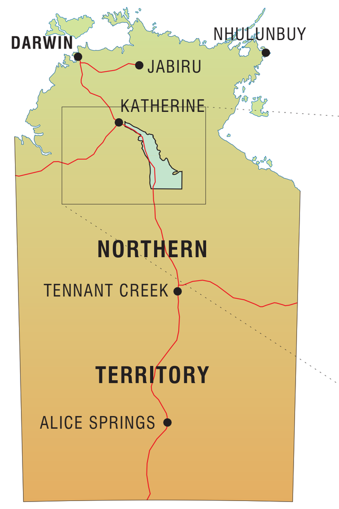
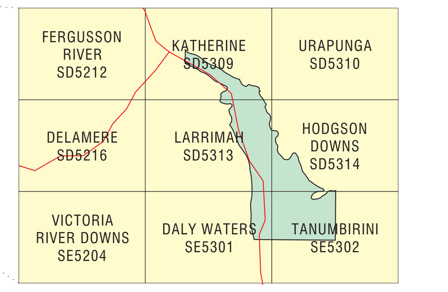
TINDALL AQUIFER
KING RIVER to DALY WATERS



MAP LOCALITY & 1:250 000 MAP SHEET INDEX



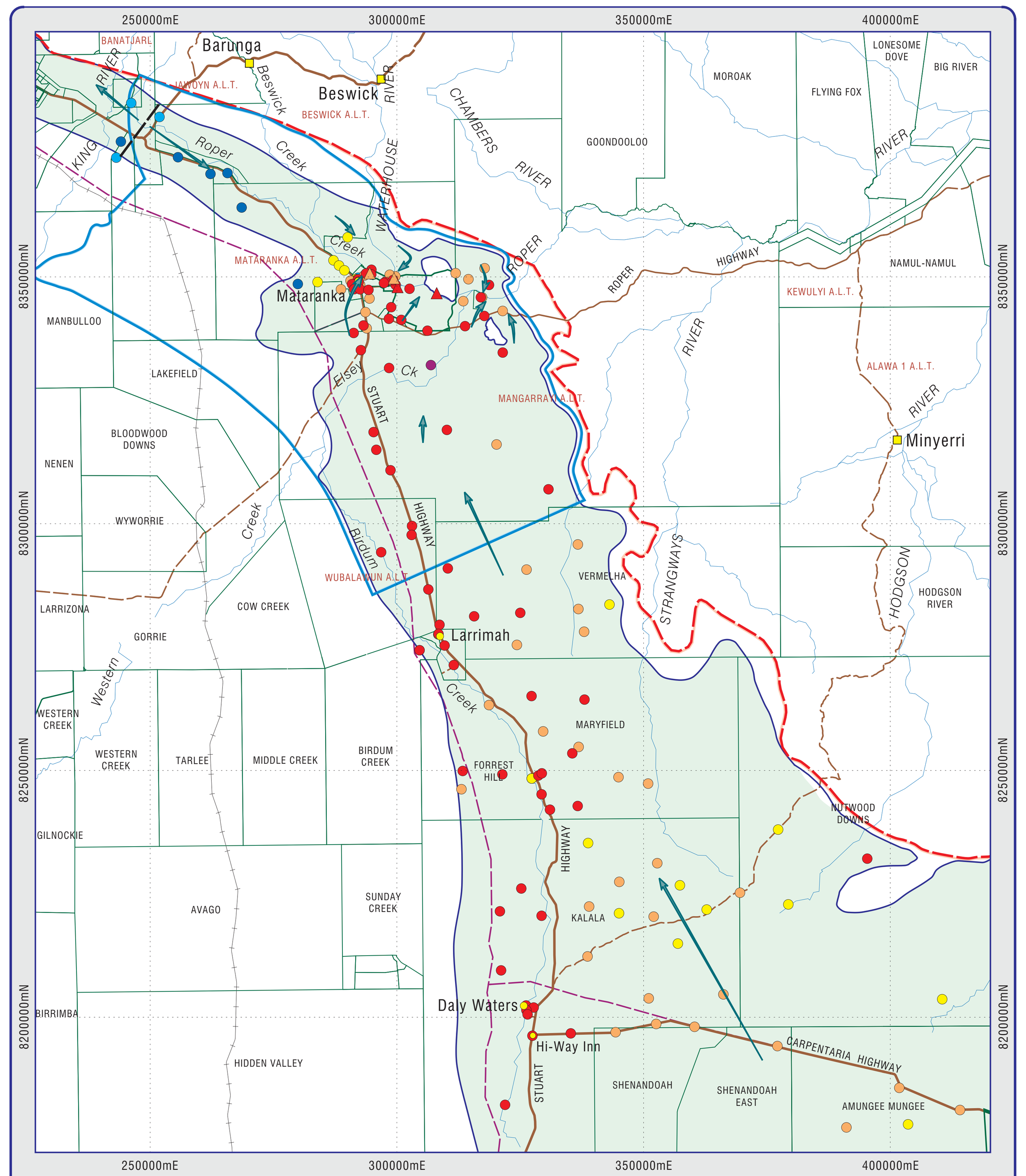
Base Information Source - Northern Territory Department of Lands, Planning and the Environment and Geoscience Australia, Australian Government

Note: for clarity, not all features are shown

GENERAL FEATURES

- Property Boundary
- LAKEFIELD .... Pastoral Station
- Park or Reserve
- Mataranka .... Minor Town
- Barunga .... Major Aboriginal Community
- Jilkminggan .... Minor Aboriginal Community
- Jomet (Urpalarwn) .... Family Outstation
- Vermelha .... Pastoral Homestead
- Highway
- Main Road
- Minor Road; sealed / unsealed
- Local Road / Track
- Railway
- Gas Pipeline
- Drainage Line
- Area subject to inundation
- Swamp area

GROUNDWATER ELECTRICAL CONDUCTIVITY

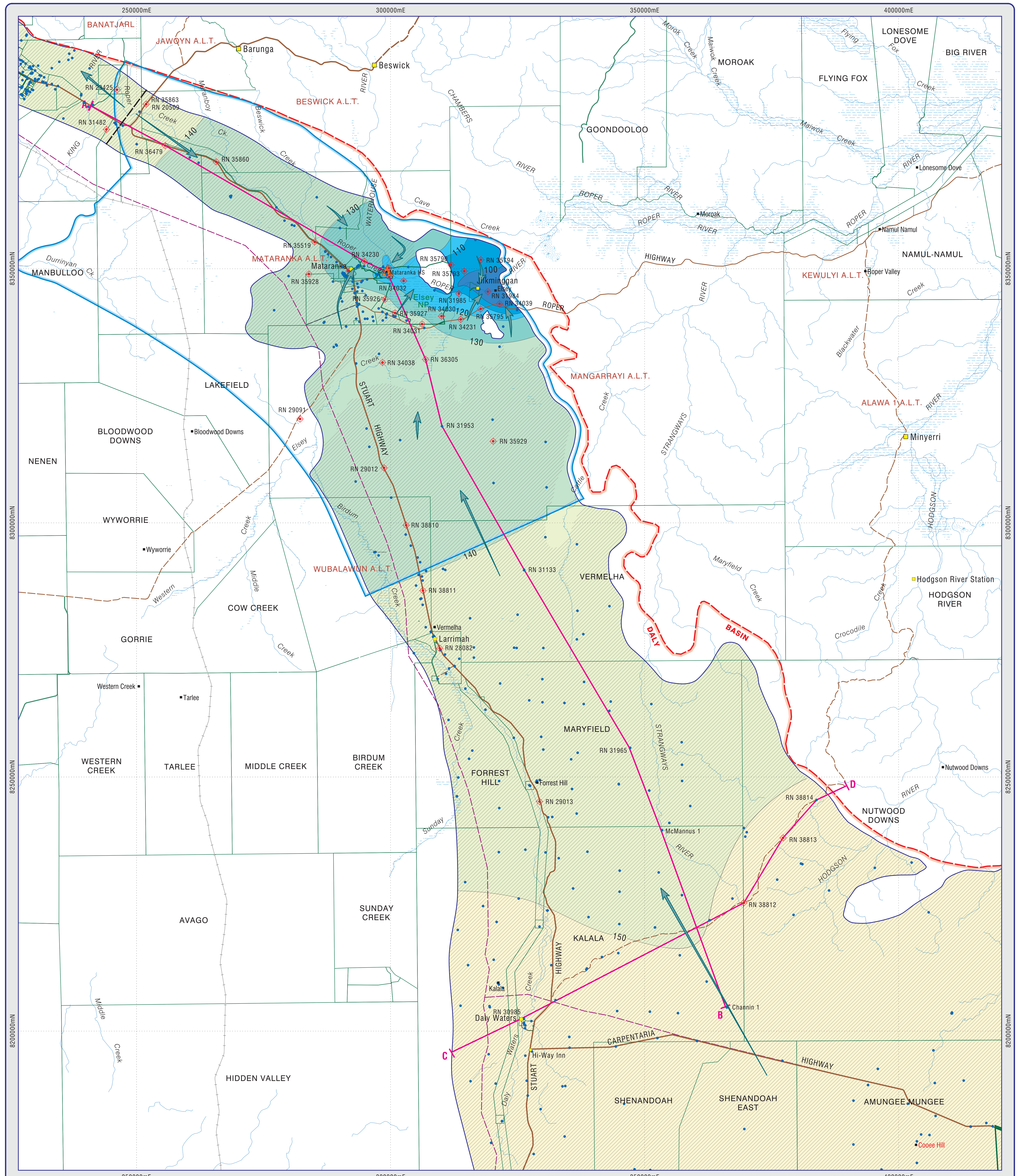


Electrical Conductivity µS/cm ○ Bore △ Spring

- 1 - 250
- 250 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- 1500 - 3000
- >3000

Mataranka Water Allocation Planning Area
Tindall Aquifer
Groundwater flow

ALL GROUNDWATER CONTAINS DISSOLVED SALTS derived from the soil and rocks which it passes through and from rainwater. Electrical conductivity (EC) directly reflects the amount of dissolved salts. The EC's of groundwaters are plotted on this map and two distinct groups of waters are present, those to the northwest of Mataranka with values less than 750 µS/cm and those to the south of the town which range from 750 to 3000 µS/cm. Sodium, potassium, magnesium, chloride and sulphate 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 EC 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 EC waters but have higher salt contents than the regional groundwaters due to concentration by evapotranspiration in the large swamp immediately to the south.



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Level 4, Goyder Building, 25 Chung Wah Terrace, Palmerston, Northern Territory of Australia.

NORTHERN TERRITORY GOVERNMENT

Groundwater Levels (m AHD) October 2015

- 150 - 160
- 140 - 150
- 130 - 140
- 120 - 130
- 110 - 120
- 100 - 110
- 90 - 100

Mataranka Water Allocation Planning Area

- Groundwater flow direction
- Groundwater divide
- Cretaceous sand and clay
- Sedimentary basin boundary
- Major spring
- RN 35793 .... Monitoring bore / number
- Bore - Stock, irrigation or Investigation

kilometres 5 0 5 10 15 20 25 kilometres

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

Black numbered lines are 50 000 metre intervals of the Map Grid of Australia (MGA) Zone 53 Transverse Mercator Projection Horizontal Datum: GDA 94

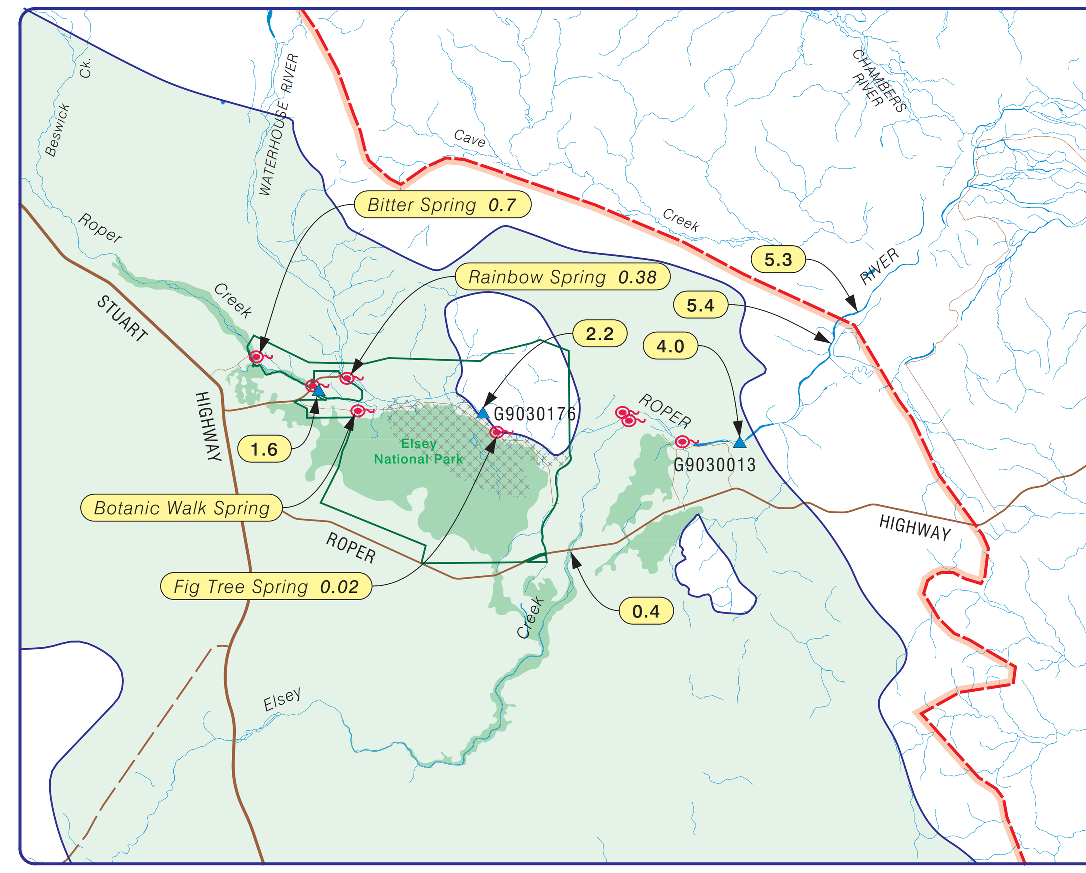
THE TINDALL AQUIFER The Tindall Limestone is an extensive sheet of limestone that formed in a shallow sea some 510 million years ago. In more recent times it has undergone weathering that has led to the formation of solution cavities ranging in size from millimetre to metre scale. These cavities form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

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 perpendicular to the watertable contours and from high to low values.

The contours are derived from measurements of depth to water in October 2015 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.

GROUNDWATER DISCHARGE FEATURES



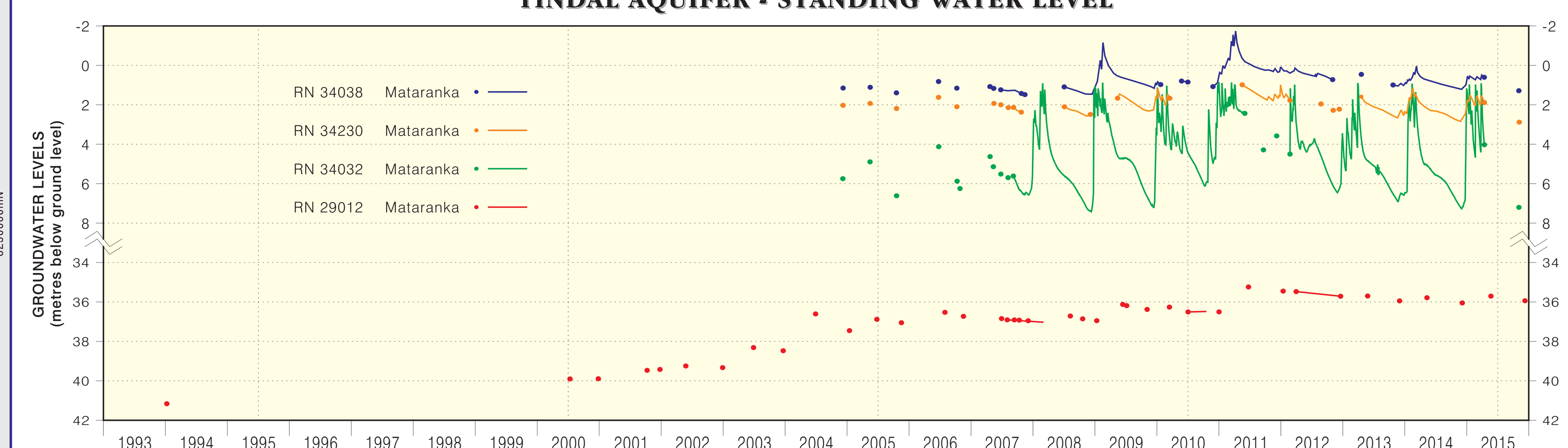
- Bitter Spring 0.7 — Major springs with flows (m^3/secs). End of October 2014
- 1.6 — Stream flows (m^3/secs). End of October 2014
- Swamps and floodplains underlain by shallow watertables. Groundwater discharges via evapotranspiration and minor springs
- Tindall Aquifer
- Tufa Aquifer - Tindall Limestone absent
- G9030176 Gauging Station

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.

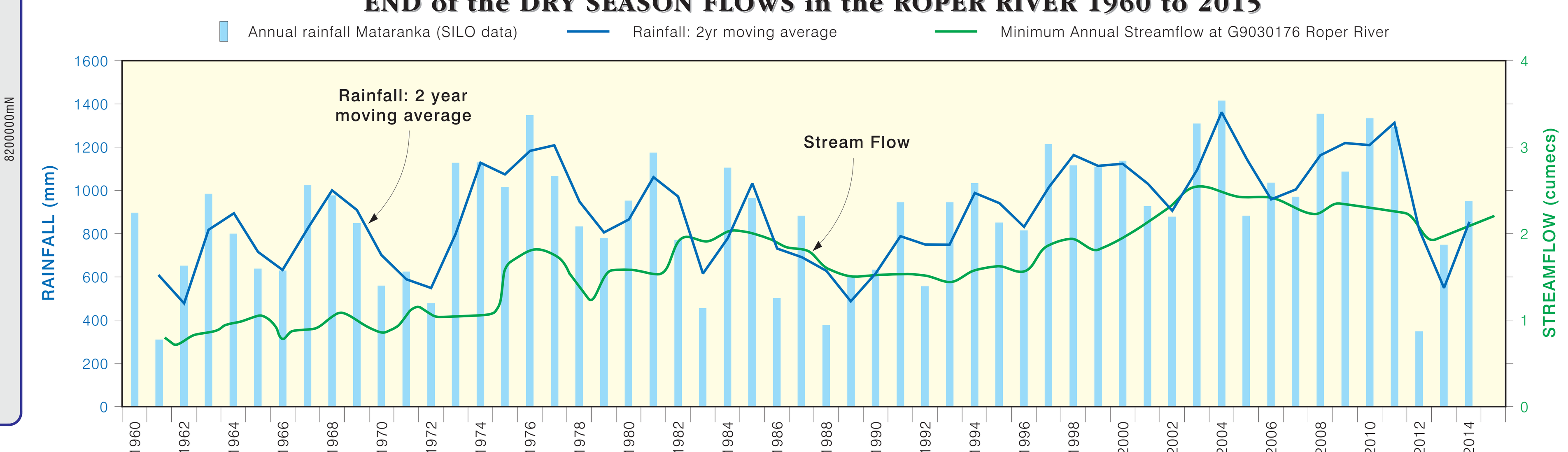
kilometres 5 0 5 10 kilometres

TINDAL AQUIFER - STANDING WATER LEVEL



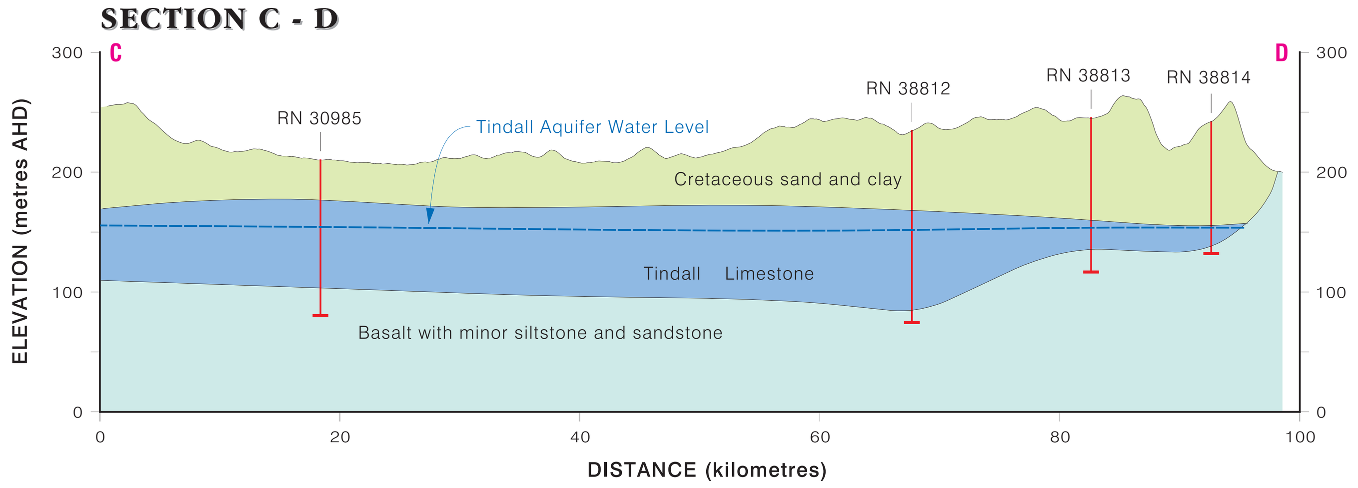
THE WATERTABLE rises and falls with the seasons. Once the soil is saturated sufficiently by early rains, subsequent rains can recharge the aquifer. Groundwater continually drains out of the aquifer but if rain replenishes it at a greater rate than water leaves the aquifer, the watertable rises. After the Wet season reaches its peak, drainage dominates and the watertable progressively drops. From the bore RN29012 and southwards, groundwater levels show much reduced annual variation. This reflects less recharge in those areas due to a covering of up to 90 metres of Cretaceous clay and sand . Rainfall decreases southwards and that also results in less recharge.

END of the DRY SEASON FLOWS in the ROPER RIVER 1960 to 2015



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 (baseflow). 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 baseflows in the absence of large scale groundwater extraction. Note that in the period shown, annual rainfall has been increasing on average as has baseflow.

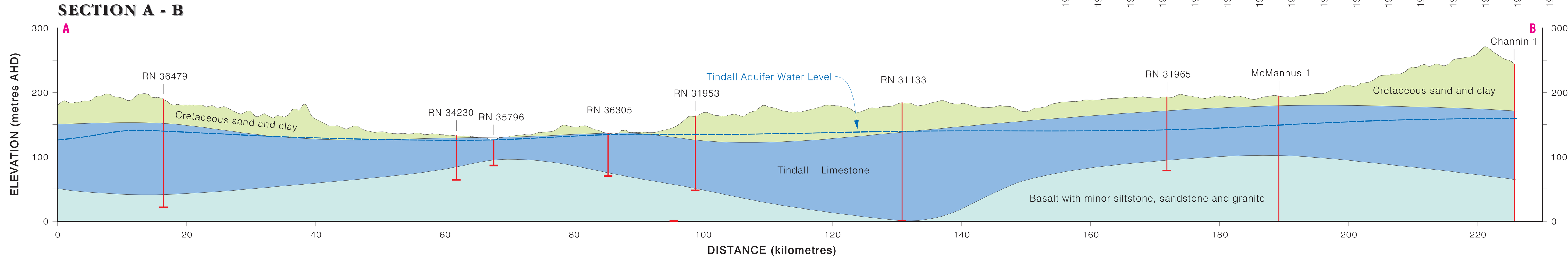
SECTION C - D



Cross Section Features

- A——B Line of cross section (map)
- RN 36479 .... Registered number of bore
- Natural surface
- Standing Water Level
- Total Depth

SECTION A - B



Hydrogeologist: S. Tickell JANUARY 2016
Water Resources
Department of Land Resource Management, Northern Territory.

Cartography by L. J. Fritz, Spatial Data & Mapping, January 2016
Water Resources, Department of Land Resource Management
Northern Territory of Australia

File Reference: Tindall-Aq_King-R-Daly-Waters Web: www.lrm.nt.gov.au/nrmapsnt