rainfall is the main factor affecting base flows in the absence of large scale groundwater extraction. Note that in the period shown annual rainfall has been increasing on average.



MAP LOCALITY

INDEX TO 100K MAP SHEETS

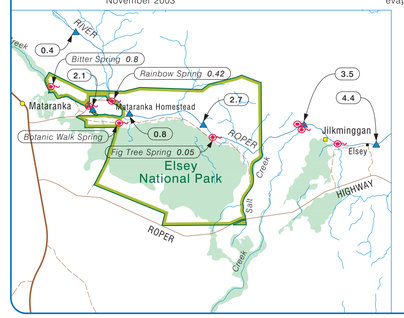
KATHERINE 5369 | EVA VALLEY 5469 | WATERHOUSE 5569 | FLYING FOX 5669
MANBULLOO 5368 | MARANBOY 5468 | MATARANKA 5568 | MOROAK 5668
DRY RIVER 5367 | ELSEY 5467 | GORRIE 5567 | MAIS 5667
BIRRIMBA 5366 | WESTERN CREEK 5466 | LARRIMAH 5566 | MARYFIELD 5666

GROUNDWATER DISCHARGE FEATURES

Bitter Spring 0.8 — Major springs with flows (cumecs). November 2003

3.5 — Stream flows (cumecs). November 2003

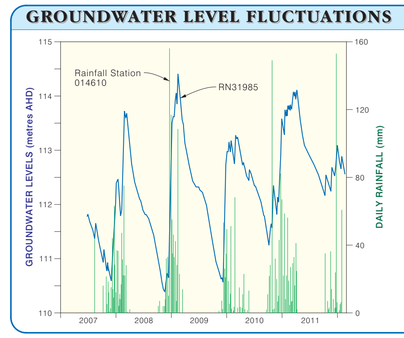
Swamps and floodplains underlain by shallow watertables. Groundwater discharges via evapotranspiration and minor springs



Groundwater flows to the lowest point in the landscape, which in this area is the Roper River. In the late dry season all the flow in the river is sourced from discharging groundwater. In recent times these flows have been from 2 to 4 m^3/sec (cumecs) at gauging station G9030176. Of that amount only 30% is from the major springs with the remainder seeping directly into the river. Several underwater springs have been observed in the river bed.

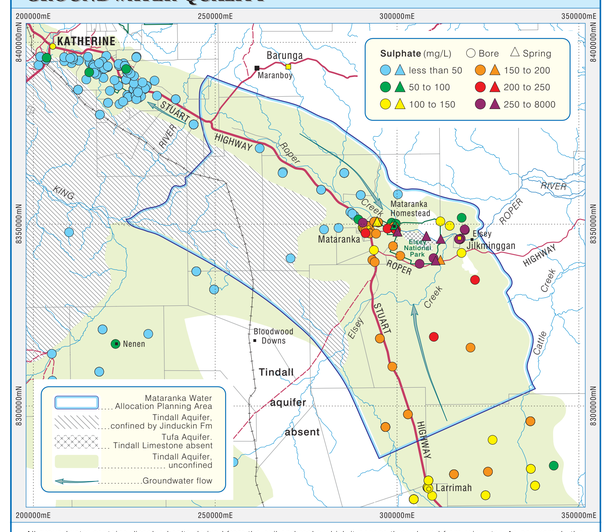
Bitter and Rainbow Springs issue directly from caverns in the Tindall Limestone. Botanic Walk and Fig Tree Springs are also sourced from the Tindall aquifer but the water passes into and discharges from a cavernous aquifer developed in overlying tufa.

GROUNDWATER LEVEL FLUCTUATIONS



The watertable rises and falls with the seasons. Once the soil is saturated sufficiently by early rains, subsequent rains can recharge the aquifer. Groundwater continually drains out of the aquifer but if rain replenishes it at a greater rate than water leaves the aquifer the watertable rises. After the Wet season reaches its peak drainage dominates and the watertable progressively drops.

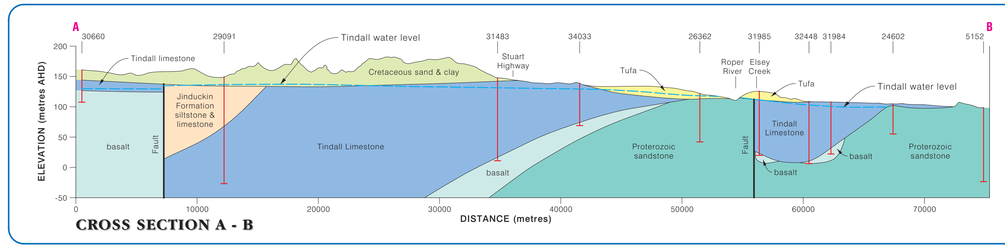
GROUNDWATER QUALITY



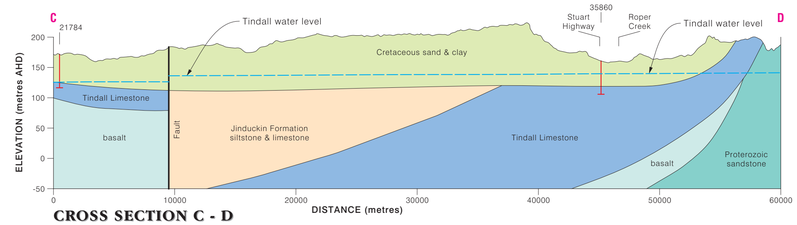
All groundwater contains dissolved salts derived from the soil and rocks which it passes through and from rainwater. As an example the sulphate content is shown here. Two distinct groups of waters are present, those to the northwest of Mataranka with values less than 50mg/L (blue symbols) and those to the south of the town which are higher than 50mg/l. Sodium, potassium, magnesium, chloride and total dissolved solids show a similar pattern. The two groups of waters correspond to the two main flow directions, from the northwest and from the south. The source of the increased salt content in the south is most likely related to the presence of minerals such as gypsum (calcium sulphate) and halite (sodium chloride) within the rock formation.

The chemistry of the spring waters indicates that they are each sourced by different proportions of the low and hi sulphate waters. The water from Bitter Spring comprises on average 70% of water from the south but in the case of Rainbow Spring it is only 35%. This can be accounted for by differences in the "plumbing" of the system of caverns that feed the springs. Botanic Walk and Fig Tree Springs are sourced by the high sulphate waters but have higher salt contents than the regional groundwaters due to concentration by evapotranspiration in the large swamp immediately to the south.

CROSS SECTION A - B



CROSS SECTION C - D



Hydrogeologist: S. Tickell JUNE 2013

Water Resources Division, Department of Land Resource Management, Northern Territory.

Cartography by L. J. Fritz, Spatial Data & Mapping Branch, June 2013
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GENERAL FEATURES

- Property Boundary
- LAKEFIELD Pastoral Station
- Park or Reserve
- KATHERINE Major Town
- Mataranka Minor Town
- Barunga Major Aboriginal Community
- Jilkminggan Minor Aboriginal Community
- Vermelha Pastoral Homestead
- Highway
- Main Road
- Minor Road; sealed / unsealed
- Local Road / Track
- Railway
- Gas Pipeline
- Drainage Line

Note: for clarity, not all features are shown

Northern Territory Government

For further information contact:
Water Resources Division,
Department of Land Resource Management
Tel: (08) 8999 4455 **Fax:** (08) 8999 3666
Email: waterresources@nt.gov.au
Web: www.lrm.nt.gov.au
Level 4, Goyder Building, 25 Chung Wah Terrace
Palmerston, Northern Territory of Australia.

kilometres 0 5 10 15 20 kilometres

Black numbered lines are 25 000 metre intervals of the Map Grid of Australia (MGA) Zone 52 Transverse Mercator Projection Horizontal Datum: GDA 94

GDA This map was produced on the Geocentric Datum of Australia 1994 (GDA 94)