



City of
Wagga Wagga

Wagga Wagga Urban Salinity Technical Report 2014/2015

Prepared by the Directorate of Environmental and Community
Services

2014/15

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1. INTRODUCTION

The Wagga Wagga Urban Salinity Technical Report 2014/15 is a summary of data collected from Councils' urban salinity piezometer network and dewatering bores. The report is a move away from the annual Urban Salinity Status Report format which contains a more holistic reporting approach to impact, attributing factors, monitoring networks and management plans regarding urban salinity in the Wagga Wagga LGA.

The Urban Salinity Status Report will now be published every four years, with the Urban Salinity Technical Report, containing results from monitoring networks for that reporting period, being published annually.

1.1 Annual Changes in Overall Standing Water Levels

For a broader interpretation of groundwater conditions, comparing annual groundwater conditions on a local scale can be done by presenting overall SWL results as a percentage of total piezometers measured. Changes in groundwater conditions (ie, SWL increase, decrease, stable and dry) are revealed when compared to previous years' data.

Figure 1 shows annual changes (as a percentage) in SWL for all piezometers in the Wagga Wagga LGA for annual reporting periods between 2005/06 - 2014/15. For example, of the one hundred and ninety seven piezometers measured during the 2014/15 reporting period, 50% showed a decrease in SWL when compared to the previous years' readings, 13% increased in SWL, 29% were dry and 9% remained stable. This allows for overall trending of groundwater conditions for the region based on all piezometers recorded.

It can be seen that from 2006/07 to 2010/11 there was a quite steep rise in SWL increase (from 13 - 67% of all piezometers respectively), coinciding with a decline in both SWL decrease (33 - 7%) and piezometers in a dry state (37 - 26%).

For the current reporting period (2014/15), overall piezometers showing a SWL increase dropped, continuing a recent trend, from 20 - 13% when comparing results between 2013/14. The majority of these piezometers migrated to a SWL decrease change, increasing from 45 to 50% of all piezometers, when comparing the two reporting periods.

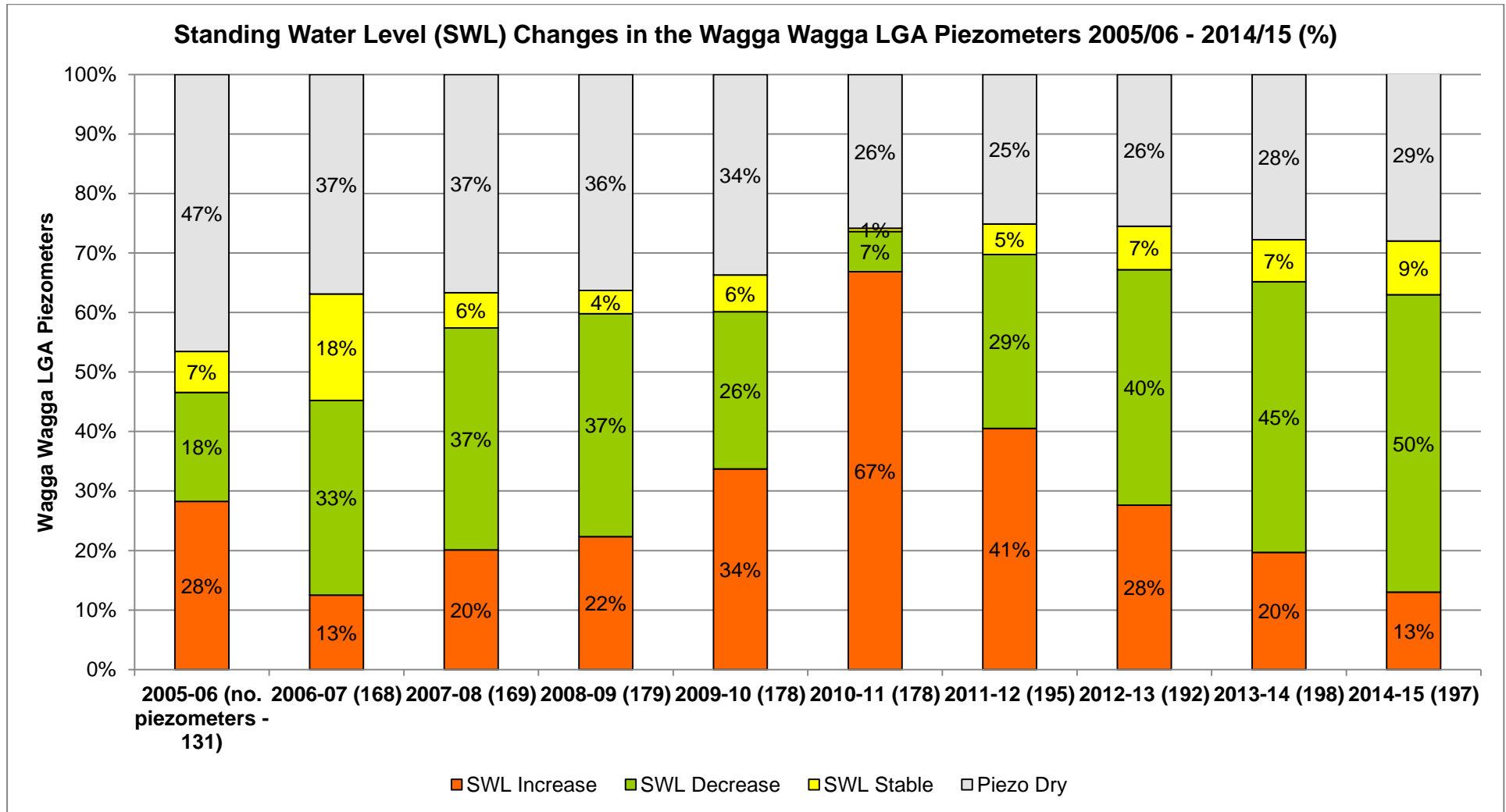


Figure 1: Graph depicting annual change in overall piezometer readings as a percentage of all piezometers in the Wagga Wagga LGA.

2. RAINFALL AND EVAPORATION

Groundwater recharge is significantly affected by the amount of rainfall relative to evaporation. Low rainfall combined with high evaporation rates are expected to result in a fall in the water table. This occurs as insufficient water is available to saturate the upper soil profile and infiltration into the groundwater system is prevented. Alternatively, high rainfall will saturate the soil profile allowing for infiltration to groundwater. This infiltration is increased in areas where clearing of deep rooted vegetation has occurred.

The Bureau of Meteorology field station at Forest Hill, Wagga Wagga recorded historical averages and annual monthly rainfall and evaporation data during the period from July 2014 to June 2015 (Figure 2).

The 2014/15 reporting period in Wagga Wagga recorded 458mm of rainfall (similar to 2013/14 460mm). This figure represents a 20% decrease on historical average rainfall (570mm). Long term monthly rainfall averages exceeded monthly rainfall figures on eight occasions during 2014/15.

The 2014/15 reporting period in Wagga Wagga recorded 1926mm of evaporation. This figure represents a 4% increase on historical average evaporation (1860mm). Monthly evaporation readings for 2014/15 were above historical monthly averages on seven occasions.

Long Term versus Short Term Rainfall and Evaporation Data for Wagga Wagga

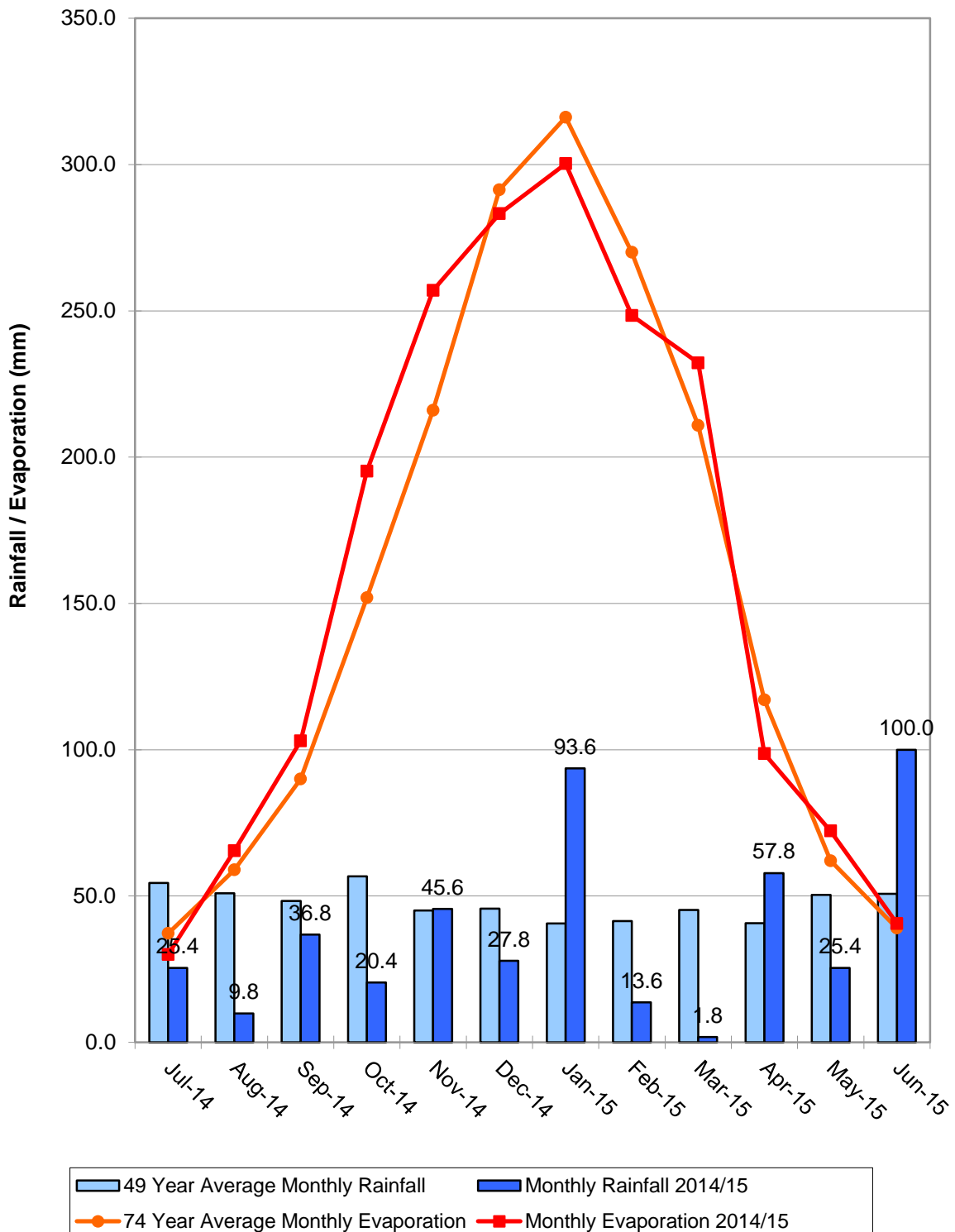


Figure 2: Monthly rainfall and evaporation graph for Wagga Wagga 2014/15.

3. MONITORING PROGRAM

Piezometers located throughout the Wagga Wagga Local Government Area are maintained by Wagga Wagga City Council to monitor urban salinity. Established in 1998, the current monitoring network consists of 198 active piezometers (Figure 4). The piezometers were monitored on a monthly, bi-monthly or quarterly basis to examine trends, identify causes of the problem and potential risks areas.

Standing water level (SWL) and electrical conductivity (EC) readings are collected and used to monitor urban salinity. The SWL is measured in metres below the ground surface to the nearest centimetre using a water level meter. Measurements are taken from the height of the piezometer casing and the height of the extension subtracted from the reading. Piezometers at ground level do not require a subtraction. Water is extracted from the piezometer using a bailer to measure for EC. The EC is measured in decisiemens per metre (dS/m) to two decimal places using a handheld conductivity meter (Figure 3).



Figure 3: Measuring standing water level (left) and electrical conductivity (right) of groundwater.

Results of groundwater monitoring identify areas susceptible to saline discharge and monitor the effectiveness of Council's preventative and remedial measures.

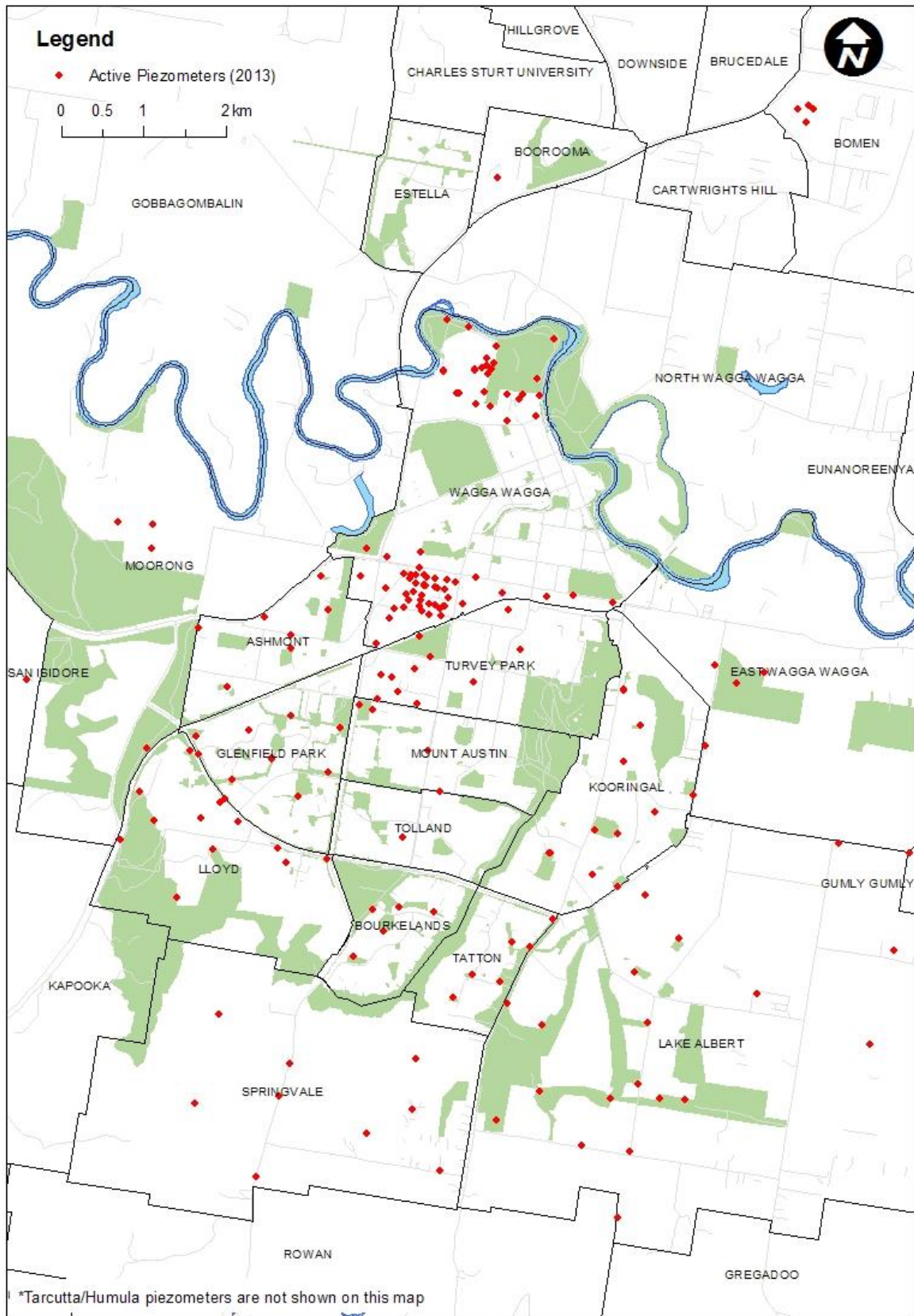


Figure 4: Location map of Wagga Wagga City Council's piezometer monitoring network

4. **RESULTS**

4.1 **Standing Water Levels**

The results discussed in this report relate to the change in the depth to the water table (standing water level) for all piezometers in the Wagga Wagga Local Government Area from July 2014 to June 2015 in relation to the results from the previous reporting period (July 2013 – June 2014).

To allow for meaningful interpretation of the data piezometers are grouped into eleven categories. Nine categories are based on the major sub-catchments identified by Golder (2007). Two additional groups (Undefined and Tarcutta/Humula) have been added to accommodate for piezometers outside the area recognised in the Golder (2007) study.

The eleven piezometer categories are:

- 1. Mid Murrumbidgee Alluvium (MA).** Thirty four piezometers are located in the Mid Murrumbidgee Alluvium piezometers 1, 62, 72-76, 79-81, 105-116,118, 120-127, 144-146, 164-166, 171, 177, 210 and 211 (old Bore 9). These piezometers are associated with the Narrung Street Sewage Treatment Plant, the disused Wiradjuri Landfill and the northern section of the Calvary hospital precinct.
- 2. North Western Sub-catchment (1).** Three piezometers 189-191 are located in the newly developed rural residential estate known as Riverview.
- 3. Far Western Sub-catchment (2).** Ten piezometers are located in the Far Western Sub-catchment piezometers 18, 41, 54-55, 143, 174-175 and 199-202. The Far Western Sub-catchment piezometers incorporate areas of the suburbs of Ashmont, Glenfield and four recently drilled piezometers in Lloyd West
- 4. Western Sub-catchment (3).** Forty one piezometers are located in the Western Sub-catchment piezometers 2-3, 6-7, 9-15, 17, 34, 37-38, 40, 42-44, 47, 56-57, 128, 142, 147, 152, 172-173, 178-179, 185-188, 197-198 and 203-209. These piezometers are located in the suburbs of Ashmont, Turvey Park, Mt Austin, Lloyd, Glenfield, Tolland, central Wagga Wagga, Bourkelands and seven recently drilled piezometers in Lloyd West.
- 5. CBD Sub-catchment (4).** Forty one piezometers are located in the CBD Sub-catchment piezometers 5, 16, 19-21, 39, 58-61, 63-69, 70-71, 78, 80, 82-90, 99-104, 176, 196, 1/1, 1/2 and 1/3. These piezometers are located in the Calvary hospital precinct and central Wagga Wagga.

- 6. Eastern CBD Sub-catchment (5).** Three piezometers are located in the Eastern CBD Sub-catchment piezometers 91-92 and 195 are situated in the suburb of Koorinal.
- 7. Far Eastern CBD Sub-catchment (6).** Three piezometers are located in the Far eastern CBD Sub-catchment piezometer 50 and 192-193. These piezometers are found in east Wagga.
- 8. Eastern Sub-catchment (7).** Forty six piezometers are located in the Eastern Sub-catchment piezometers 23-31, 36, 45, 48-49, 51, 53, 93-98, 129-140, 153-163, 170 and 180-184. The Eastern Sub-catchment is the largest catchment and incorporates the suburbs of Koorinal, Lake Albert, Glenoak and Springvale.
- 9. Far Eastern Sub-catchment (8).** Three piezometers are located in the Far eastern Sub-catchment piezometers 167-169 situated in the suburb of Lake Albert.
- 10. Undefined (O).** Seven piezometers are grouped within the undefined category as they fall outside the major Sub-catchments defined by Golder (2007). Piezometers 22, 32, 33, 148-151 are located at San Isidore, Forest Hill, Boorooma and Bomen.
- 11. Tarcutta/Humula (T/H)** contains the 7 piezometers installed in the villages of Tarcutta and Humula (piezometers T1-T6, H1-H2).

Names given to the major sub-catchments by Golder (2007) Mid Murrumbidgee Alluvium, CBD sub-catchment, Western sub-catchment and Eastern sub-catchment formed the basis of names for the piezometers categories.

The change in standing water level for all piezometers is presented in

Table 1. The Table illustrates the number of individual piezometers recorded in each piezometer category per group during 2014/15. A discussion of each group can be found in subsequent sections of this report.

Table 1: Changes in standing water levels across piezometer groupings.

Change in SWL Category	MA	1	2	3	4	5	6	7	8	T/H	O	Total in Category
SWL Increase	2	0	2	2	12	0	0	7	0	0	0	25
SWL Decrease	20	3	3	23	15	2	1	18	2	5	6	98
SWL Stable	1	0	1	7	1	0	1	5	0	1	0	17
Piezometer Dry	11	0	4	9	12	1	1	16	1	1	1	57
Total Piezometers	34	3	10	41	40	3	3	46	3	7	7	197

The change in SWL for each piezometer category during 2014/15 is presented in Figure 5.

The dataset shows that the greatest number of piezometers, ninety eight (50%), have decreased in standing water level (SWL) when comparing SWL change between 2014/15 and 2013/14. Twenty five (13%) recorded an increase in SWL with fifty seven (29%) piezometers remaining dry, during the reporting period. Seventeen (9%) piezometers remained stable (those with an increase/decrease of 5cm or less).

Piezometers that contained water in the previous year that are now dry have been included in the 'SWL decreased' category, whereas piezometers that started as dry but now contain groundwater have been included in the 'SWL increased' category. These results were omitted from average increase/decrease calculations. Graphs of individual piezometers containing groundwater have been placed in Appendix D.

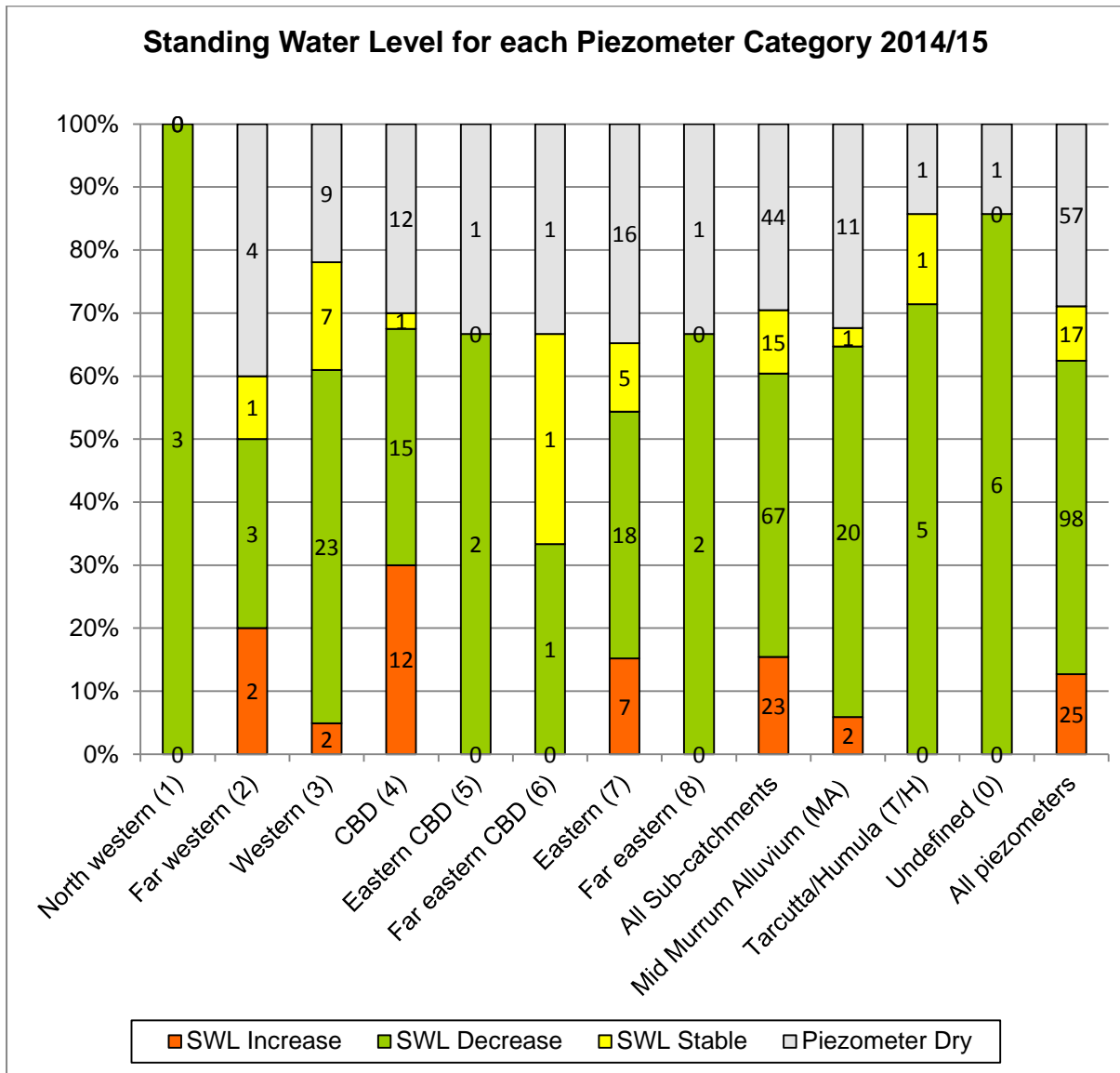


Figure 5: Chart depicting change in Standing Water Levels for each piezometer category

Mid Murrumbidgee Alluvium

The Mid Murrumbidgee Alluvium is the fourth largest piezometer category and contains 34 individual piezometers. Twenty of the piezometers located in the Mid Murrumbidgee Alluvium decreased in SWL for the reporting period. Eleven piezometers remained dry, with only two experiencing an increase in SWL.

Mid Murrumbidgee Alluvium (MA)			
Increased	2	20	Decreased
Average	1.35	-0.63	Average
Maximum	1.81	-1.13	Maximum
Minimum	0.90	-0.06	Minimum

Piezometers increasing in SWL recorded an average increase of 1.35m. The piezometer with the greatest increase in SWL is located in Gormly Ave. Decreasing piezometers decreased by an average of -0.63m. The greatest decrease in SWL was recorded at Narrung St, Wiradjuri.

North Western Sub-catchment

Three piezometers are located within the Riverview estate. Of these piezometers zero increased in SWL and three piezometer decreased at an average of -0.40m.

North Western Sub Catchment (1)			
Increased	0	3	Decreased
Average	-	-0.40	Average
Maximum	-	-0.73	Maximum
Minimum	-	-0.19	Minimum

Far Western Sub-catchment

Ten piezometers are located in the Far Western Sub-catchment. Of these piezometers, three decreased in SWL with four piezometers remaining dry throughout the reporting period.

Far Western Sub catchment (2)			
Increased	2	3	Decreased
Average	0.12	-0.21	Average
Maximum	0.18	-0.43	Maximum
Minimum	0.07	-0.06	Minimum

A decrease in SWL of -0.43m occurred for one piezometer in the Far Western Sub-catchment.

Western Sub-catchment

Of the forty one piezometers measured within the Western Sub-catchment, twenty-one decreased in SWL, with nine remaining dry for the 2014/15 reporting period, and three increasing.

Western Sub-Catchment (3)			
Increased	3	21	Decreased
Average	0.09	-0.41	Average
Maximum	0.15	-2.33	Maximum
Minimum	0.01	-0.13	Minimum

Average SWL for increasing piezometers within the Western Sub-catchment were 0.09m, ranging from 0.01m to 0.15m. Highest increases were found in Glenfield and Bourkelands suburbs.

Twenty one piezometers showed an average decrease over the reporting period, ranging from -0.13m to -2.33m, at an average of -0.41m. Highest decreases were found at Charles Sturt University South Campus and Mount Austin.

CBD Sub-catchment

The CBD Sub-catchment is greatly influenced by the management of the dewatering bore scheme in the Intensive Borefield. High average increases and decreases in SWL of piezometers within close proximity of the Intensive Borefield can be correlated to the dewatering bore operations.

Of the forty CBD Sub-catchment piezometers, twelve (30%) showed increasing SWL, fifteen revealed decreasing SWL (38%), one remained stable and twelve (30%) remained dry over the 2014/15 reporting period.

CBD Sub Catchment (4)			
Increased	12	15	Decreased
Average	1.85	-0.27	Average
Maximum	4.32	-1.02	Maximum
Minimum	0.06	-0.06	Minimum

Average SWL decreases of -0.27m were reported across 28 water bearing piezometers within the CBD Sub-catchment during the 2014/15 reporting period. Maximum decrease of -1.02m was recorded at the deep piezometer no. 39 at Wagga Wagga High School.

Twelve piezometers revealed an average increase of 1.85m in SWL with piezometer no.104 (Cnr Meurant St - Lewisham Ave) showing a maximum increase of 4.32m at an average SWL of 5.11m below the surface. This piezometer is drilled to a depth of 61.0m and reveals the 'natural' inflow rate of a deeper piezometer when the dewatering is switched to the OFF position.

The average SWL for 2014/15 in CBD Sub-catchment water bearing piezometers is 9.19m. This figure represents an increase in SWL of 0.14m when compared to the 2013/14 reporting period.

Eastern CBD Sub-catchment

Limited piezometers are situated in the Eastern CBD sub-catchment. Of the three piezometers monitored, two decreased at an average SWL of -0.16m, and one remained dry.

Eastern CBD Sub-Catchment (5)			
Increased	0	2	Decreased
Average	-	-0.16	Average
Maximum	-	-0.16	Maximum
Minimum	-	-0.15	Minimum

Far eastern CBD Sub-catchment

As a small sub-catchment minimal data on the SWL is available for the far eastern CBD piezometer category. One water bearing piezometers showed an average decrease in SWL of -0.37m with average SWL's of 9.66m. One piezometer remained dry and one stable.

Far Eastern CBD Sub-Catchment (6)			
Increased	0	1	Decreased
Average	-	-0.37	Average
Maximum	-	-0.37	Maximum
Minimum	-	-0.37	Minimum

Eastern Sub-catchment

The Eastern sub-catchment is the largest sub-catchment and contains 46 piezometers, the largest number of piezometers within a sub-catchment. The 2014/15 reporting period revealed a majority decrease in SWL. Eighteen (39%) of Eastern Sub-catchment piezometers showed a decrease in SWL, with seven (15%) revealing an increase in SWL and sixteen (35%) remaining dry over the 2014/15 reporting period.

Eastern Sub-Catchment (7)			
Increased	7	18	Decreased
Average	0.40	-0.66	Average
Maximum	1.01	-2.83	Maximum
Minimum	0.09	-0.07	Minimum

Increasing SWL piezometers within the Eastern sub-catchment ranged from 1.01m to 0.09m with an average increase of 0.40m across seven piezometers. The highest SWL increase of 1.01m was found at the deep piezometer no. 98, located at Amaroo St, Koorungal.

Decreasing SWL piezometers within the Eastern sub-catchment ranged from -0.07m to -2.83m with an average decrease of -0.66m across eighteen piezometers. The highest SWL decrease of -2.83m was found at the deep piezometer no. 130, located at the Lakehaven Dr, Lake Albert. Interestingly, this piezometer exhibited the highest increase in the previous reporting period.

Far eastern Sub-catchment

The far eastern sub-catchment covers the second largest area of all the sub-catchments, containing mainly larger rural residential landholdings. Coverage of piezometers in this sub-catchment is poor and may not be a true indication of the sub-catchment as a whole. Of the three piezometers located in the sub-catchment, two piezometers decreased in SWL, continuing the trend for the 2014/15 reporting period. The remaining piezometer stayed dry during the reporting period.

Far Eastern Sub-Catchment (8)			
Increased	0	2	Decreased
Average	-	-0.31	Average
Maximum	-	-0.48	Maximum
Minimum	-	-0.14	Minimum

Two piezometers (no.168 and 169) on Bakers Lane, Lake Albert showed decreases in SWL of -0.14m and -0.48m respectively.

Undefined

Piezometers within this category are located outside the sub-catchments defined by Golder (2007) and are therefore widespread. Six piezometers experienced a decrease in SWL, none increased in SWL, with one piezometer remaining dry.

Undefined (0)			
Increased	0	6	Decreased
Average	-	-0.37	Average
Maximum	-	-0.96	Maximum
Minimum	-	-0.06	Minimum

All four piezometers located at the Bomen Industrial Sewage Treatment Facility showed a decrease in SWL of between -0.45m to -0.14m. San Isidore piezometer no.22 decreased in SWL by -0.06m to an average SWL depth of DRY. Piezometer no.32 (drill depth 16.0m) located at Forest Hill has remained dry since drilling in 1995. Boorooma piezometer no.33 decreased in SWL by -0.96m to an average SWL depth of 15.98m.

Tarcutta/Humula

Seven piezometers are located in the rural villages of Tarcutta and Humula. Five piezometers revealed a decrease in SWL over the 2014/15 reporting period of between -0.45m and -0.53m and one remaining dry and one stable.

Tarcutta-Humula (T/H)			
Increased	0	5	Decreased
Average	-	-0.49	Average
Maximum	-	-0.53	Maximum
Minimum	-	-0.45	Minimum

4.2 Groundwater Contour Mapping

During the 2014/15 reporting period Council engaged Catchment Simulation Solutions to provide a mechanism for Council for the production of ArcGIS groundwater contour maps based on measurements entered into a field based spreadsheet taken from the 200+ piezometers within the LGA.

This integrated system will allow Council to keep updating the piezometer the piezometer data directly into the spreadsheet and allow this information to be interpolated and mapped on demand.

The mapping system allows Council to map four different contours:

1. Groundwater table depth from surface (m)
2. Groundwater table depth in AHD (mAHD)
3. Electrical conductivity (EC)
4. Differences in groundwater table depth over different years/seasons.

Figure 6 shows the groundwater contour map of Western catchments of Wagga Wagga (Calvary, Turvey Park, Mount Austin, Ashmont, Glenfield, Lloyd) interpolated from piezometers measured in June 2015. Red areas indicate extremely shallow groundwater levels between 0 – 2m from surface level, orange areas show 2 – 4m from surface, green areas showing 4 – 10m from surface and purple areas show groundwater levels greater than 10m from surface. Numbers labelling piezometer points (black dots) show actual readings taken in the field on or before June 2015.

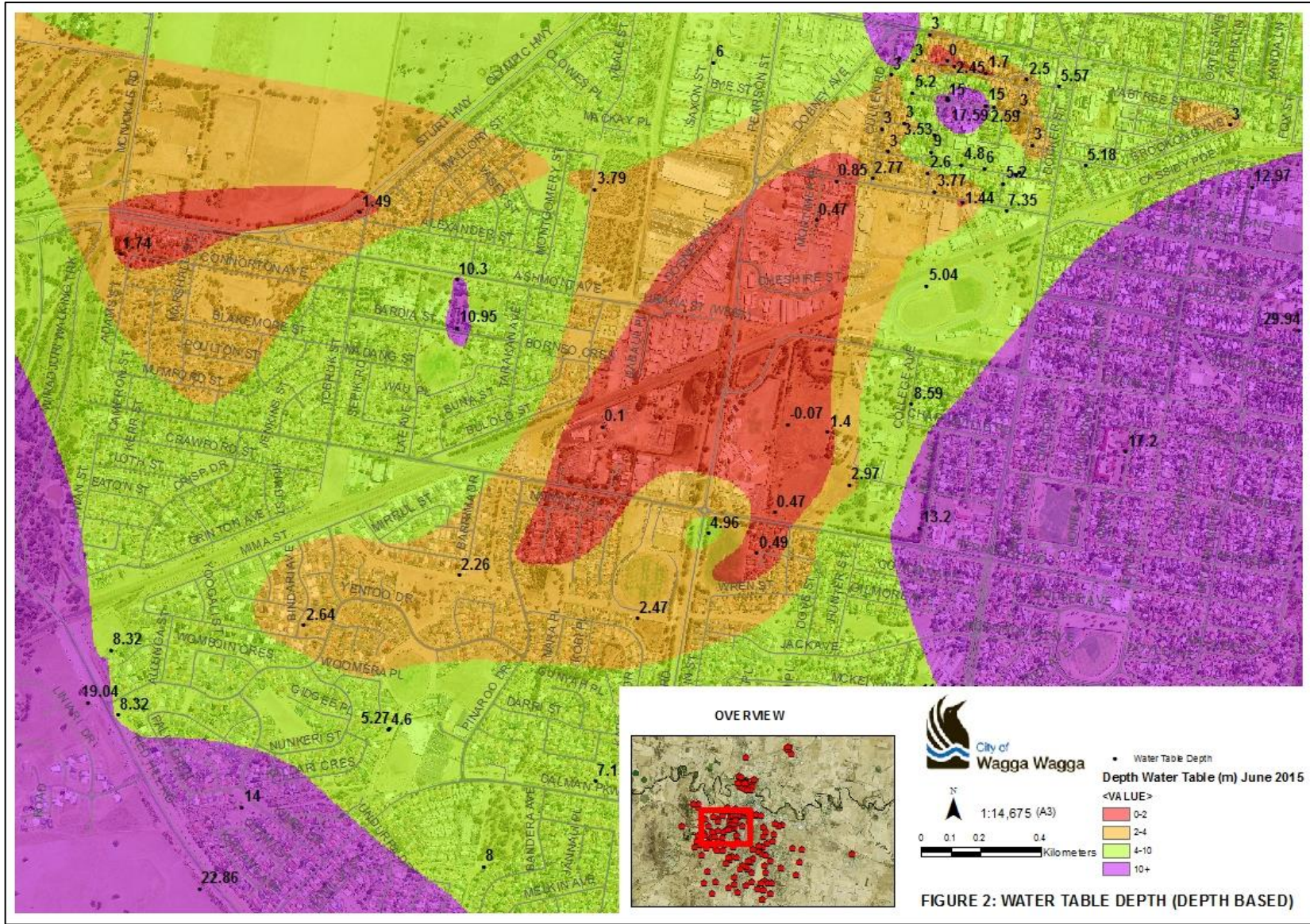


Figure 6: Groundwater contour map showing water table contour levels interpolated from piezometer readings taken in June 2015.

4.3 Critical Piezometers

Piezometers with both EC concentrations (>5 dS/m) and a high SWL (<5m) can indicate urban salinity concerns. The criteria of EC greater than 5 dS/m and SWL of less than 5 metres has been taken from the previous reports to maintain consistency of which piezometers and surrounding areas are most susceptible to urban salinity problems (Table 2).

Table 2: Critical piezometers, piezometers displaying high Standing Water Levels (<5.00m) and Electrical Conductivity (>5dS/m) in 2014/15.

Piezometer Number	Location	Urban Sub catchment	Average SWL 2014/15 (m)	Average EC 2014/15 (dS/m)
7	South Campus, Turvey Park	3	-2.59	5.34
9	South Campus, Turvey Park	3	-0.28	8.49
18	Nathan Park, Ashmont	2	-1.59	9.25
29	Dalkeith Ave, Lake Albert	7	-3.13	6.34
54	Derna Pl, Ashmont	2	-1.57	9.73
57	7 Mortimer Pl, Central Wagga	3	-0.64	14.82
89	31 Chaston St, Central Wagga	4	-3.64	13.63
90	51 Chaston St, Central Wagga	4	-2.55	9.54
147	South Campus, Turvey Park	3	-0.99	17.65

Nine piezometers (compared with 10 in 2013/14 and 10 in 2012/13) recorded both an EC greater than 5 dS/m and SWL of less than 5 metres in the reporting period. Piezometers with these characteristics are critical and have the potential to cause extensive damage to the surrounding environment. The surrounds of piezometers in Table 2 are at risk from urban salinity due to their high standing water levels.

Six of the nine 'members' of the critical piezometer list are located in urban salinity 'hotspot' areas of CSU South Campus, Showgrounds and the Calvary Hospital area (CBD sub catchments 3 and 4). Piezometers no. 18 and 54 are located in the Ashmont area of the far Western Sub catchment. Standing water levels of piezometer no. 29 (located at Dalkeith Ave, Lake Albert) may be high due to lateral influences of Lake Albert.

Critical piezometers provide valuable data on target areas for remediation action. The increasing severity within these critical areas especially in area noted for high salinity levels is concerning for urban salinity management in Wagga Wagga.

4.4 Dewatering Bores

The dewatering bores of the Intensive borefield are monitored monthly allowing for the volume of water and amount of salt discharged to the Murrumbidgee River to be calculated (Table 3). Groundwater from the Intensive Borefield is pumped to the Murrumbidgee River via a pump station adjacent to the intersection of the Sturt Highway and Moorong Street.

Table 3: Intensive Borefield salt load calculations for July 2014 – June 2015.

Bore number	Bore Location	Volume Pumped (m3)	Pump Hours	Average EC (dS/m)	Salt Discharged (tonnes)
1	Emblen Park	6,402.70	1,938.88	943.59	6.04
2	Meurant - Emblen roundabout	116.09	141.85	1,517.15	0.18
3	19 Sullivan Ave	7,261.06	7680.75	1,406.08	10.21
4	3 Cullen Rd	194.20	7.88	925.96	0.18
5	Calvary Hospital Carpark	34,694.34	meter broken	1,348.19	46.77
6	Docker St - Meurant Ave	-	-	1,406.08	-
7	9 Hardy Ave	13,524.57	5,753.03	1,953.45	26.42
8	25 Gormly Ave	20,470.10	7,545.53	1,776.76	36.37
10	Chaston St - Foxborough Ave	-	-	1,376.00	-
	Total	82,663.05	23,067.92		126.17
	Average (per bore)	10,332.88	2,883.49		15.77
	Average (per day)	226.47	63.20		0.35

A daily average of 226.47 cubic metres (226,470 litres) of groundwater from nine dewatering bores was pumped into WWCC's stormwater system during 2014/15 (down from 247,630 litres in 2013/14). Based on EC readings, this volume represents average daily discharges of 0.35 tonnes (350kg) of salt from groundwater aquifers below the Calvary Hospital precinct (down from 370kg in 2013/14).

At present, Wagga Wagga City discharges this saline water to the river. Investments in revegetation, rear of block drainage and education programs are considered by Council as sufficient offsets to permit the discharge of moderately saline water.

5. DISCLAIMER

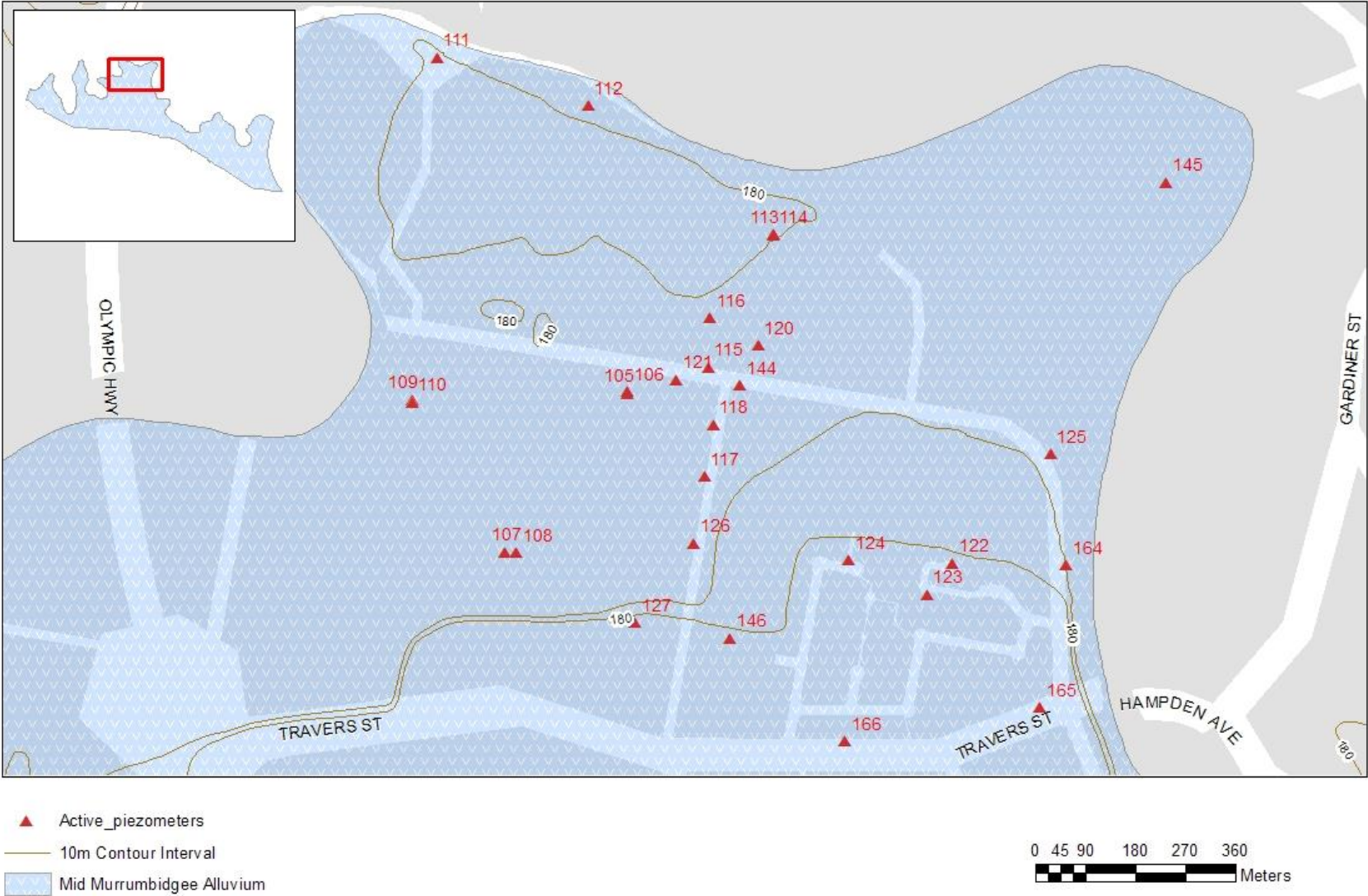
This report has been compiled by Wagga Wagga City Council's Department of Environmental & Community Services exercising all due care and attention. Council does not accept any responsibility for any inaccurate or incomplete information supplied by third parties. No representation is made as to the accuracy, completeness or suitability for any particular purpose of the source material included in this report.

6. REFERENCES

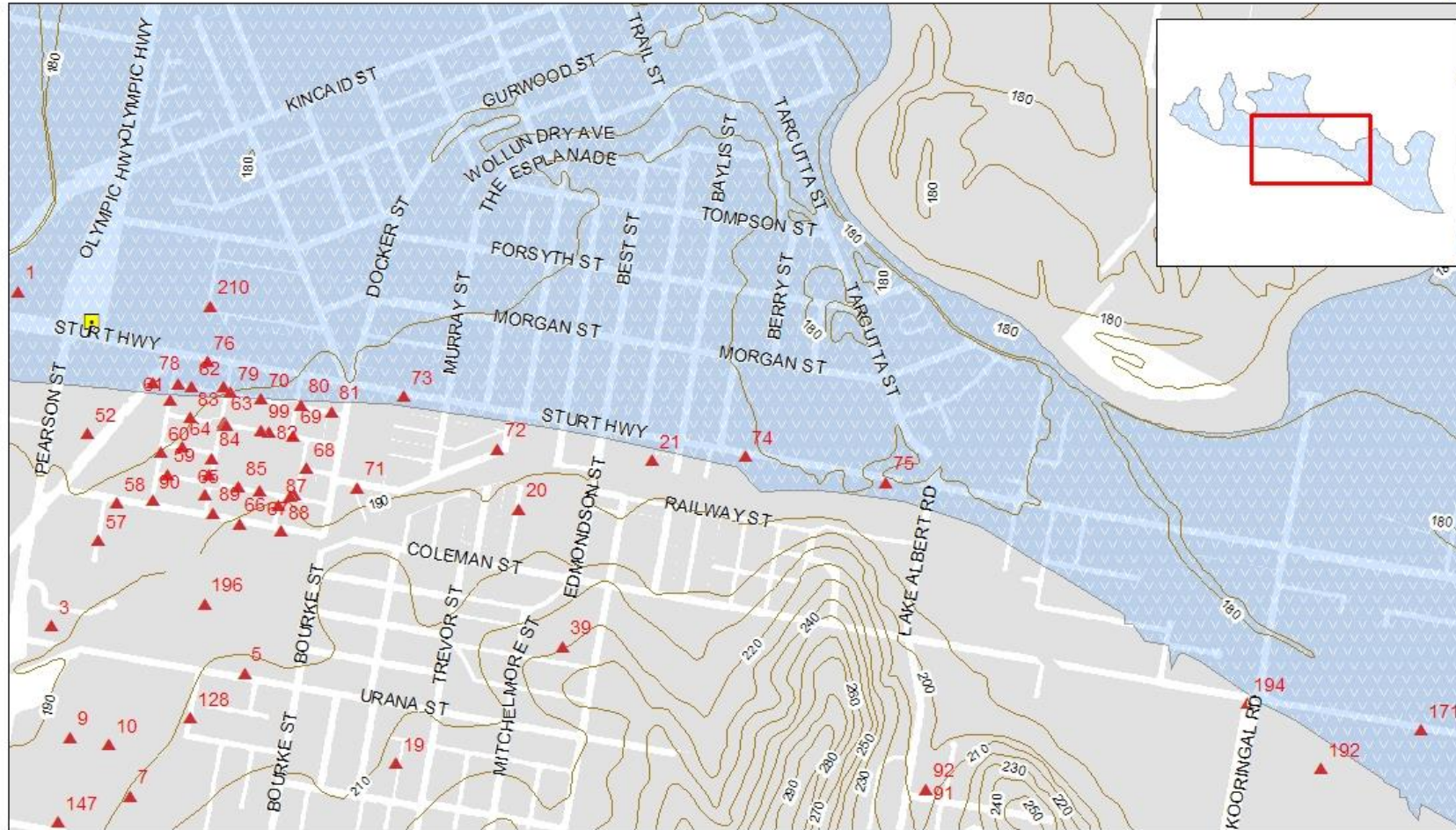
Golder Associates Pty Ltd (2007). Wagga Wagga Urban Salinity – Water level and Quality Study (1999-2006). Golder Associates, Perth.

**APPENDIX A:
MAPS OF PIEZOMETER LOCATIONS**

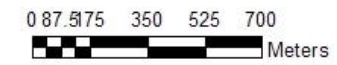
Piezometer Locations: Mid Murrumbidgee Alluvium



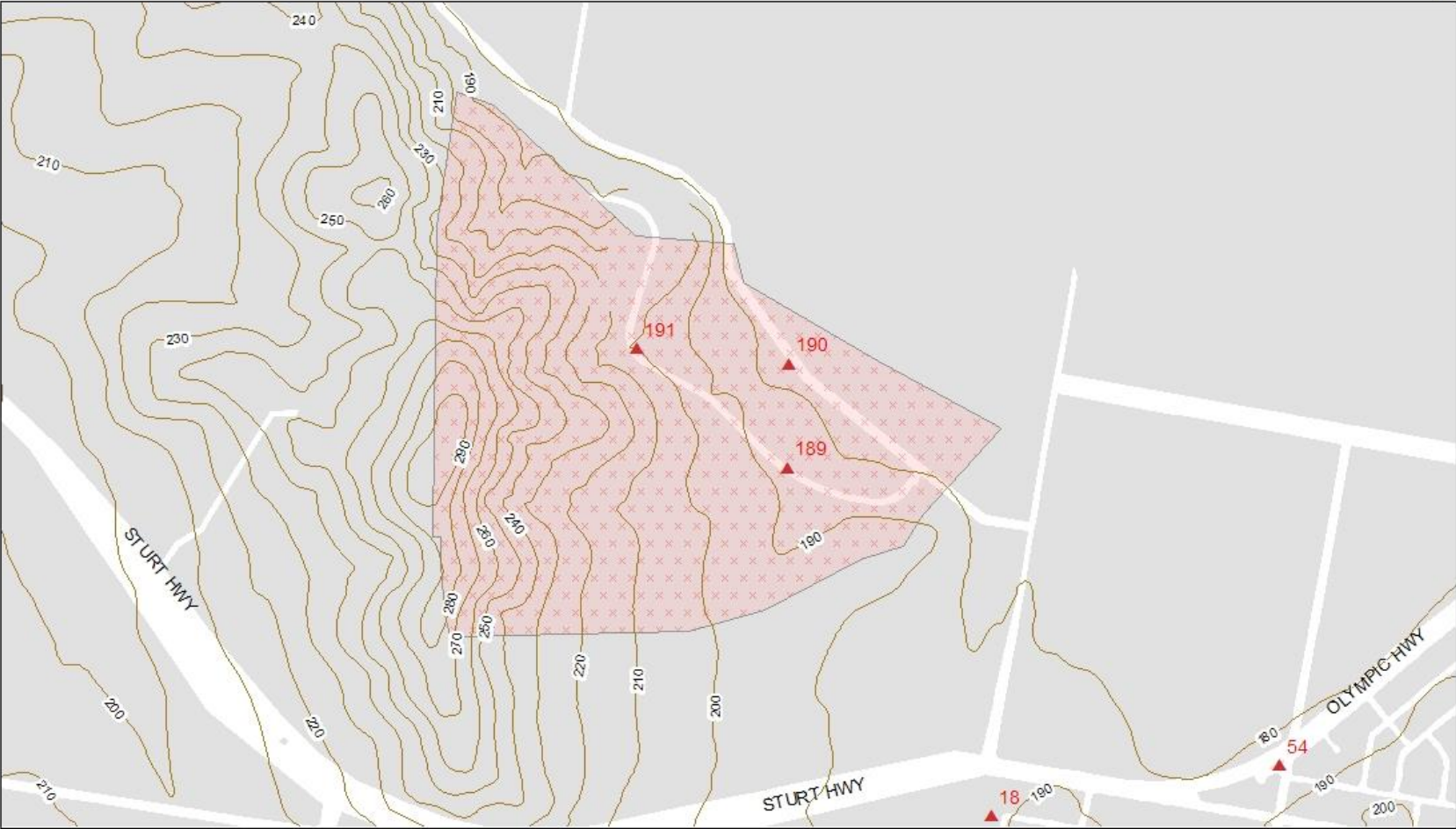
Piezometer Locations: Mid Murrumbidgee Alluvium






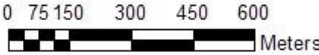
- ▲ Active_piezometers
- Pump Station
- 10m Contour Interval
- Mid Murrumbidgee Alluvium



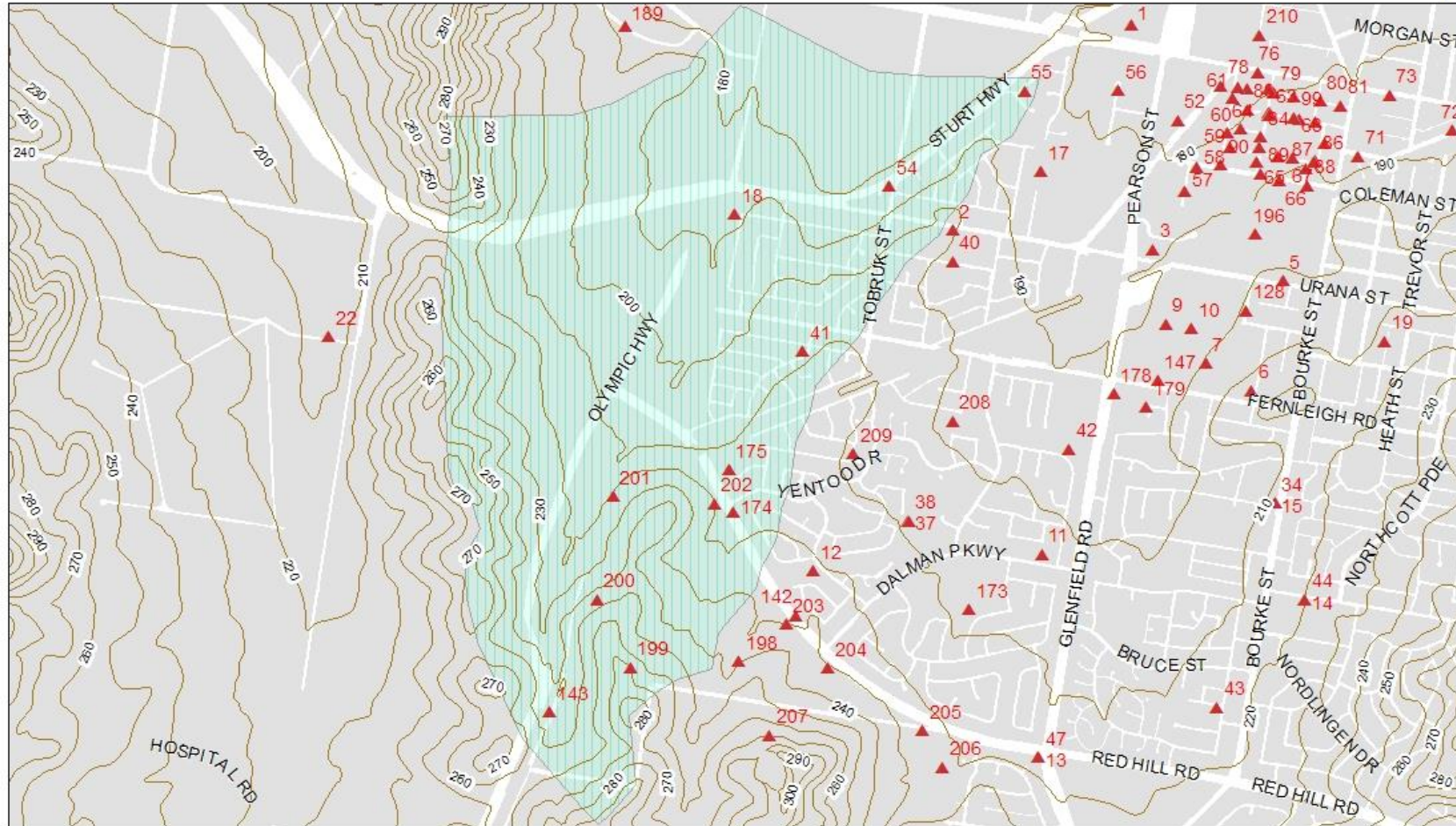
Piezometer Locations: North Western Sub-catchment



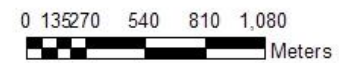
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-  10m Contour Interval
-  North Western Sub-catchment



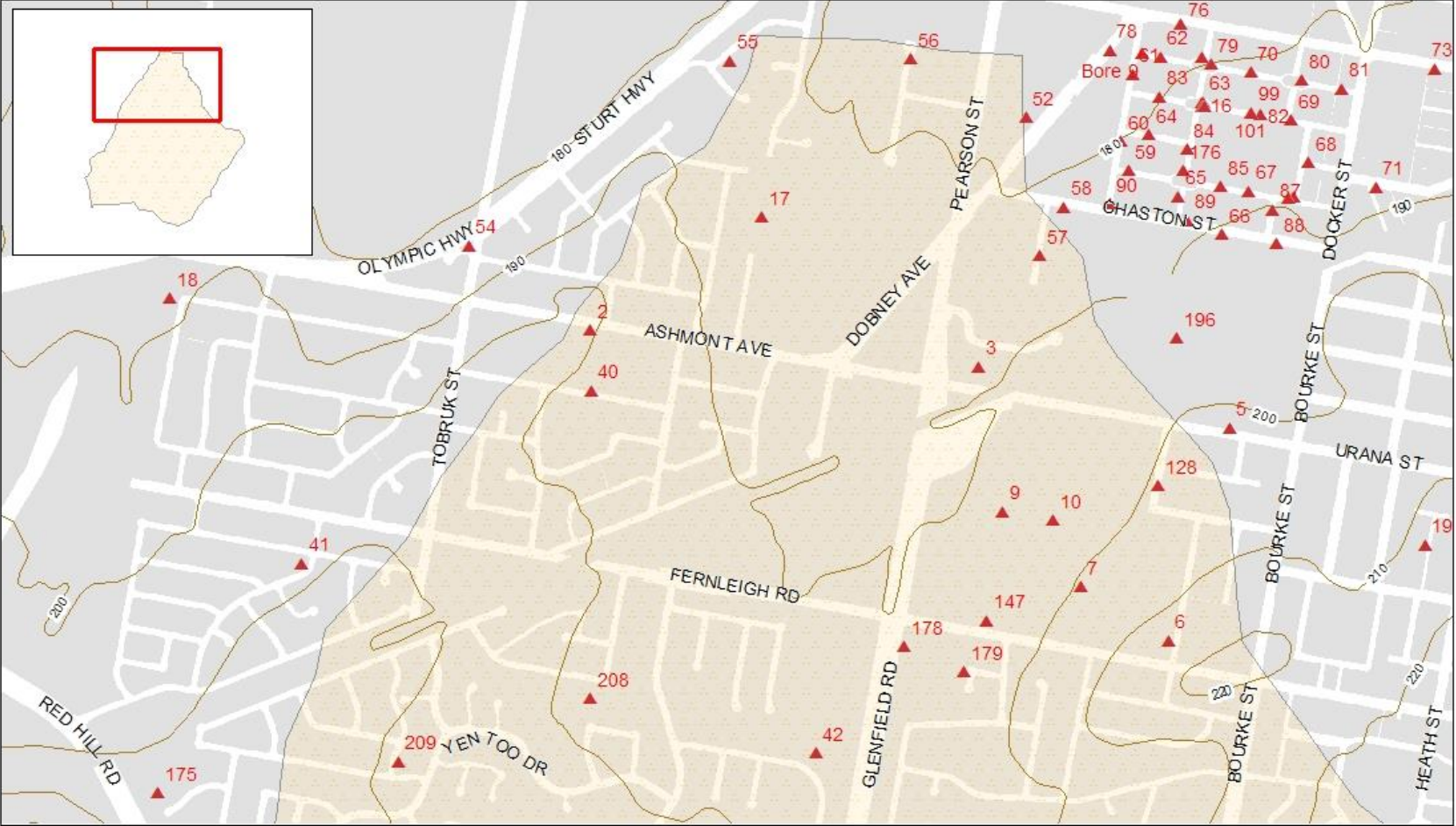
Piezometer Locations: Far Western Sub-catchment



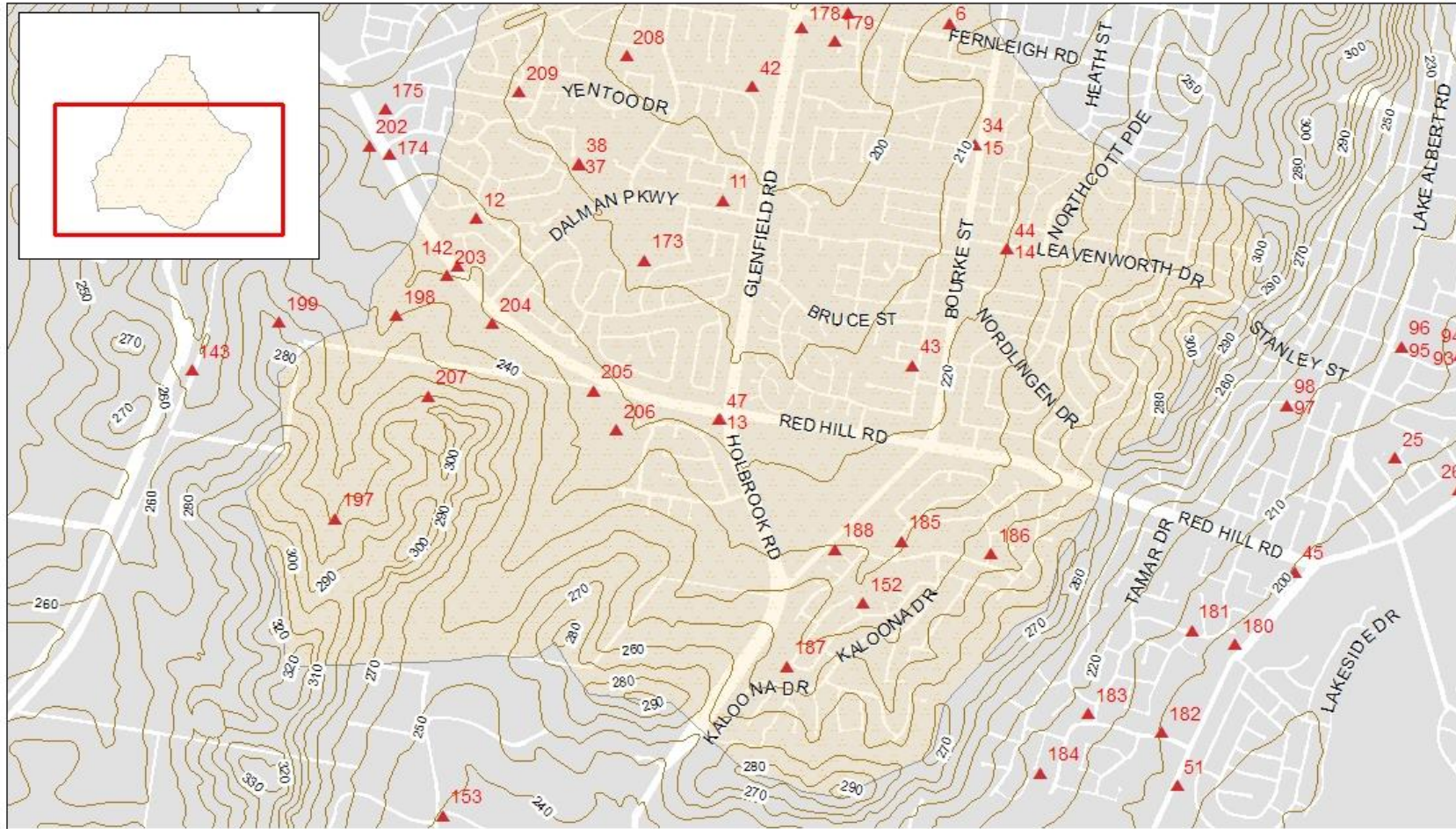
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- 10m Contour Interval
- ▨ Far Western Sub-catchment



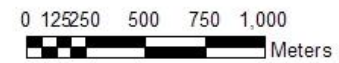
Piezometer Locations: Western Sub-catchment



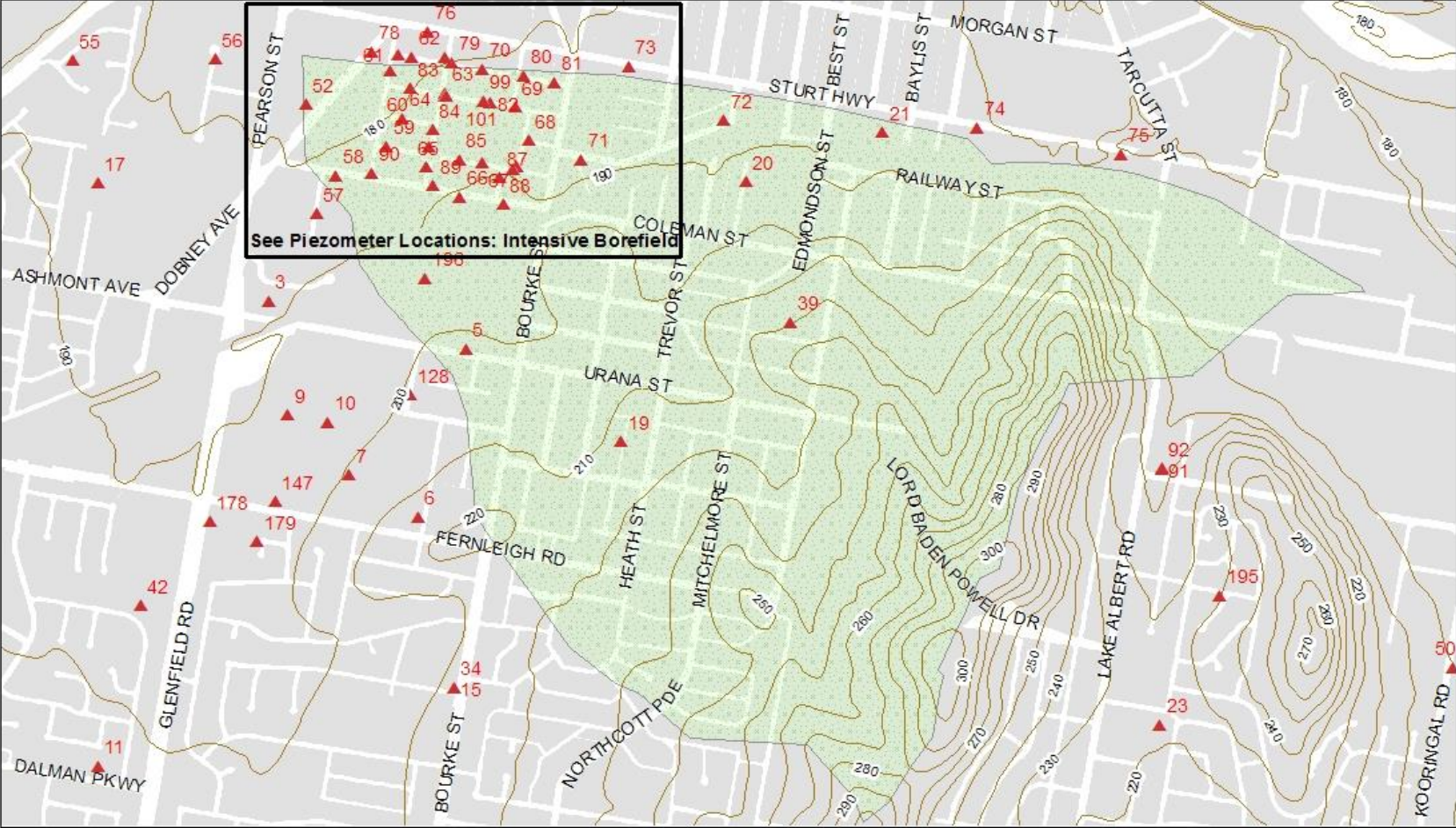
Piezometer Locations: Western Sub-catchment



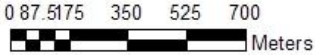
- ▲ Active_piezometers
- 10m Contour Interval
- Western Sub-catchment



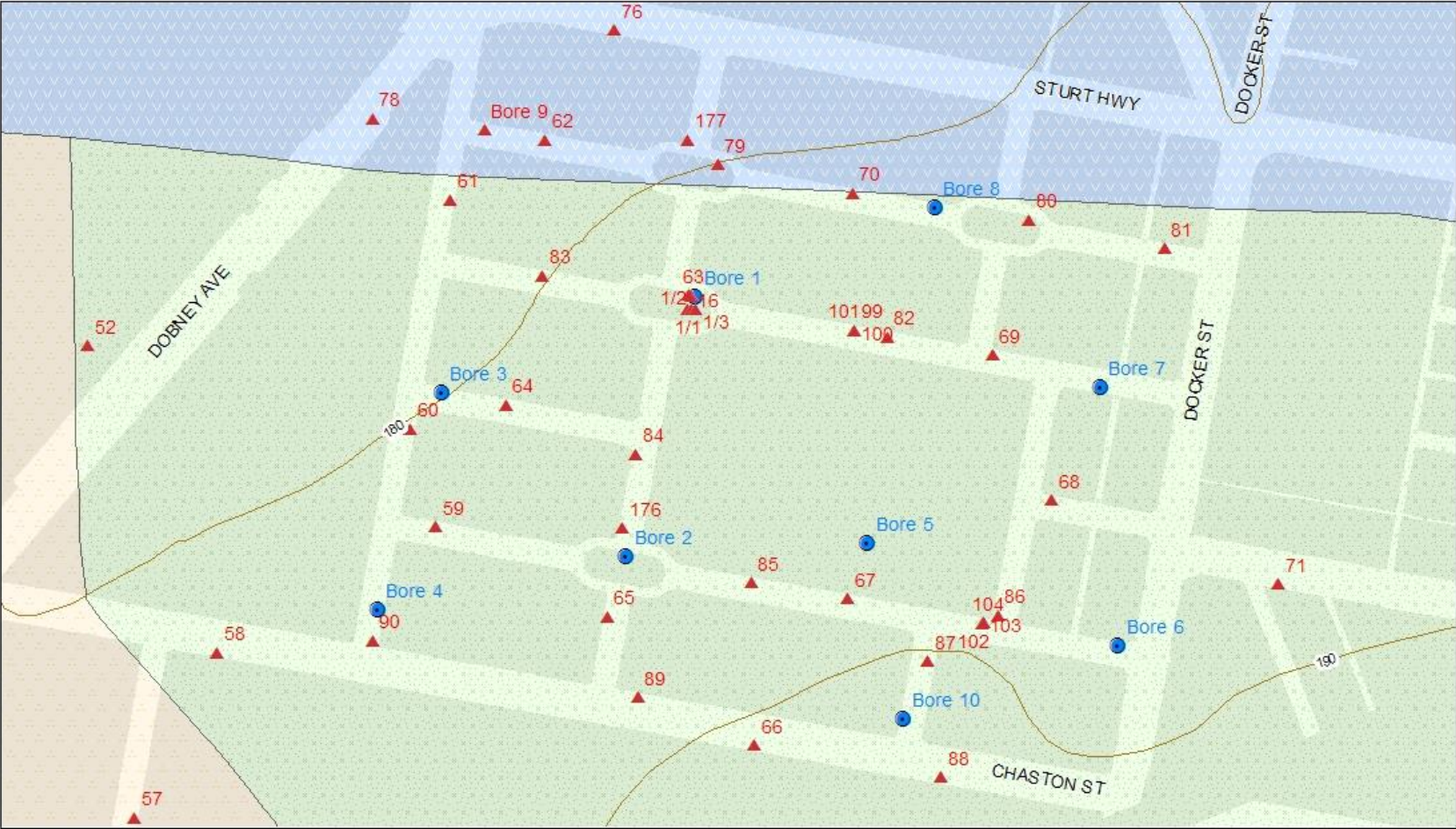
Piezometer Locations: CBD Sub-catchment



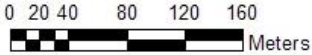
- ▲ Active_piezometers
- 10m Contour Interval
- CBD Sub-catchment



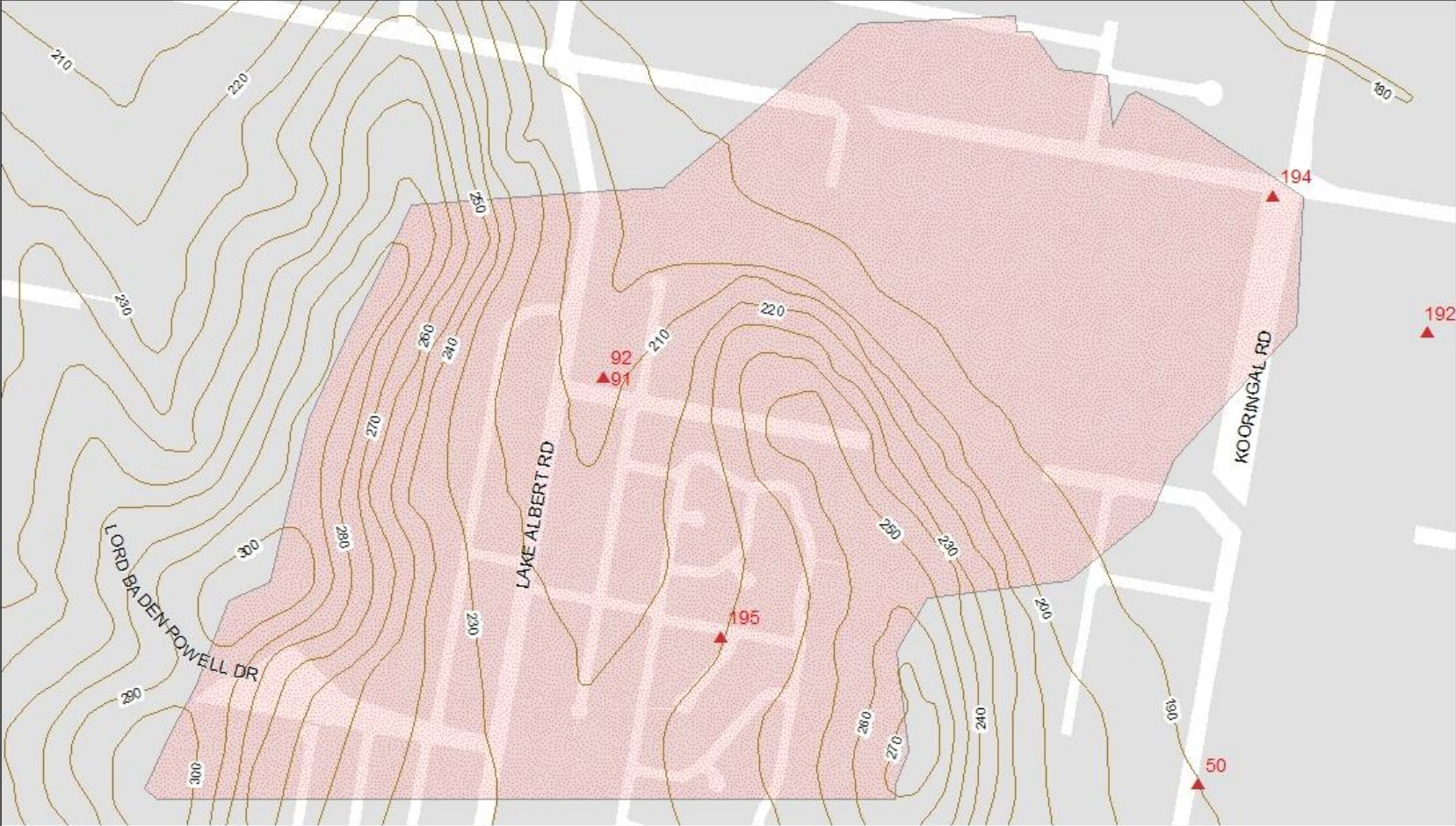
Piezometer Locations: Intensive Borefield



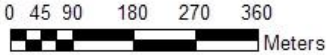
- ▲ Active_piezometers
- Dewatering Bore
- Pump Station
- 10m Contour Interval
- Mid Murrumbidgee Alluvium
- Western Sub-catchment
- CBD Sub-catchment



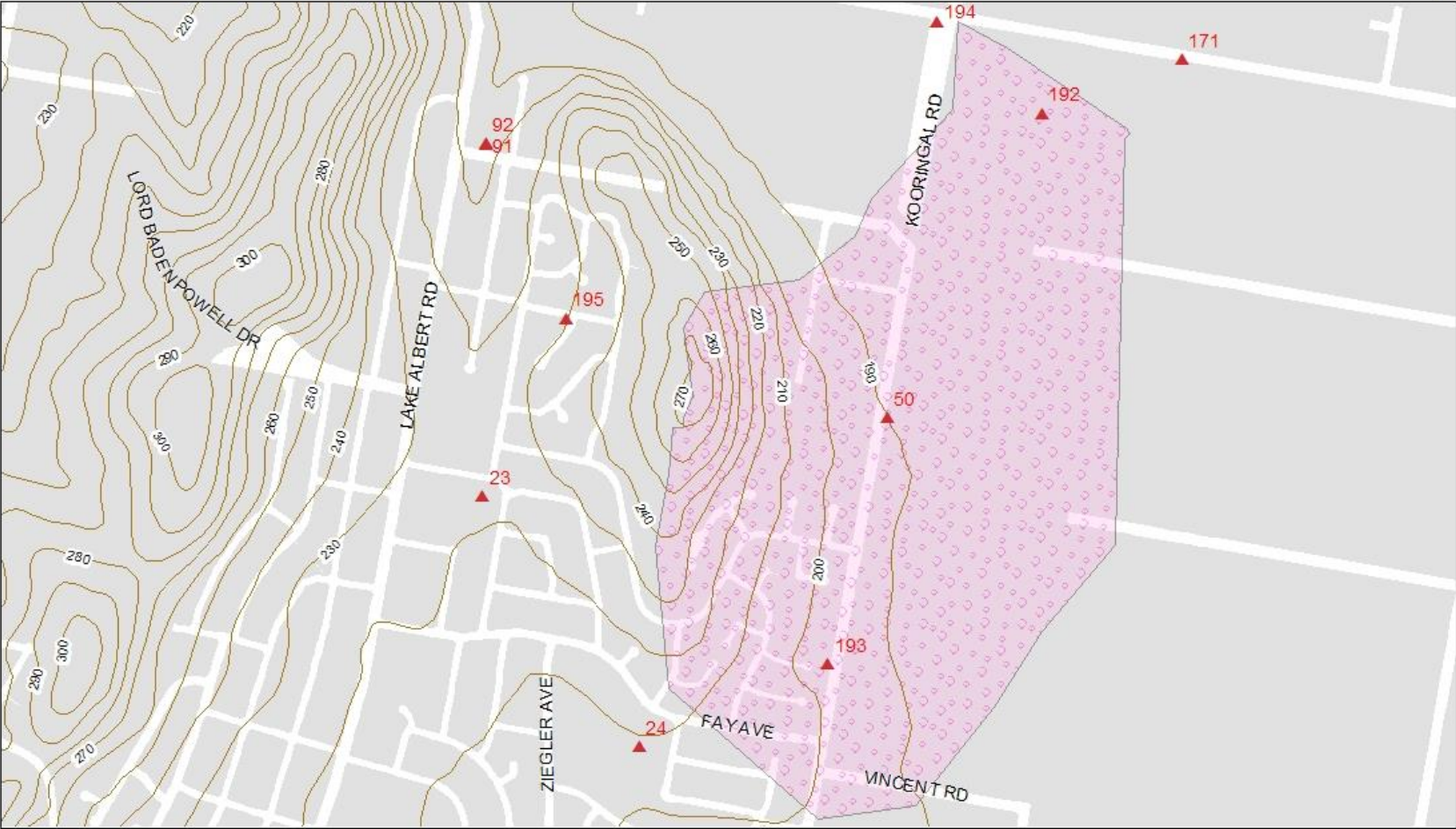
Piezometer Locations: Eastern CBD Sub-catchment



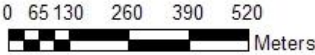
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- 10m Contour Interval
- Eastern CBD Sub-catchment



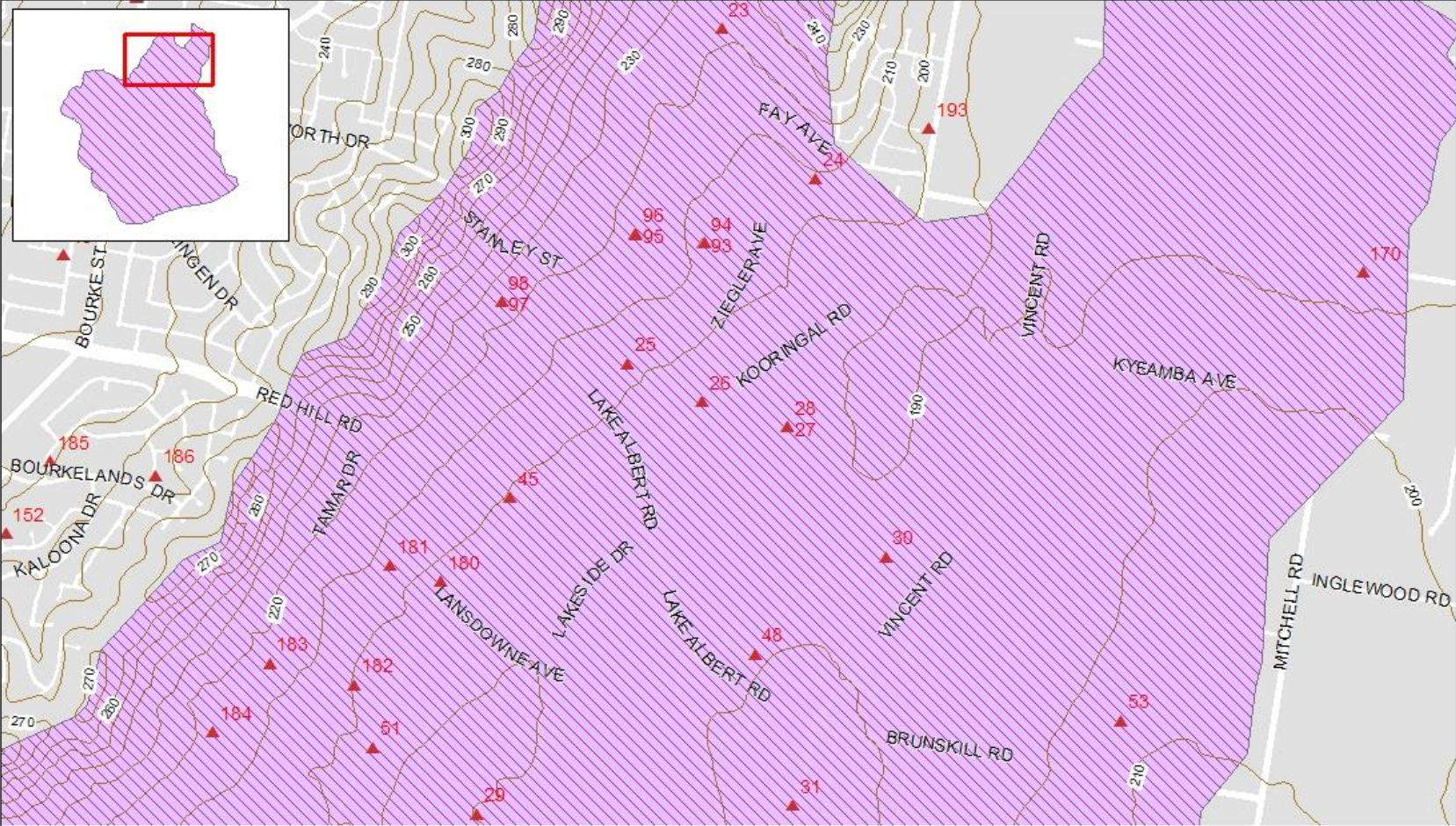
Piezometer Locations: Far Eastern CBD Sub-catchment



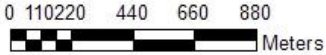
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- 10m Contour Interval
- Far Eastern CBD Sub-catchment



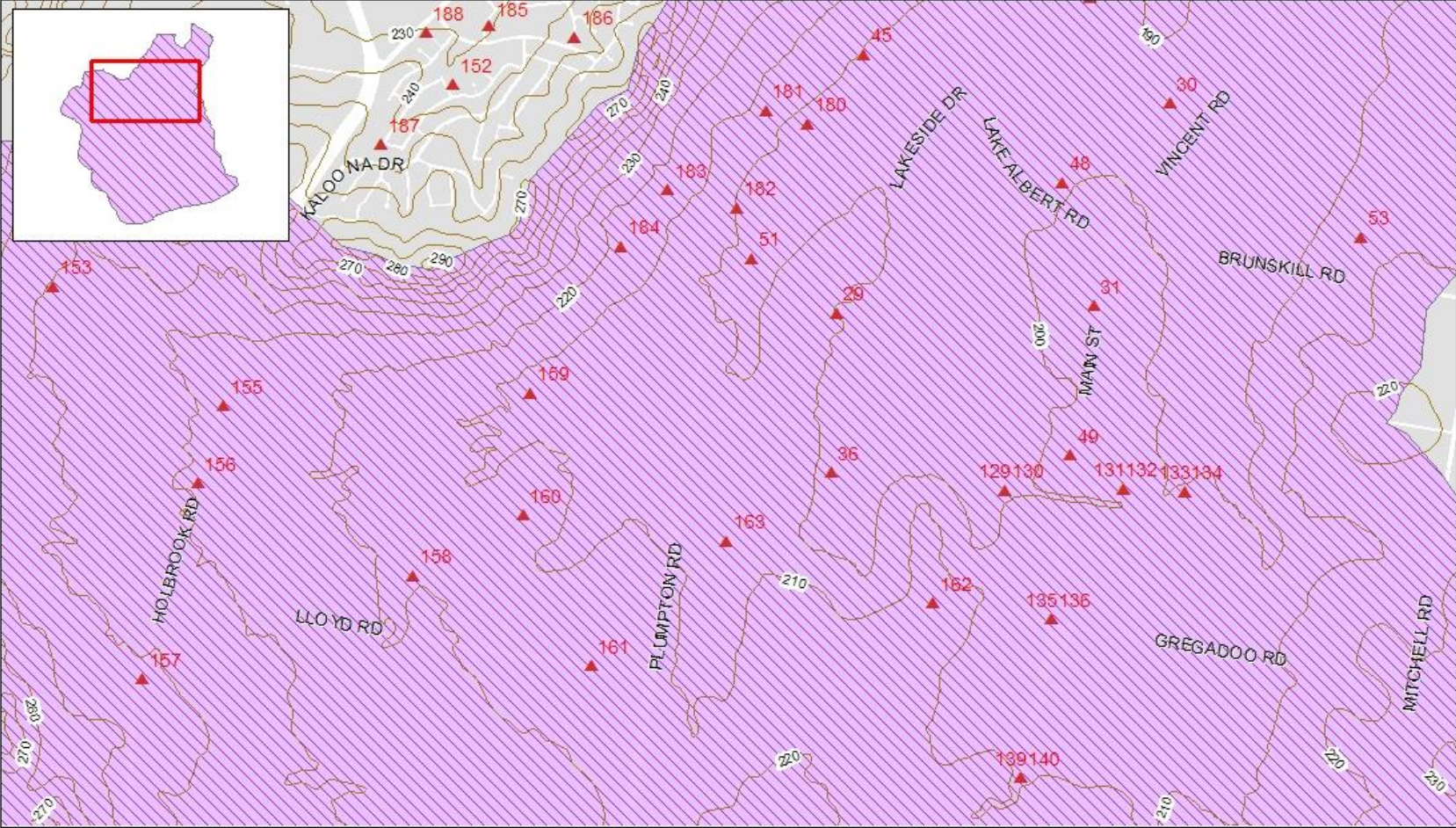
Piezometer Locations: Eastern Sub-catchment



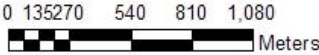
- ▲ Active_piezometers
- 10m Contour Interval
- ▨ Eastern Sub-catchment



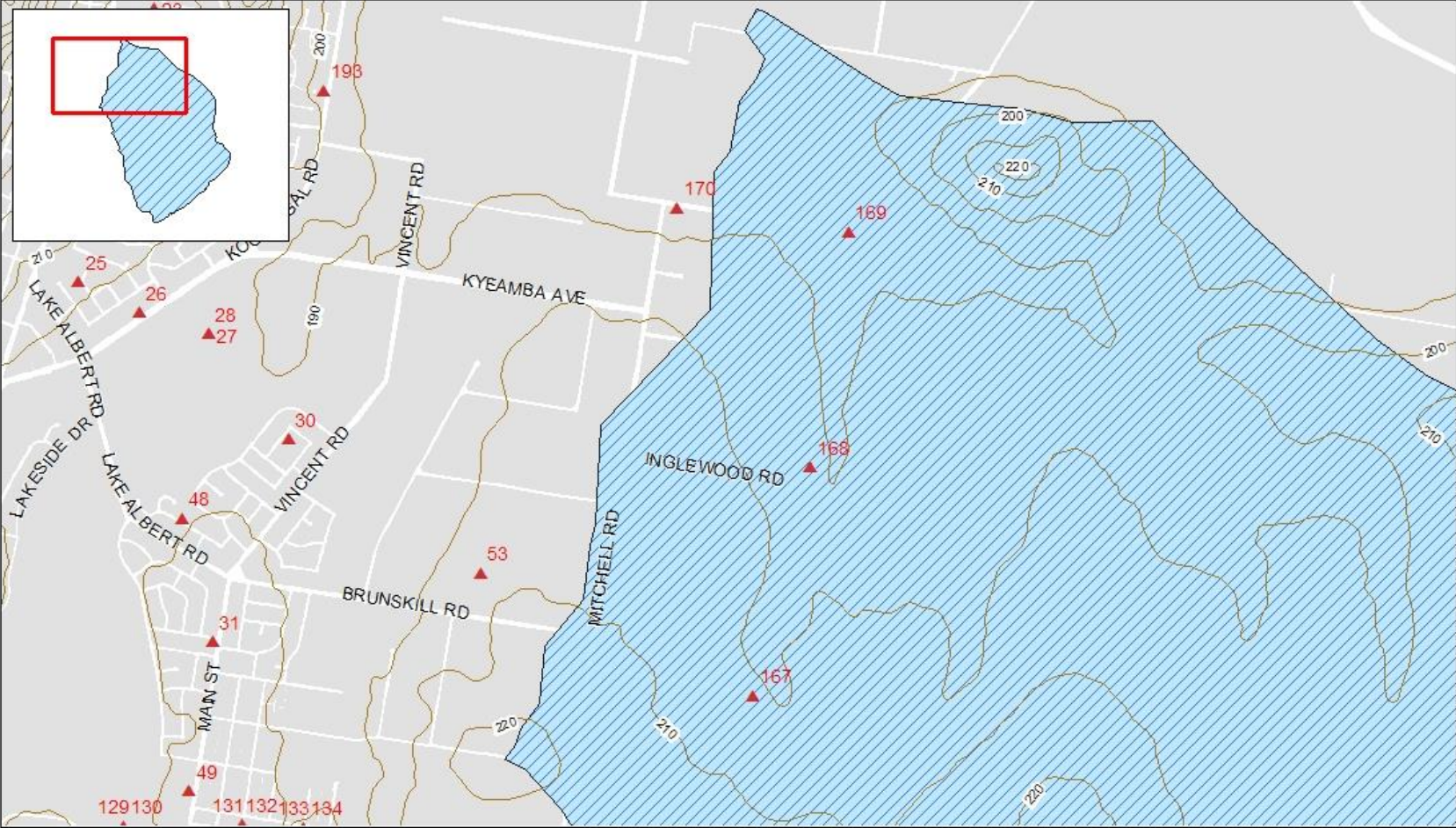
Piezometer Locations: Eastern Sub-catchment



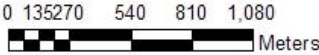
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- 10m Contour Interval
- ▨ Eastern Sub-catchment



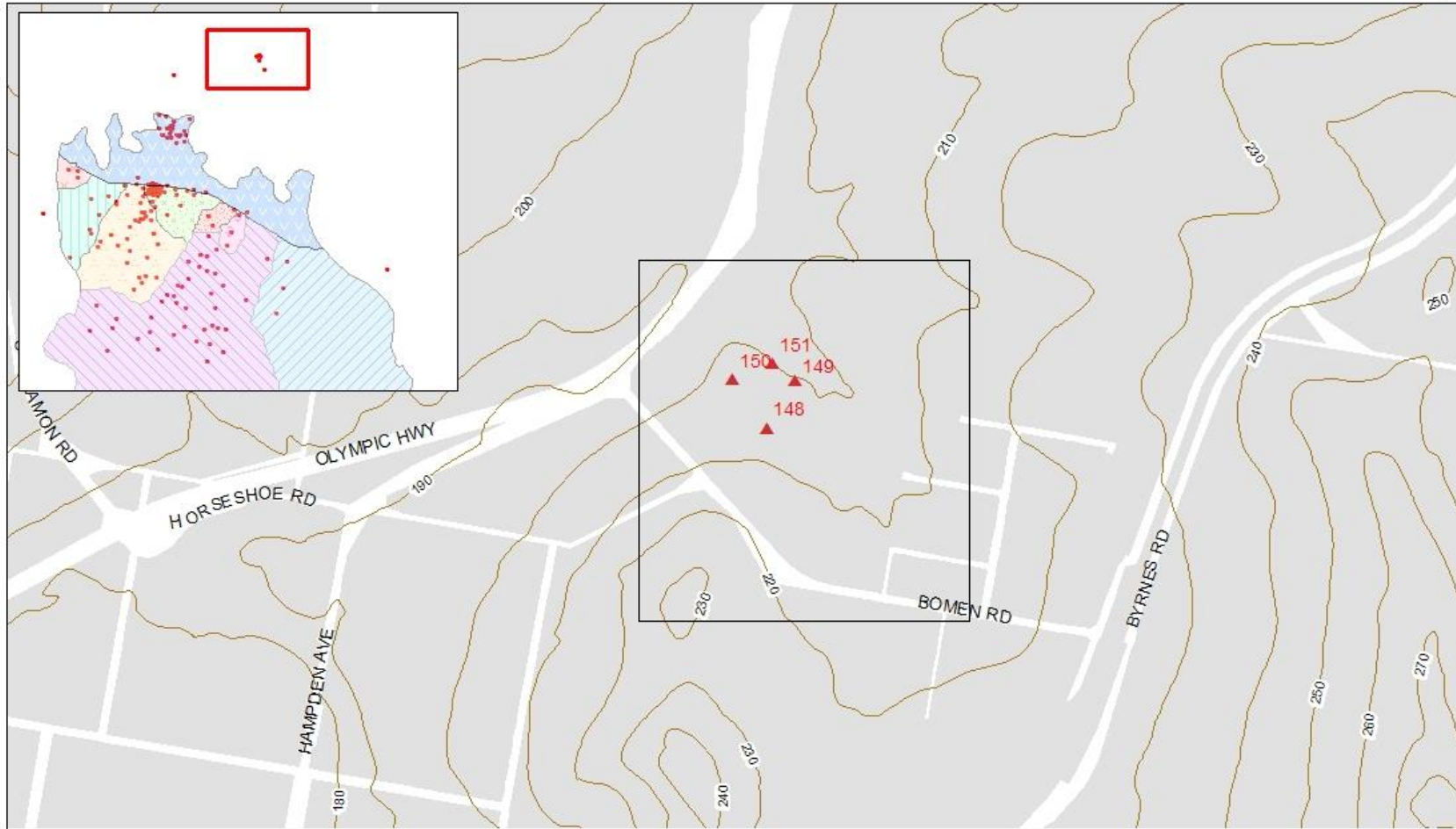
Piezometer Locations: Far Eastern Sub-catchment



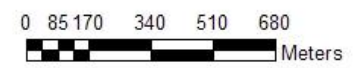
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- 10m Contour Interval
- ▨ Far Eastern Sub-catchment



Piezometer Locations: Undefined



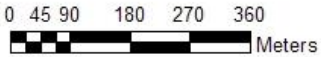
- ▲ Active_piezometers
- 10m Contour Interval
- Undefined



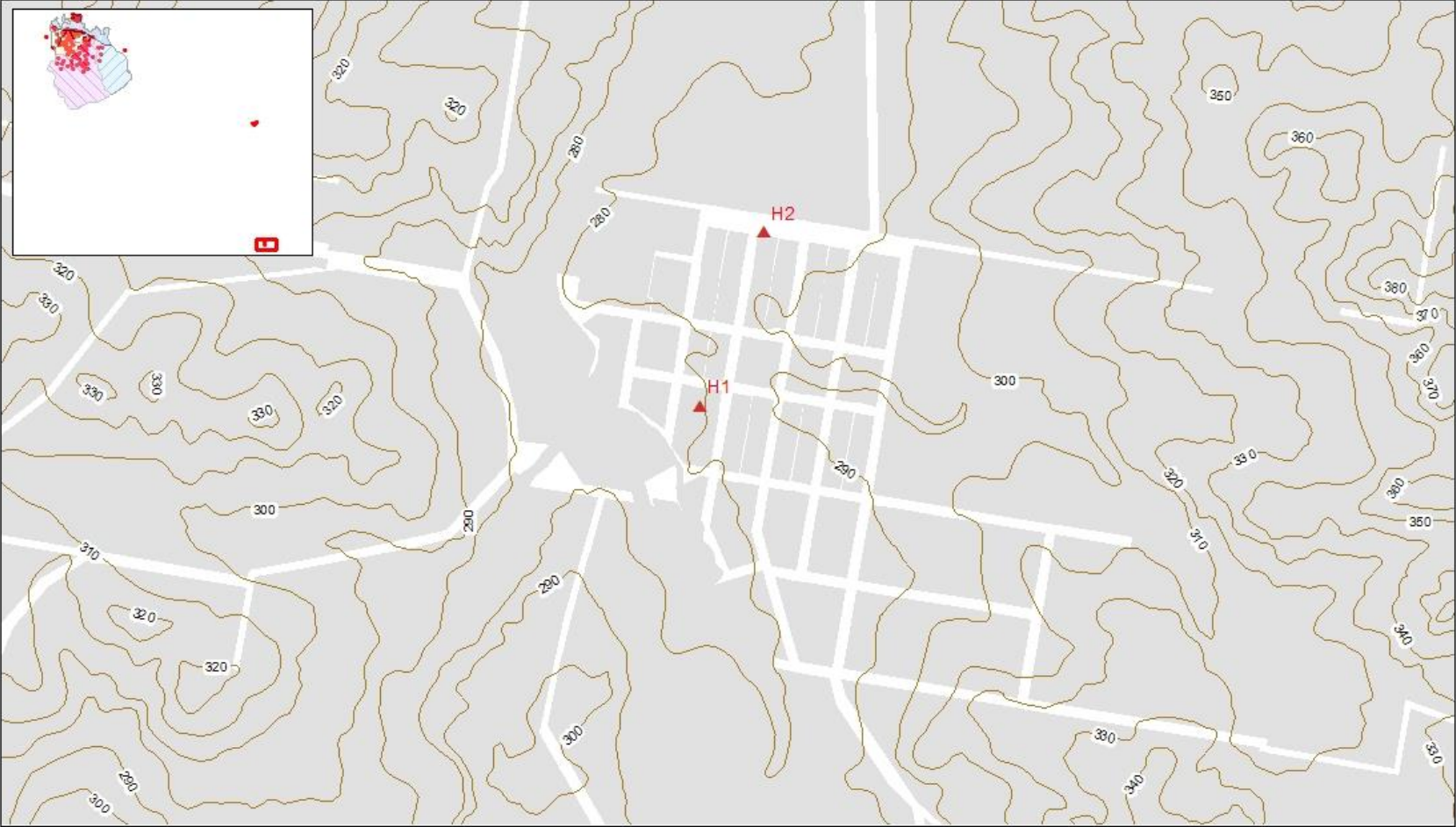
Piezometer Locations: Tarcutta



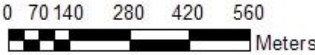
- ▲ Active_piezometers
- 10m Contour Interval



Piezometer Locations: Humula

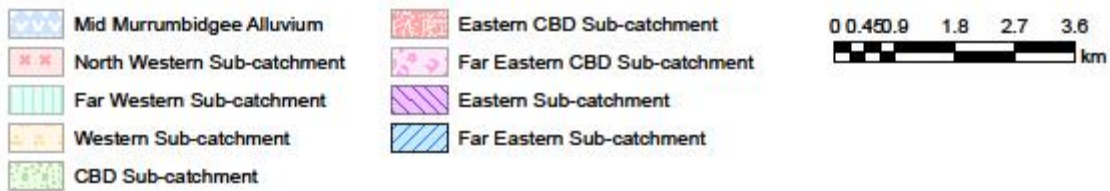
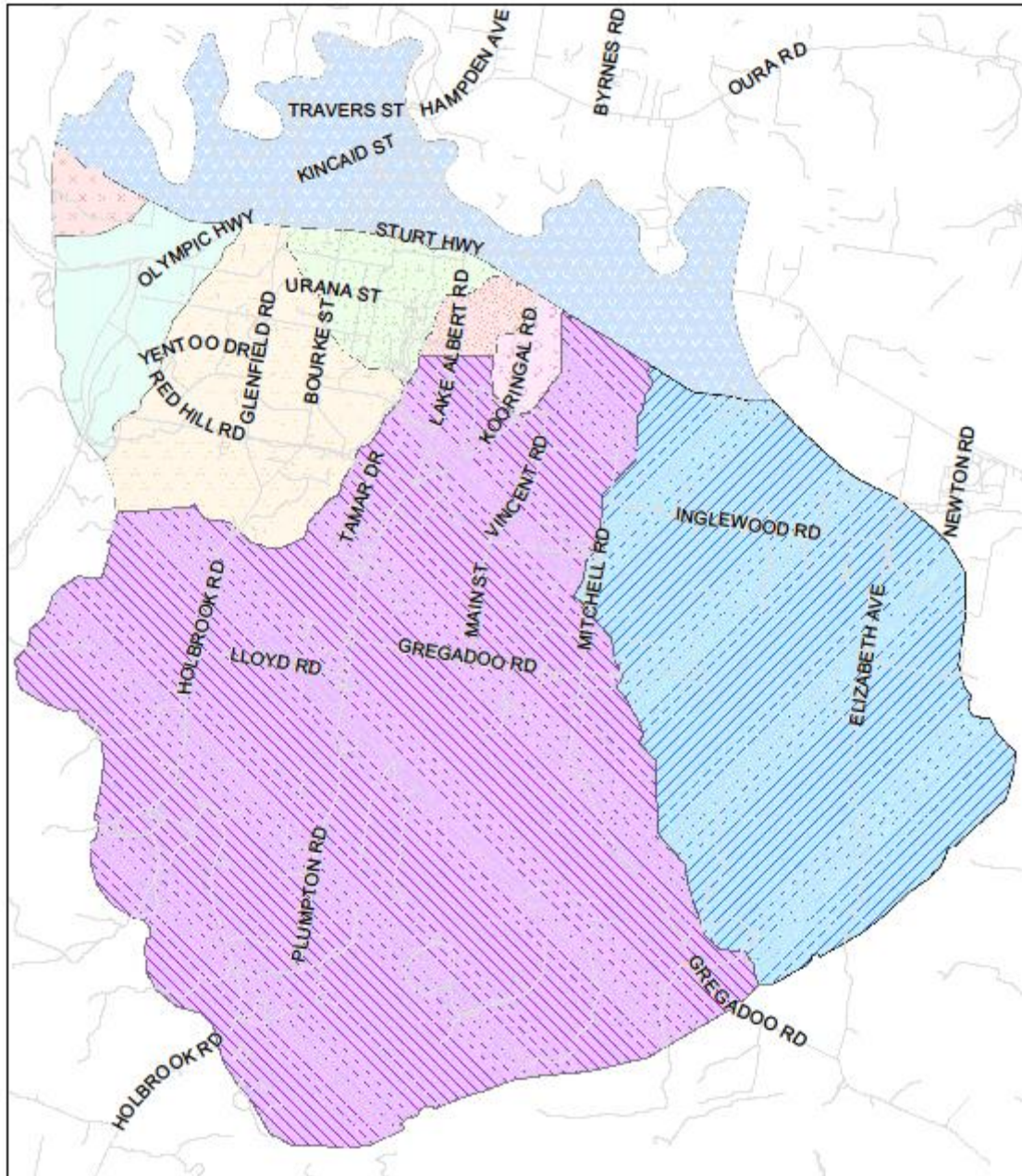


- ▲ Active_piezometers
- 10m Contour Interval



**APPENDIX B:
WAGGA WAGGA MAJOR URBAN SUB-CATCHMENTS**

Wagga Wagga Major Urban Sub-catchments



Please note that the 'Undefined' and 'Tarcutta/Humula' piezometer categories are not presented on this map.

**APPENDIX C:
STANDING WATER LEVEL & SALINITY DATA - JULY 2014 TO JUNE 2015**

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
1	Cnr Moorong St - Sturt Hwy, Central Wagga	MA	10.20	May-94	-7.36	-7.75	-0.39	0.68	0.72	0.04
2	Ashmont Primary School, Ashmont	3	10.30	Jun-94	DRY	DRY	DRY	DRY	DRY	DRY
3	Cheshire St, Central Wagga	3	7.40	May-94	DESTROYED					
4	Showground arena, Turvey Park		3.30	Mar-94	DESTROYED					
5	Showgrounds, Turvey Park	4	9.70	May-94	DRY	DRY	DRY	NETS	NETS	NETS
6	South Campus, Turvey Park	3	13.20	May-94	DRY	DRY	DRY	DRY	DRY	DRY
7	South Campus, Turvey Park	3	3.90	Mar-94	-2.22	-2.59	-0.37	5.58	5.34	-0.24
8	South Campus, Turvey Park		4.20	Mar-94	DESTROYED					
9	South Campus, Turvey Park	3	4.30	Mar-94	-0.14	-0.28	-0.14	8.90	8.49	-0.41
10	South Campus, Turvey Park	3	4.10	Mar-94	-1.43	-1.61	-0.17	2.51	2.76	0.25
11	3 Dalman Parkway, Glenfield	3	7.10	May-94	-1.52	-1.57	-0.05	0.27	0.31	0.04
12	Kimba Dr, Glenfield	3	14.00	May-94	DRY	DRY	DRY	DRY	DRY	DRY
13	Cnr Glenfield - Red Hill Rds, Lloyd (shallow)	3	8.58	May-94	-6.96	-6.97	0.00	1.39	1.35	-0.04
14	Mt Austin High School, Tolland (shallow)	3	9.90	May-94	DRY	DRY	DRY	DRY	DRY	DRY
15	Mt Austin Public School, Mt Austin (shallow)	3	9.90	May-94	DRY	DRY	DRY	DRY	DRY	DRY
16	Emblen Park, Central Wagga	4	15.10	Jan-95	-10.49	-9.13	1.36	1.56	1.61	0.05
17	Best Park Reserve, Ashmont	3	13.70	Jan-95	-3.35	-3.48	-0.13	3.23	3.22	-0.01
18	Nathan Park, Ashmont	2	11.00	Jan-95	-1.46	-1.59	-0.13	9.49	9.25	-0.24
19	Turvey Park Public School, Turvey Park	4	17.20	Jan-95	DRY	DRY	DRY	DRY	DRY	DRY
20	Kildare Catholic College, Turvey Park	4	14.90	Jan-95	-12.35	-12.65	-0.30	11.64	9.92	-1.72
21	South Wagga Public School, Central Wagga	4	13.00	Jan-95	-12.12	-12.25	-0.13	NETS	NETS	NETS
22	Norman Duck Oval, San Isidore	0	17.00	Mar-95	-15.98	DRY	DEC	1.81	DRY	DRY
23	Sacred Heart Primary School, Koorungal	7	23.00	Mar-95	-4.62	-6.12	-1.50	0.60	0.59	-0.01
24	Koorungal High School, Koorungal	7	22.00	Mar-95	NO ACCESS	NO ACCESS	NA	NA	NA	NA
25	Koorungal Public School, Koorungal	7	15.20*	Jun-07*	DRY	DRY	DRY	DRY	DRY	DRY
26	514 Koorungal Rd, Koorungal	7	27.00	Mar-95	-9.30	-9.09	0.21	10.65	10.82	0.17
27	Koorungal Rd, Koorungal (shallow)	7	13.50	Mar-95	-7.33	-7.40	-0.07	12.79	12.79	0.00
28	Koorungal Rd, Koorungal (deep)	7	21.50	Mar-95	-7.43	-7.44	-0.01	12.01	15.07	3.06
29	Dalkeith Ave, Lake Albert	7	10.00	Mar-95	-2.79	-3.13	-0.34	5.39	6.34	0.95
30	Croker Park, Lake Albert	7	13.00	Mar-95	-7.01	-7.35	-0.33	0.75	NA	NA
31	Ron Wheeler Park, Lake Albert	7	30.00	Mar-95	-21.55	-21.57	-0.02	2.00	2.01	0.01

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
33	Cooramin St, Boorooma	0	18.00	Mar-95	-14.22	-15.18	-0.96	NETS	NETS	NETS
34	Mt Austin Public School, Mt Austin (deep)	3	24.00	Jun-95	-10.70	-11.13	-0.44	5.68	5.03	-0.65
35	Emblen Park, Central Wagga		50.00	Jun-95	DESTROYED					
36	Lake Albert foreshore, Lake Albert		11.80	Jan-96	DESTROYED					
37	Kaldari Cres, Glenfield (deep)	3	40.00	May-96	-4.34	-4.53	-0.18	2.77	2.78	0.01
38	Kaldari Cres, Glenfield (shallow)	3	15.00	May-96	-4.99	-5.16	-0.17	1.48	1.37	-0.11
39	Wagga Wagga High School, Turvey Park	4	49.00	May-96	-28.65	-29.67	-1.02	2.62	2.41	-0.21
40	Holy Trinity Primary School, Ashmont	3	25.77	Apr-97	-10.40	-10.63	-0.23	8.13	8.15	0.02
41	Crisp Park, Ashmont	2	16.85	Apr-97	DRY	DRY	DRY	DRY	DRY	DRY
42	Karoom Dr reserve, Glenfield	3	12.60	Apr-97	-2.07	-2.21	-0.14	5.12	4.96	-0.16
43	Tolland Public School, Tolland	3	9.50*	Jun-07*	-5.65	-6.80	-1.15	1.45	1.48	0.03
44	Mt Austin High School, Tolland (deep)	3	22.54	Apr-97	-15.49	-15.85	-0.36	6.39	6.21	-0.18
45	Caloola Hostel, Tatton	7	12.89	Apr-97	-11.18	-11.30	-0.12	6.04	5.69	-0.35
46	Wagga Wagga Railway Station, Central Wagga		16.02	Apr-97	DESTROYED					
47	Cnr Red Hill - Glenfield Rds, Lloyd (deep)	3	16.27	Apr-97	-8.95	-8.99	-0.04	1.23	1.23	0.00
48	Jack Skeers Park, Lake Albert	7	16.05	Apr-97	-7.23	-7.58	-0.34	2.80	2.71	-0.09
49	Lake Albert Public School, Lake Albert	7	26.93	Apr-97	-14.16	-13.86	0.30	1.64	1.70	0.06
50	Wagga Wagga Christian College, East Wagga	6	19.20	May-97	-16.32	-16.33	-0.01	1.48	1.45	-0.03
51	Plumpton Rd, Lake Albert	7	16.70	Apr-97	-9.25	-9.37	-0.12	4.17	4.85	0.67
52	39 Dobney Ave, Central Wagga	4	12.60	May-97	-8.89	NO ACCESS	NA	6.20	NO ACCESS	NA
53	Lawn Cemetery, Lake Albert	7	21.50	Jun-97	-18.55	-20.21	-1.65	0.65	0.65	0.00
54	Derna Pl, Ashmont	2	3.00	Nov-97	-1.51	-1.57	-0.06	11.03	9.73	-1.31
55	1 Clowes Pl, Ashmont	2	3.00	Nov-97	LOST					
56	6 Saxon St, Central Wagga	3	6.00*	Jun-07*	-5.98	-5.98	0.00	1.23	NETS	NETS
57	7 Mortimer Pl, Central Wagga	3	3.00	Nov-97	-0.61	-0.64	-0.03	2.80	14.82	12.02
58	62 Chaston St, Central Wagga	4	3.00	Nov-97	-0.87	-0.92	-0.05	1.64	4.73	3.09
59	53-55 Meurant Ave, Central Wagga	4	3.00	Nov-97	-2.99	DRY	DEC	1.48	DRY	NETS
60	Opp 16 Cullen Rd, Central Wagga	4	3.00	Nov-97	-2.93	-2.84	0.09	4.17	NETS	NETS
61	Opp 38 Cullen Rd, Central Wagga	4	3.00	Nov-97	-2.97	DRY	DEC	6.20	DRY	NETS
62	59 Gormly Ave, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	0.65	DRY	DRY
63	Emblen Park, Central Wagga	4	3.00	Nov-97	DRY	DRY	DRY	11.03	DRY	DRY

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
64	11 Sullivan St, Central Wagga	4	3.00	Nov-97	-2.92	-2.98	-0.07	NETS	NETS	NETS
65	40 Meurant Ave, Central Wagga	4	3.00	Nov-97	DRY	DRY	DRY	NETS	DRY	DRY
66	18 Chaston St, Central Wagga	4	3.00	Nov-97	-1.29	-1.28	0.01	4.64	4.13	-0.51
67	Meurant Ave, Central Wagga	4	6.00*	Jun-07*	DRY	DRY	DRY	DRY	DRY	DRY
68	11 Lewisham Ave, Central Wagga	4	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
69	19 Hardy Ave, Central Wagga	4	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
70	33 Gormly Ave, Central Wagga	4	1.70	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
71	1 Roma St, Central Wagga	4	9.00*	Jun-08*	-4.69	-5.22	-0.53	0.99	0.95	-0.05
72	9 Brookong Ave, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
73	Wagga Wagga Base Hospital, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
74	Edward St, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
75	6 Edward St, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
76	332-334 Edward St, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
77	312 Edward St, Central Wagga		3.00	Nov-97	DESTROYED					
78	2 Dobney Ave, Central Wagga	MA	3.00	Nov-97	DRY	DRY	DRY	DRY	DRY	DRY
79	Gormly-Emblen Sts roundabout, Central Wagga	MA	4.40	Sep-98	DRY	DRY	DRY	DRY	DRY	DRY
80	Gormly-Harrison Sts roundabout, Central Wagga	4	6.00	Sep-98	-2.18	-2.33	-0.15	2.76	2.55	-0.21
81	48 Docker St, Central Wagga	MA	6.80	Sep-98	-5.36	-5.91	-0.55	1.36	1.28	-0.08
82	27 Hardy Ave, Central Wagga	4	2.60	Sep-98	DRY	DRY	DRY	DRY	DRY	DRY
83	57 Hardy Ave, Central Wagga	4	5.20*	Jun-07*	-5.05	DRY	DEC	NETS	DRY	DRY
84	2 Sullivan Ave, Central Wagga	4	3.40	Sep-98	DRY	DRY	DRY	DRY	DRY	DRY
85	27 Meurant Ave, Central Wagga	4	4.80*	Sep-98	DRY	DRY	DRY	DRY	DRY	DRY
86	2 Lewisham Ave, Central Wagga	4	7.50	Sep-98	-4.80	-4.88	-0.08	1.56	2.10	0.54
87	12 Meurant Ave, Central Wagga	4	5.20	Sep-98	DRY	DRY	DRY	DRY	DRY	DRY
88	2 Chaston St, Central Wagga	4	10.00*	May-07*	-7.32	-6.99	0.33	21.77	22.38	0.60
89	31 Chaston St, Central Wagga	4	5.50	Sep-98	-4.05	-3.64	0.40	13.42	13.63	0.21
90	51 Chaston St, Central Wagga	4	6.60	Sep-98	-2.43	-2.55	-0.12	9.63	9.54	-0.09
91	Mount St, Koorinal (shallow)	5	10.60	Jun-99	-1.23	-1.38	-0.15	1.20	1.13	-0.07
92	Mount St, Koorinal (deep)	5	27.70	Jun-99	-1.25	-1.41	-0.16	0.87	0.93	0.06
93	Henwood Park, Koorinal (shallow)	7	13.60	Jun-99	DRY	DRY	DRY	DRY	DRY	DRY
94	Henwood Park, Koorinal (deep)	7	29.90	Jun-99	-14.24	-13.88	0.36	1.29	1.31	0.02

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
95	Henwood Park, Koorungal (shallow)	7	7.90	Jun-99	DRY	DRY	DRY	DRY	DRY	DRY
96	Henwood Park, Koorungal (deep)	7	66.00	Jun-99	-22.87	-22.29	0.58	1.05	1.07	0.02
97	Opp 22 Amaroo St, Koorungal (shallow)	7	9.30	Jul-99	DRY	DRY	DRY	DRY	DRY	DRY
98	Opp 22 Amaroo St, Koorungal (deep)	7	83.00	Jul-99	-47.71	-46.70	1.01	1.45	1.42	-0.03
99	29 Hardy Ave, Central Wagga	4	15.00	Mar-01	-13.65	-12.85	0.79	NETS	1.29	NETS
100	29 Hardy Ave, Central Wagga	4	31.00	Mar-01	-18.57	-15.82	2.74	1.12	1.19	0.07
101	29 Hardy Ave, Central Wagga	4	60.00	Mar-01	-18.53	-15.82	2.71	1.02	1.09	0.07
102	Cnr Meurant St - Lewisham Ave, Central Wagga	4	15.00	Mar-01	-12.35	-10.57	1.78	17.02	16.11	-0.92
103	Cnr Meurant St - Lewisham Ave, Central Wagga	4	31.50	Mar-01	-19.65	-15.39	4.26	2.63	2.61	-0.02
104	Cnr Meurant St - Lewisham Ave, Central Wagga	4	61.00	Mar-01	-19.59	-15.27	4.32	4.85	5.11	0.26
105	Narrung St, Wiradjuri (shallow)	MA	8.09	May-94	DRY	DRY	DRY	DRY	DRY	DRY
106	Narrung St, Wiradjuri (deep)	MA	17.88	Mar-99	-9.01	-9.83	-0.82	0.28	0.27	-0.01
107	Narrung St STW, Wiradjuri (shallow)	MA	8.13	May-94	NO ACCESS	-7.44	NA	NA	1.40	NA
108	Narrung St STW, Wiradjuri (deep)	MA	16.00	Mar-99	NO ACCESS	-9.63	NA	NA	0.37	NA
109	Narrung St STW, Wiradjuri (shallow)	MA	7.80	May-94	NO ACCESS	NO ACCESS	NA	NA	NA	NA
110	Narrung St STW, Wiradjuri (deep)	MA	11.49	Mar-99	NO ACCESS	-7.48	NA	NA	0.42	NA
111	Narrung St STW, Wiradjuri	MA	7.75	May-94	NO ACCESS	NO ACCESS	NA	NA	NA	NA
112	Narrung St STW, Wiradjuri	MA	6.58	May-94	NO ACCESS	NO ACCESS	NA	NA	NA	NA
113	Narrung St STW, Wiradjuri (shallow)	MA	7.87	May-94	-7.16	-7.13	0.02	NETS	NETS	NETS
114	Narrung St STW, Wiradjuri (deep)	MA	16.39	Mar-99	-8.75	-9.57	-0.82	0.76	0.78	0.02
115	Narrung St liquid waste cell, Wiradjuri	MA	10.20	Jan-95	DESTROYED					
116	Narrung St liquid waste cell, Wiradjuri	MA	15.78	Mar-99	-9.23	-10.18	-0.95	0.98	0.94	-0.04
117	Billagha St, Wiradjuri		6.22	Jan-95	DESTROYED					
118	Billagha St, Wiradjuri	MA	15.96	Mar-99	-8.42	-9.40	-0.98	0.96	0.92	-0.04
119	Narrung St sweeper waste dump, Wiradjuri		9.60	May-94	DESTROYED					
120	Narrung St sweeper waste dump, Wiradjuri	MA	16.07	Mar-99	-9.16	-10.29	-1.13	0.97	1.00	0.02
121	Narrung St, Wiradjuri	MA	16.09	Mar-99	-9.24	-10.07	-0.83	NA	NA	NA
122	59 Galing Pl, Wiradjuri	MA	19.38	Aug-01	-10.38	-11.08	-0.70	2.34	1.91	-0.43
123	33 Galing Pl, Wiradjuri	MA	17.48	Aug-01	-10.29	-10.91	-0.62	2.10	2.07	-0.04
124	Wiradjuri Cres, Wiradjuri	MA	16.39	Aug-01	-9.92	-10.64	-0.72	1.78	1.74	-0.04

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
125	Cnr Narrung St - Wiradjuri Reserve, Wiradjuri	MA	18.39	Aug-01	-9.76	-10.34	-0.58	0.34	0.31	-0.02
126	Billagha St, Wiradjuri	MA	19.13	Aug-01	-9.54	-10.46	-0.92	0.56	0.62	0.06
127	Toll Group, Wiradjuri	MA	13.78	Aug-01	-10.26	-10.67	-0.42	0.40	0.39	-0.02
128	9 College Ave, Turvey Park	3	10.20*	May-07*	-7.70	-8.16	-0.47	2.56	2.36	-0.20
129	Lakehaven Dr, Lake Albert (shallow)	7	5.91	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
130	Lakehaven Dr, Lake Albert (deep)	7	15.00*	May-07*	-10.09	-12.92	-2.83	9.02	8.53	-0.49
131	Cnr Craft - Graham Sts, Lake Albert (shallow)	7	5.13	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
132	Cnr Craft - Graham Sts, Lake Albert (deep)	7	12.30	Oct-92	-7.65	-7.81	-0.16	3.46	3.39	-0.07
133	Cnr Craft - Bouquet Sts, Lake Albert (shallow)	7	5.84	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
134	Cnr Craft - Bouquet Sts, Lake Albert (deep)	7	11.96	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
135	Cnr Main St - Gregadoo Rd, Lake Albert (shallow)	7	5.04	Oct-92	-3.22	-4.14	-0.93	0.13	0.40	0.27
136	Cnr Main St - Gregadoo Rd, Lake Albert (deep)	7	12.01	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
137	10 Gregadoo Rd, Lake Albert (shallow)		4.70	Oct-92	DESTROYED					
138	10 Gregadoo Rd, Lake Albert (deep)		12.20	Oct-92	DESTROYED					
139	Redbank Rd, Lake Albert (shallow)	7	5.87	Oct-92	DRY	DRY	DRY	DRY	DRY	DRY
140	Redbank Rd, Lake Albert (deep)	7	12.40	Oct-92	-11.37	-11.29	0.09	NETS	NETS	NETS
141	Travelling stock reserve, Bomen		16.04	Jun-00	DESTROYED					
142	Red Hill Rd, Glenfield	3	25.60	Apr-02	-20.48	-20.63	-0.15	NA	NA	NA
143	6930 Olympic Hwy, Kapooka	2	42.00	Apr-02	DRY	DRY	DRY	DRY	DRY	DRY
144	Cnr Narrung - Billagha Sts, Wiradjuri	MA	15.50	Nov-06	-8.71	-9.55	-0.84	1.39	1.26	-0.13
145	Wiradjuri Reserve, Wiradjuri	MA	14.00	Nov-06	-6.61	-6.69	-0.07	0.27	0.23	-0.04
146	Orana PI, Wiradjuri	MA	19.50	Nov-06	-9.89	-10.60	-0.71	1.42	1.65	0.24
147	South Campus, Turvey Park	3	3.30	unknown	-0.83	-0.99	-0.15	17.17	17.65	0.48
148	Bomen Industrial Sewage Treatment Facility	0	13.20	unknown	-4.73	-5.15	-0.42	2.43	2.22	-0.21
149	BISTF, Bomen	0	14.20	unknown	0.38	0.21	-0.17	2.60	2.35	-0.25
150	BISTF, Bomen	0	13.10	unknown	-3.66	-4.11	-0.45	1.14	1.21	0.07
151	BISTF, Bomen	0	unknown	unknown	-1.38	-1.52	-0.14	3.64	3.52	-0.12
152	1 Bedervale St, Bourkelands	3	14.70	Jun-07	-9.25	-11.57	-2.33	1.36	1.97	0.60
153	Cnr Burgan - Indigo Dr, Glenoak	7	15.00	May-07	-10.70	-11.36	-0.66	4.67	5.60	0.93
154	19 Mirbelia Dr, Glenoak	7	13.00	Jun-07	-3.27	-3.01	0.26	0.49	0.48	-0.01
155	Cnr Indigo Dr - Holbrook Rd, Springvale	7	10.20	Jun-07	-7.86	-8.27	-0.42	0.80	0.71	-0.08

Piezometer Number	Piezometer Location	Urban Sub catchment	Piezometer Depth	Date Drilled	Average SWL 13/14	Average SWL 14/15	Change In SWL	Average EC 13/14	Average EC 14/15	Change in EC
156	Cnr Mirbelia Dr - Holbrook Rd, Springvale	7	15.20	Jun-07	DRY	DRY	DRY	DRY	DRY	DRY
157	Holbrook Rd, Springvale	7	15.00	May-07	-10.66	-11.30	-0.64	3.95	3.88	-0.07
158	Stringybark Pl, Springvale	7	15.00	Jun-07	DRY	DRY	DRY	DRY	DRY	DRY
159	6 Yarran Pl, Springvale	7	10.00	May-07	-5.45	-6.06	-0.61	0.57	0.59	0.02
160	3 Mallee Rd, Springvale	7	15.30	Jun-07	DRY	DRY	DRY	DRY	DRY	DRY
161	1 Lloyd Rd, Springvale	7	8.60	May-07	-3.16	-3.74	-0.58	4.19	4.12	-0.07
162	39 Gregadoo Rd, Lake Albert	7	9.00	May-07	-5.85	-5.85	0.00	3.79	3.79	0.00
163	Stringybark Creek Wetland, Gregadoo Rd, L.A	7	8.50	unknown	DRY	DRY	DRY	DRY	DRY	DRY
164	Adjacent to Murrumbidgee River, Narrung Street	MA	20.00	Dec-07	-9.21	-9.74	-0.53	NA	NA	NA
165	Travers St at entrance of Narrung St, Wiradjuri	MA	13.00	Dec-07	-9.59	-8.69	0.90	NA	NA	NA
166	Travers St behind 10 Incarnie Cres, Wiradjuri	MA	14.80	Dec-07	-9.31	DRY	DEC	NETS	DRY	DRY
167	56 Cummins Road, Lake Albert	8	11.00	Jun-08	DRY	DRY	DRY	DRY	DRY	DRY
168	378 Bakers Ln., Lake Albert	8	13.50	Jun-08	-8.39	-8.53	-0.14	2.34	2.34	0.00
169	334 Bakers Ln., Lake Albert	8	13.50	Jun-08	-6.10	-6.58	-0.48	10.65	10.60	-0.04
170	1 Mitchell Road, Lake Albert	7	13.00	Jun-08	-11.42	-11.46	-0.04	4.60	4.33	-0.28
171	124-156 Copland street, East Wagga Wagga	MA	8.50	Jun-08	DRY	DRY	DRY	DRY	DRY	DRY
172	Rear of 5-6 Kenny Place, Tolland		9.50	Jun-08	DESTROYED					
173	Rear of 28 Bandera Avenue, Glenfield Park	3	8.00	Jun-08	DRY	DRY	DRY	DRY	DRY	DRY
174	Rear of 48 Paldi Cres, Glenfield Park	2	14.00	Jun-08	-8.27	-8.09	0.18	9.37	9.02	-0.35
175	Rear of 12 Birri Place, Glenfield Park	2	15.00	Jun-08	-7.59	-8.02	-0.43	2.40	2.32	-0.08
176	39 Meurant Avenue (on Emblem Street)	4	9.00	Jun-08	DRY	-7.28	INC	DRY	12.15	DRY
177	47 Gormly Avenue (on Emblem St)	MA	5.50	Jun-08	DRY	DRY	DRY	DRY	DRY	DRY
178	Anderson Oval, Tolland	3	7.30	Jun-10	-4.22	-4.57	-0.35	0.77	0.79	0.03
179	Anderson Oval, Tolland	3	7.50	Jun-10	-0.56	-0.56	0.01	4.73	3.86	-0.87
180	Plumpton Rd, Tatton	7	6.80	Jun-10	DRY	DRY	DRY	DRY	DRY	DRY
181	Kimberley Dr, Tatton	7	10.00	Jun-10	-8.89	-9.24	-0.36	6.85	6.55	-0.30
182	2 Stirling Blvd, Tatton	7	12.00	Jun-10	-3.23	-3.43	-0.20	1.55	1.52	-0.03
183	46 Stirling Blvd, Tatton	7	11.70	Jun-10	-11.40	-11.37	0.03	NETS	7.57	DEC
184	72 Stirling Blvd, Tatton	7	5.80	Jun-10	DRY	DRY	DRY	DRY	DRY	DRY
185	43A Berembee St, Bourkelands	3	6.30	Jun-10	DRY	DRY	DRY	DRY	DRY	DRY
186	Wilgoma St, Bourkelands	3	8.60	Jun-10	-2.85	-2.90	-0.05	0.82	0.81	0.00

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187	Yarrawah Cres, Bourkelands	3	9.00	Jun-10	-2.97	-3.17	-0.21	0.74	0.73	-0.01
188	Audervale Cl, Bourkelands	3	5.00	Jun-10	-2.38	-2.67	-0.29	0.67	0.51	-0.16
189	46 Riverview Dr, Riverview	1	5.70	Jun-10	-3.15	-3.88	-0.73	0.93	1.15	0.21
190	Roach Rd, Riverview	1	9.20	25-Jun-10	-6.81	-7.08	-0.27	7.26	5.30	-1.96
191	110 Riverview Dr, Riverview	1	5.00	25-Jun-10	-3.30	-3.49	-0.19	0.41	0.52	0.11
192	Exhibition Centre, East Wagga Wagga	6	10.50	27-Jun-10	-9.29	-9.66	-0.37	1.57	1.56	-0.01
193	Koorungal Rd, Koorungal	6	8.00	21-Jun-10	DRY	DRY	DRY	DRY	DRY	DRY
194	Copeland St, East Wagga Wagga		12.00	Jun-10	DESTROYED					
195	Macintosh Place, Koorungal	5	6.00	23-Jun-10	DRY	DRY	DRY	DRY	DRY	DRY
196	Showground, Central Wagga	4	14.60	26-Jun-10	-5.45	-5.74	-0.30	1.98	1.60	-0.38
197	South west of quarry, Lloyd	3	25.00	Jul-12	DRY	DRY	DRY	DRY	DRY	DRY
198	Adjacent creek bed, Lloyd	3	25.00	Jul-12	-24.67	DRY	DEC	NETS	DRY	DRY
199	West of farm house, Lloyd	2	25.00	Jul-12	DRY	DRY	DRY	DRY	DRY	DRY
200	Transmission line, Lloyd	2	25.00	Jul-12	DRY	DRY	DRY	DRY	DRY	DRY
201	Wiradjuri track, Silverlite Reserve, Lloyd	2	25.00	Jul-12	-24.89	-24.82	0.07	NETS	NETS	NETS
202	Cnr Yentoo Dr - Red Hill Rd, Lloyd	2	25.00	Jul-12	-18.98	-19.01	-0.03	15.32	16.02	0.71
203	West of cnr Dalman Pk - Red Hill Rd, Lloyd	3	25.00	Jul-12	-22.86	-22.87	-0.01	NETS	NETS	NETS
204	East of cnr Dalman Pk - Red Hill Rd, Lloyd	3	25.00	Jul-12	-16.99	-17.19	-0.21	3.87	4.46	0.60
205	Rear Barton Ave (north), Lloyd	3	25.00	Jul-12	-17.57	-17.41	0.15	10.29	10.55	0.26
206	Rear Barton Ave (south), Lloyd	3	25.00	Jul-12	-15.24	-15.14	0.10	0.61	1.38	0.77
207	Quarry entrance, Lloyd	3	24.00	Jul-12	DRY	DRY	DRY	DRY	DRY	DRY
208	Rear 33 Barrima Dr, Glenfield Park	3	7.50	Jun-13	-1.47	-1.91	-0.43	1.93	0.69	NA
209	4 Mima St, Glenfield Park	3	5.00	Jun-13	-2.42	-2.97	-0.55	2.04	1.92	NA
210	Duke of Kent Oval, Central Wagga	MA	8.75	Jun-13	-8.72	-8.79	-0.07	NETS	NETS	NETS
211	63 Gormly Ave, Central Wagga	MA	48.8	Unknown	-20.43	-18.62	1.81	0.51	0.50	-0.02
1/1	Emblen Park, Central Wagga	4	15.00	Unknown	-11.36	-7.99	3.37	2.23	2.07	-0.16
1/2	Emblen Park, Central Wagga	4	30	Unknown	-12.12	-12.46	-0.34	1.81	1.80	-0.01
1/3	Emblen Park, Central Wagga	4	60.00	Unknown	-12.67	-13.25	-0.58	1.43	1.41	-0.02
H1	Cnr Clark - Mate Sts, Humula	T	4.50	Unknown	-1.76	-2.21	-0.45	2.81	2.61	-0.20
H2	Cnr Boundary Rd - Mount St, Humula	T	4.20	Unknown	-3.38	-3.91	-0.53	0.49	0.59	0.10
T1	26 Centenary Ave, Tarcutta	T	unknown	Unknown	-10.23	-10.74	-0.51	1.33	1.22	-0.11

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T2	Sydney St, Tarcutta	T	unknown	Unknown	DESTROYED					
T3	Cnr Cynthia - Young Sts, Tarcutta	T	16.00	Unknown	-15.54	-15.57	-0.03	NETS	NETS	NETS
T4	Cnr Argent - Spring Sts, Tarcutta	T	19.50	Unknown	DRY	DRY	DRY	DRY	DRY	DRY
T5	Sydney St, Tarcutta	T	5.75	Unknown	-4.69	-5.17	-0.48	4.27	3.23	-1.03
T6	Breaden Sports Ground, Tarcutta	T	4.15	Unknown	-2.33	-2.80	-0.47	0.92	0.88	-0.04
T7	Cnr Bent & Sydney St, Tarcutta	T	8.00	Jun-14	NEW	-7.38	NA	NEW	3.55	NEW

**APPENDIX D:
STANDING WATER LEVELS - HISTORICAL
HYDROGRAPHS**

