Appendix F - Greenbushes Lithium Mine TSF and Process Dam Areas – Water Monitoring Review 2016-17 (Significant Environmental Services)

GREENBUSHES MINE – TSF & Process Dam Areas

WATER MONITORING REVIEW 2016/17

Report
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EXECUTIVE SUMMARY

Talison Lithium Australia Pty Ltd (TLA) and Global Advanced Metals Greenbushes Pty Ltd (GAMG) mine lithium and tantalum (TLA lithium and GAMG tantalum) at Greenbushes operations (Greenbushes Mine, the Site), located 250km south-east of Perth and 80km from the Port of Bunbury in Western Australia.

Water supplies for mineral processing are obtained from the Austins-Southampton dams, which are fed from a drainage channel that receives excess water flows from the Clear Water Pond (CWP) and general site runoff. The Cowan Brook Dam is located on a creek and receives overflow during the wet winter months from the Austins Dam spillway, in addition to overflow from the TSF2 seepage collection sump, which is minimised by TLA through maximising the pumping capacity to return the majority of the water to the processing circuit. Historically seepage from below the Austins Dam wall has flowed to a tributary of the Cowan Brook. A solar pump was installed at the seepage pond in early 2016 and the water is now being returned to the dam. The Cowan Brook Dam is used to supply make-up water into the water circuit via the Southampton Dam during the summer months.

There are no discharges to the environment from minesite operations, with the exception of losses from the water circuit by means of evaporation, seepage and when the Cowan Brook Dam overflows during winter seasons due to rainfall within the catchments. Tailings from mineral processing are currently discharged into TSF2, which was commissioned in January 2006. TSF1 is in care and maintenance, no longer receiving tailings from mineral processing.

Significant Environmental Services (SignificantENV) was engaged by TLA to prepare this Water Monitoring Review (WMR) report for the July 2016 to June 2017 review period, for submission to the Department of Environment Regulation (DER) and Department of Water (DoW), and inclusion in the Annual Environmental Report (AER) for submission to the Department of Mines and Petroleum (DMP). It specifically reviews the groundwater and surface water impacts associated with the tailings storage facility (TSF) and process dam areas. The operations at Greenbushes are covered under DER operating licences L4247/1991/13 and L8501/2010/2, issued by the DER under Part V of the *Environmental Protection Act 1986* (EP Act). The licences require monitoring of several bores surrounding the TSF areas and three reservoirs (Austins-Southampton, Cowan Brook and Norilup dams) forming part of the Mine Water Circuit.

Monitoring of groundwater and surface water resources at the Greenbushes Mine for the current review period (July 2016 to June 2017) was conducted in accordance with the requirements of the DER licences L4247/1991/13 and L8501/2010/2. The summary of results and conclusions are provided below. It is important to note that the new proposed monitoring bores captured under the updated DER Licence L4247/1991/13 (July 2016) were not installed at the time this WMR report was prepared due to the TSF2 buttressing activities associated with embankment raises still undergoing completion at the time this report was prepared.

Groundwater Monitoring Results

The water levels in the monitoring bores have remained relatively stable since the commencement of monitoring in 1997, showing seasonal fluctuations whereby water levels reach a maximum at the end of winter in October, then decline to the lowest point at the end of summer in April.

The pH values recorded in the monitoring bores varied between 5.10 (MB97/1) and 7.77 (MB01/13) over the 2016/17 review period, and when compared with historical data generally display relatively similar and stable trends. The pH levels are generally lower, within the 5 to 6 range, in the bores bordering the western perimeter of TSF2.

Measurements of EC (measure of salinity) in the monitoring bores ranged between 606μS/cm (MB05/02) and 8,230μS/cm (MB97/3) for the TSF perimeter bores, and up to 14,240μS/cm for the western regional monitoring bores (MB01/11 and MB97/2). The highest EC values in TSF perimeter bores MB97/3 and MB97/4 is likely attributed to them being the two bores in closest proximity to the TSF2 decant collection and downstream seepage recovery sump points. The EC has increased by 3,000μS/cm in MB97/3 and MB97/4 since 2010, considered to be associated with the increased seepage rates from the TSF2 seepage collection drain via the shallow sand (old tailings/ dredge path) aquifer in area.

Analysis and review of the salinity, chloride, sulphate and SO_4:Cl ratio data for the monitoring bores suggests that seepage is occurring southwards from both the original TSF1 and active TSF2 cells, and via the open drain (Austins Return Drain) which directs water north-westerly from the TSF decant pond (Clear Water Pond) into the Austins Dam. Furthermore, TSF2 seepage captured within the constructed recovery sump is able to overflow into a natural drainage line which flows westerly to the Cowan Brook Dam. Hence, there is an opportunity for the excess water from TSF2 to drain to the Cowan Brook Dam or into the underlying groundwater. However, it is important to note that TLA makes proactive efforts to increase the pumping capacity from the TSF2 seepage collection sump, resulting in the maximum return of the water to the processing circuit except during peak rainfall events when it still overflows. When the current program of works on TSF2 are completed, overflows from this sump are expected to cease.

The concentration of lithium (Li) recorded in monitoring bore MB1 remained elevated during the 2016/17 review period, and MB05/01 for the third consecutive review period recorded increasing Li values. The concentration of Li recorded in these two bores is considerably higher than in other TSF2 monitoring bores, with MB05/01 recording the highest value of 4.7mg/L in January 2017 and MB1 maintaining similar levels to the past decade (up to 3.8mg/L in July 2015). While the ADWG does not specify a level for Li, the lithium level specified in the ANZECC Guidelines for Irrigation is 2.5mg/L.

Based on the knowledge that bores MB1 and MB05/01 have damaged casings, the substantially higher Li readings in these two bores is considered to be attributed to them receiving surface water infiltration from the TSF seepage collection drains via the shallow sand (old tailings/ dredge path) aquifer in the local area, as opposed to TSF seepage into the deeper underlying groundwater. This is because the adjacent bores MB01/09 (located 100m south of MB1) and MB01/13 (located 50m west of MB05/01) have recorded negligible (<0.05mg/L) Li concentrations to date. Nevertheless, the fact MB05/01 continues the increasing trend in SO_4 and recording Li values >2.5mg/L due to surface water infiltration from the TSF2 seepage collection drain, indicates that the increased rate of tailings disposal in the northern portion of TSF2 has directly resulted in increased seepage rates into the downstream shallow sand (old tailings/ dredge path) aquifer.

Except for the elevated arsenic levels in the western regional monitoring bore MB97/1, added to the updated DER Licence (July 2016), the concentration of other trace metals and major ions are relatively low and consistent across the monitoring bores. While concentrations of copper (Cu), zinc (Zn) and lead (Pb) are typically non-detectable, the following bores continued to record values for certain metals/metalloids above the ADWG and/or ANZECC Guidelines for Irrigation during the 2016/17 review period:

- MB1 – manganese (Mn) (0.36mg/L) and iron (Fe) (16.4mg/L), plus nutrient phosphorus (P) (0.43mg/L).
- MB3 – only Fe (0.44mg/L), plus nutrient P (0.27mg/L).
- MB97/3 – Mn (1.8mg/L), arsenic (As) (0.011mg/L) and nickel (Ni) (0.038mg/L), plus nutrient P (0.25mg/L).
- MB97/4 – Mn (1.5mg/L), Ni (0.12mg/L) and cobalt (Co) (0.081mg/L), plus nutrient P (0.39mg/L).
- MB01/01 – Mn (0.93mg/L) and Fe (0.32mg/L), plus nutrient P (0.16mg/L).
- MB01/09 – Mn (0.67mg/L) and Fe (0.86mg/L), plus nutrient P (0.16mg/L).
- MB05/02 – Fe (41mg/L) and cadmium (Cd) (0.007mg/L), plus nutrient P (0.48mg/L).
- MB05/01 – Mn (0.97mg/L) and Fe (7.3mg/L), plus nutrient P (0.18mg/L).
- MB01/13 – only Fe (3.1mg/L), plus nutrient P (0.37mg/L).
- MB97/1 – Mn (0.35mg/L), Fe (10.4mg/L), As (0.22mg/L), Cd (0.005mg/L) and Ni (0.021mg/L), plus nutrient P (0.58mg/L).
- MB97/2 – Mn (7.9mg/L), Fe (49.4mg/L), Co (0.075mg/L) and Ni (0.09mg/L), plus nutrient P (0.75mg/L).
- MB01/11 – Mn (1.3mg/L), Fe (0.35mg/L), As (0.021mg/L) and Ni (0.05mg/L), plus nutrient P (0.34mg/L).

When compared to historical data, these values have remained relatively similar and stable over time and are thus likely to represent a combination of background levels plus further contributions from TSF seepage, with the greatest suite of elevated values (EC, TDS, Mn, As, Ni, Fe, Co, Cd & P) recorded in TSF2 perimeter monitoring bores MB97/3 & MB97/4 and western regional monitoring bores MB97/1, MB97/2 & MB01/11. TSF2 perimeter monitoring bores MB97/3 & MB97/4 are in closest proximity to the TSF2 seepage recovery sump points.

The elevated arsenic levels in the western regional monitoring bore MB97/1, added to the updated DER Licence (July 2016), is difficult to assess considering the historical nature of the site which is acknowledged in the DER Licence ("Lithium has been mined since 1983, however historical mining operations at the Premise date back to tin mining in 1888 ad tantalum mining in the 1940's"). As per the Appendix 7 "Investigation of Soil and Aquifers" report (Peck & Associates, 1998), it was determined that there were Arsenic enriched soils at around 8-10 meters in this location and there was nothing to suggest that the Arsenic was connected to the TSF at this time. However, a review of the historical graphical trends for arsenic, TDS, pH and lithium (Appendix 8), and considering TSF2 was commissioned in 2006 including the open drain (Austins Return Drain) which directs process water north-westerly from the TSF decant pond (Clear Water Pond) into the Austins Dam, there appears to be a connection between the altered TSF2 process water stream and the water quality measured in MB97/1 (the closest monitoring bore to Austins Dam). As displayed in Appendix 8, the TDS and lithium levels have decreased since 2006 (TDS from 4,000 to 1,000mg/L; and Li from 0.2 to 0.05mg/L), while the arsenic levels have increased (from <0.05 to 0.25mg/L). The underlying reason for the elevated arsenic levels in MB97/1 will require further investigation shall the DER request.

The concentrations of radioactive elements thorium (Th) and uranium (U) continued to remain below the detection limits (<0.05mg/L) for all monitoring bores during the review period.

The highest radium (Ra) concentration values recorded during the review period were in the monitoring bores located near the TSF seepage collection points. However, all levels continued to remain significantly below the ANZECC radionuclide activity trigger values for irrigation water

Surface Water Monitoring Results

Analysis and review of the surface water monitoring data highlights that the water quality of the Austins-Southampton dams is affected by use in the Mine Water Circuit for water supply, including Southampton Dam receiving return process water from the TSF decant pond (Clear Water Pond) via the open drain (Austins Return Drain).

The Cowan Brook Dam is located on a creek and receives overflow during the wet winter months from the Austins Dam spillway to the north, in addition to overflow from the TSF2 seepage collection sump to the east, which is minimised by TLA through maximising the pumping capacity to return the majority of the water to the processing circuit. Historically seepage from below the Austins Dam wall has flowed to a tributary of the Cowan Brook. A solar pump was installed at the seepage pond in early 2016 and the water is now being returned to the dam. TLA returns the TSF2 seepage water to the circuit all year round and allow it to temporarily overflow the spillway to the Cowan Brook Dam during peak flows (i.e. rainfall events during winter months). When the current program of works on TSF2 are completed, there should be no overflows to Cowan Brook Dam from this sump except under extreme circumstances (e.g. power failures to upstream pumps).

Seasonal water quality fluctuations in the Austins-Southampton, Cowan Brook and Norilup reservoirs are caused by rainfall events in winter months (increased dilution) and evaporation in summer months (increased concentration).

During the 2016/17 review period, the pH in the reservoirs ranged between 7.47 and 8.9, and the EC concentrations between 788µS/cm and 1,794µS/cm, continuing the stable historical trends, with slight gradual increasing trend. The SO_4 concentrations in Southampton Dam increased from 2004 to 2010 (peaking in May 2009 - 345mg/L), and have gradually decreased back to within historical ranges since the 2010/11 review period, ranging between 152 and 180mg/L during the 2016/17 review period. Likewise, the SO_4 concentrations in Cowan Brook Dam have remained stable with a slight decrease since the 2010/11 review period, ranging between 118mg/L and 129mg/L during the 2016/17 review period. The SO_4 concentrations in the dams have always remained below the ADWG value (500mg/L).

The stabilisation and slight decrease of SO_4 concentrations since the 2010/11 review period, together with a coinciding gradual increase in pH, is attributed to TLA producing a greater quantity of chemical grade product than technical grade in recent years. Production of technical grade product includes an attrition step which uses sulphuric acid (H_2SO_4). Process improvements have resulted in a reduction in H_2SO_4 in the processing circuit and SO_4 levels are decreasing as a result.

The concentration of lithium (Li) in the Austins-Southampton and Cowan Brook reservoirs exceed the trigger level specified in the ANZECC Guidelines for Irrigation (2.5mg/L). Historically, there has been a trend of increasing lithium concentrations since the 2002/03 review period. During the 2016/17 review period, the Li concentrations recorded in Southampton Dam ranged between 9.8 and 11.9mg/L, and between 9.7 and 12.9mg/L in Austins Dam. This is similar to the values recorded during the previous six review periods, marking a turning point to the increasing trend (i.e. the maximum Li concentration recorded during the 2015/16 review period was 12.5mg/L, 10.7mg/L in 2014/15, 12.1mg/L in 2013/14, 12.0mg/L in 2012/13, 11.4mg/L in 2011/12, 12.0mg/L in 2010/11 and 9.7mg/L in 2009/10). The concentrations of Li recorded in Cowan Brook Dam over the 2016/17 review period were between 6.4 and 7.3mg/L, similar to the previous 2015/16 review period (between 6.8 and 7.7mg/L) and slightly higher than the maximum values recorded during earlier review periods, thus confirming a turning point to the long-term trend of increasing lithium concentrations in the Mine Water Circuit.

With the exception of arsenic (As), and minor extent iron (Fe), the concentration of all other trace metals and major ions recorded in the Austins-Southampton dams are low and below the ADWG values. The arsenic values recorded during 2016/17 continued to be above the ADWG value of 0.01mg/L, ranging from 0.046 to 0.15mg/L in Southampton Dam, and between 0.067 and 0.18mg/L in Austins Dam. The maximum recorded value in Cowan Brook Dam was 0.005mg/L during the review period. When compared to historical data, these values have typically remained stable over time; however, there has been a further increasing trend of arsenic levels in the Mine Water Circuit since 2010, with the highest level recorded in Southampton Dam in April 2016 (0.185mg/L). The elevated arsenic levels in the Mine Water Circuit since 2010 appears to be associated with the increased volumes of spodumene ore being mined and processed to produce chemical grade spodumene.

The increasing trend in arsenic levels was identified by TLA in 2012 and in early 2013 an Arsenic Water Treatment Unit (AWTU) was installed, followed by a second unit in June 2013, and a third unit was installed and commissioned by GAMG in early 2015. Both TLA units recirculate water in and out of the CWP. During 2013/14 there were a number of issues that prevented the units from operating continuously. This resulted in reduced run-time and also delayed the optimisation of the units. These issues have now been resolved, including alteration of the configuration of the units so that they recirculate water out of the CWP when they are not being used to treat water coming into the circuit from the mining pits. Arsenic levels are monitored closely by TLA at weekly water management meetings and if the arsenic increasing trends are not arrested, further controls will be investigated.

The concentrations of radioactive elements thorium (Th) and uranium (U) continued to remain near or below the detection limits (<0.005mg/L) in the reservoirs during the review period, and radium (Ra) levels also indicated that radionuclide activity continued to remain relatively stable and below the trigger values in both reservoirs.

Conclusions and Recommendations

The existing Water Monitoring Programme for the DER licences L4247/1991/13 and L8501/2010/2 is sufficient to monitor both surface water and groundwater potential impacts from Greenbushes mining and processing operations.

The elevated lithium levels in the Austins-Southampton and Cowan Brook dams continue to be an ongoing concern due to the connectivity of these reservoirs to the downstream areas of the Norilup Brook catchment. TLA has made significant advances since the 2013/14 review period in the implementation the Surface Water Management Plan (SWMP) to manage water usage and quality on site and subsequently minimise downstream impacts, and as a result also address the requirements of the DER. This has resulted in the implementation of the majority of actions detailed in the SWMP, including the following key actions:

- Ecotoxicology of Lithium on Environmental Receptors Study – completed.
- Bioaccumulation of Heavy Metals Study and Setting Lithium Trigger Value – completed.
- Reduction of Arsenic Levels in Process Water – commenced/ongoing.
- Reduction of Lithium Levels in Process Water – a reverse osmosis plant to recover lithium is scheduled to be operational in late 2018.

Based on the continued compliance of TLA with the Water Monitoring Programme under the DER licences, the 2016/17 review period recording similar water monitoring results to previous review periods, and TLA's ongoing commitment to the implementation of the Surface Water Management Plan (SWMP), there are no additional water monitoring recommendations at this point in time for the upcoming 2017/18 review period. The underlying reason for the elevated arsenic levels in MB97/1 will require further investigation shall the DER request.

The new proposed monitoring bores captured under the updated DER Licence L4247/1991/13 (July 2016) will be installed when the TSF2 buttressing activities associated with embankment raises are completed during the 2017/18 review period, and these new monitoring bores can therefore be included in the next WMR report.

1.0 INTRODUCTION

1.1 Background

Talison Lithium Australia Pty Ltd (TLA) and Global Advanced Metals Greenbushes Pty Ltd (GAMG) mine lithium and tantalum (TLA lithium and GAMG tantalum) at Greenbushes operations (Greenbushes Mine, the Site), located 250km south-east of Perth and 80km from the Port of Bunbury in Western Australia. The Greenbushes site layout is shown in Figure 1.

Tantalum and lithium ores are mined using conventional drill and blast, and load and haul open pit operations. The ores are processed through a four-stage crushing circuit prior to treatment in the lithium processing plant. The Cornwall Pit was completed in 2003 at a depth of 270 metres and in 2001 an underground mining operation commenced at the base of the Cornwall Pit. Due to a low demand for tantalum, the underground mine is now flooded, mining operations have ceased in the Cornwall Pit and it is filling with water. The Central Lode C1 and C3 pits are being actively mined for lithium ore.

Significant Environmental Services (SignificantENV) was engaged by TLA to prepare this Water Monitoring Review (WMR) report for the July 2016 to June 2017 review period, for submission to the Department of Environment Regulation (DER) and Department of Water (DoW), and inclusion in the Annual Environmental Report (AER) for submission to the Department of Mines and Petroleum (DMP). It specifically reviews the groundwater and surface water impacts associated with the tailings storage facility (TSF) and process dam areas.

1.2 DER Licensing

The operations at Greenbushes are covered under DER operating licences L4247/1991/13 and L8501/2010/2 (included in Appendix 1), issued by the DER under Part V of the *Environmental Protection Act 1986* (EP Act). The licences require monitoring of several bores surrounding the TSF areas and three reservoirs (Austins-Southampton, Cowan Brook and Norilup dams) forming part of the Mine Water Circuit. A summary of the water monitoring programme specified in the DER licences for compliance reporting in this Water Monitoring Review is presented in Table 1.

The DER Licence was amended in July 2016 for the TSF2 embankment raises and supporting infrastructure. The footprint of the TSF2 has been extended to the west and south, resulting in the requirement to replace a series of groundwater monitoring bores surrounding the TSF. This Licence amendment also imposed controls on the surface water discharges from the Premises. The water monitoring requirements have been increased under the Licence amendment (refer to Appendix 1), including monitoring of point source emissions to surface water (Table 3.2.1 of Licence), process water monitoring (Table 3.3.1), ambient surface water quality monitoring (Table 3.4.2), and expanded ambient groundwater quality monitoring (Table 3.4.3). This WMR report only reviews the groundwater and surface water monitoring data associated with the tailings storage facility (TSF) and process dam areas (i.e. Table 3.4.2 & 3.4.3), as summarised in Table 1.

It is important to note that the new proposed monitoring bores captured under the updated DER Licence L4247/1991/13 (July 2016) were not installed at the time this WMR report was prepared due to the TSF2 buttressing activities associated with embankment raises still undergoing completion at the time this report was prepared. Therefore, only the groundwater monitoring bores sampled during the previous 2015/16 review period, in addition to the pre-existing regional TSF2 monitoring bores (MB97/1, MB97/2 & MB01/11) added to the updated DER Licence L4247/1991/13 (July 2016), were monitored this 2016/17 review period.

Water samples were collected by Greenbushes staff and analysed by the internal Greenbushes Laboratory (GBL) and independently by SGS laboratory services (SGS), with analyses for radionuclides sub-contracted to Australian Radiation Services (ARS).

Table 1: Water Monitoring Programme – TSF & Process Dam Areas

Monitoring Sites	Sampling Frequency	Parameters *
Surface water points: Southampton Dam Austins Dam Cowan Brook Dam Norilup Dam	Quarterly (Jan, Apr, Jul & Oct)	pH, redox potential (Eh), total dissolved solids (TDS), dissolved oxygen (DO), specified anions & cations, specified nutrients, specified metals, and lithium.
	Biannually (Jan & Jul)	Radium 226 & 228
Groundwater monitoring bores: Refer to DER Licence L4247/1991/13 (Table 3.4.3) for the specified bores **	Quarterly (Jan, Apr, Jul & Oct)	Standing water level (SWL) pH, total dissolved solids (TDS), specified anions & cations, specified nutrients, specified metals, and lithium.
	Biannually (Jan & Jul)	Radium 226 & 228

* With the exception of pH and Radium, all measurements shall be presented in mg/L. Radium shall be presented in Bq/L.
Standing Water Level shall be reported in metres AHD (Australian Height Datum) & metres below ground level (mbgl).
Refer to DER Licence L4247/1991/13 for the specified parameters (Table 3.4.2 & 3.4.3).

***** Note: only the monitoring bores sampled during the previous 2015/16 review period were sampled this 2016/17 review period due to the updated DER Licence (July 2016) not being fully implemented at the time of this WMR report.***

1.3 Site Water Flows

Local reservoirs form part of the Mine Water Circuit (Figure 1 map and Figure 3 diagram). Water supplies for mineral processing are obtained from the Austins-Southampton dams, which are fed from a drainage channel (Austins Drain) that receives excess water flows from the Clear Water Pond (CWP) and general site runoff. The Cowan Brook Dam is located on a creek and receives overflow during the wet winter months from the Austins Dam spillway, in addition to overflow from the TSF2 seepage collection sump, which is minimised by TLA through maximising the pumping capacity to return the majority of the water to the processing circuit. Historically seepage from below the Austins Dam wall has flowed to a tributary of the Cowan Brook. A solar pump was installed at the seepage pond in early 2016 and the water is now being returned to the dam. The Cowan Brook Dam is used to supply make-up water into the water circuit via the Southampton Dam during the summer months.

TSF1 is in care and maintenance, no longer receiving tailings from mineral processing. Seepage from TSF1 is captured within a trench drainage system constructed along the southern and eastern sides of the embankment wall, which directs water northwards into a gully swampland. This water eventually drains into the historic Vultans Pit, located north-east of TSF1, and is pumped back into the Mine Water Circuit.

TSF2, constructed to the west of the original TSF1 cell, began receiving tailings discharge in January 2006. TSF2 currently receives all tailings from the mineral processing on site and collects rain water from its 50ha surface area. Water is decanted from TSF2 into the Clear Water Pond. A toe drain at the western base of TSF2 collects seepage through the embankment wall and runoff from the embankment slope. This water flows south via the Maranup Ford Road main drain and is intercepted by two seepage recovery sumps. The northern sump recovers seepage and returns to Austins Dam via Austins Drain. The southern seepage return sump, located between the Tin Shed Dam and Cowan Dam, returns water to the circuit during summer and can be allowed to overflow to Cowan Dam in the winter depending on the comparison of its water quality with that overflowing from Austins. The construction of the TSF2 embankment raises and supporting infrastructure should be completed by the end of 2017.

There are no direct discharges to the environment from minesite operations, however indirect losses from the Mine Water Circuit occur by means of evaporation, seepage and when the Cowan Brook Dam overflows during most winter seasons due to rainfall within the catchments.

The Surface Water Management Plan (SWMP) for the Greenbushes operation can be referred to for further details on the Mine Water Circuit and associated water storage reservoirs. The Mine potential contaminant sources and possible pathways, as reported in the SWMP and considered the focus of this WMR report, are summarised in Appendix 2.

1.4 Water Monitoring Locations

The location of surface water sampling points and groundwater monitoring bores are shown in Figure 1 and 2. A brief description of the locations of the monitoring bores included under the DER licences current water monitoring programme (Table 1) is provided below:

- MB1 (replaced by MB17/07 in Q3-2017) is located south of the original TSF1, less than 100m from the wall.
- MB3 is located in a valley that drains to the Cowan Brook reservoir.
- MB97/03 (replaced by MB17/04 in Q3-2017) is located west of the active TSF2 cell.
- MB97/04 is located west of the active TSF2 cell, to the north of MB97/03 (replaced by MB17/04 in Q3-2017). MB97/4 remains as the deep bore in this location, with an intermediate bore (MB17/03) also installed at this location in Q3-2017.
- MB01/01 is located east of the original TSF1, near the Vultans Pit.
- MB01/09 is located approximately 200m south of the TSF1 and 100m south of MB1.
- MB05/01 (replaced by MB17/01 in Q3-2017) is located immediately to the north-west of the active TSF2 cell.
- MB05/02 (replaced by MB17/02 in Q3-2017) is located immediately west of the TSF2 cell, south of MB05/01.
- MB07/01 (replaced by MB17/06 in Q3-2017) is located at the southern end of the active TSF2. It was installed in August 2007 based on TSF2 being constructed to the west of the original TSF1 and receiving tailings discharge in January 2006.
- MB01/13 & MB97/05 were added to the water monitoring programme in 2013/14 as validation bores to MB05/01 (replaced by MB17/01 in Q3-2017).
- Regional TSF2 monitoring bores added to the updated DER Licence L4247/1991/13 (July 2016) – MB97/1, MB97/2 & MB01/11.

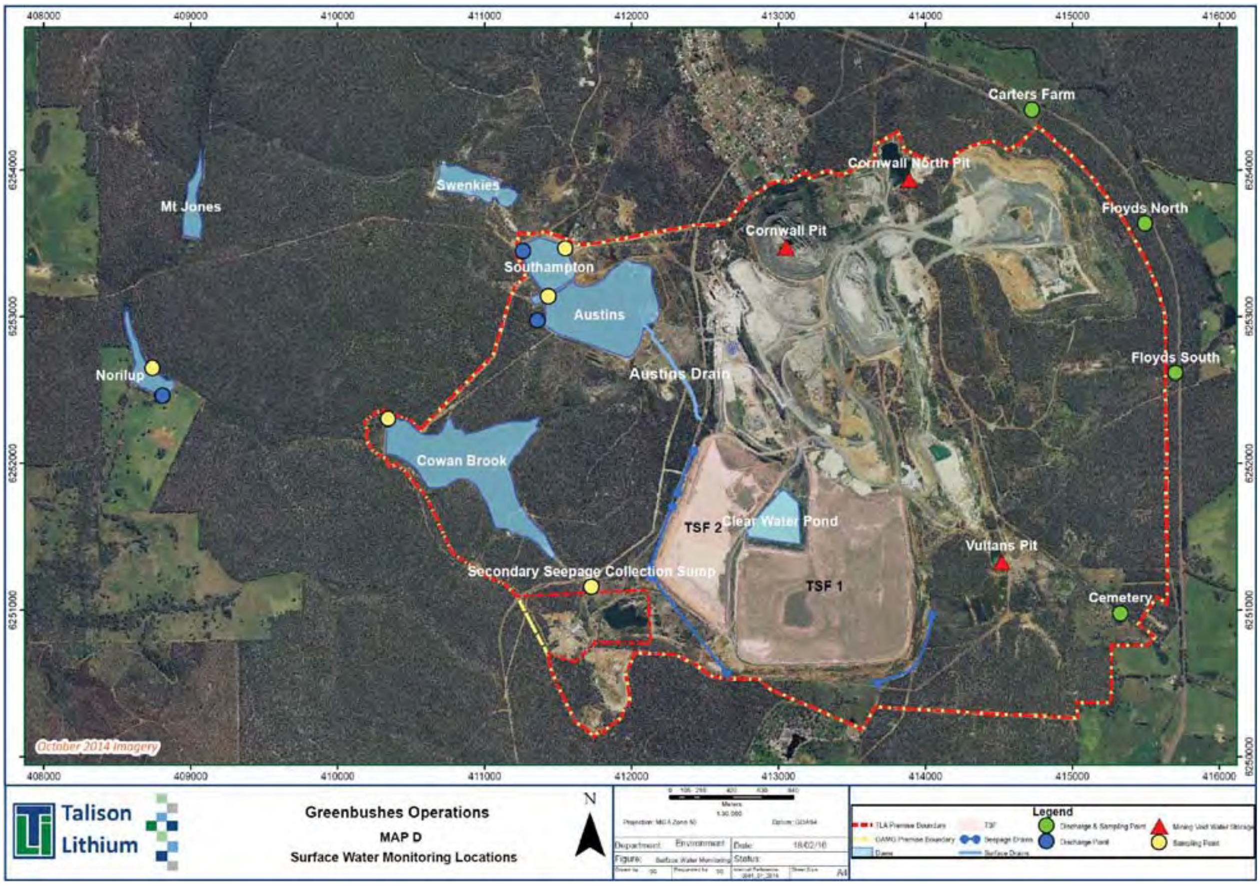


Figure 1: Site Layout Plan – Surface Water Monitoring Locations

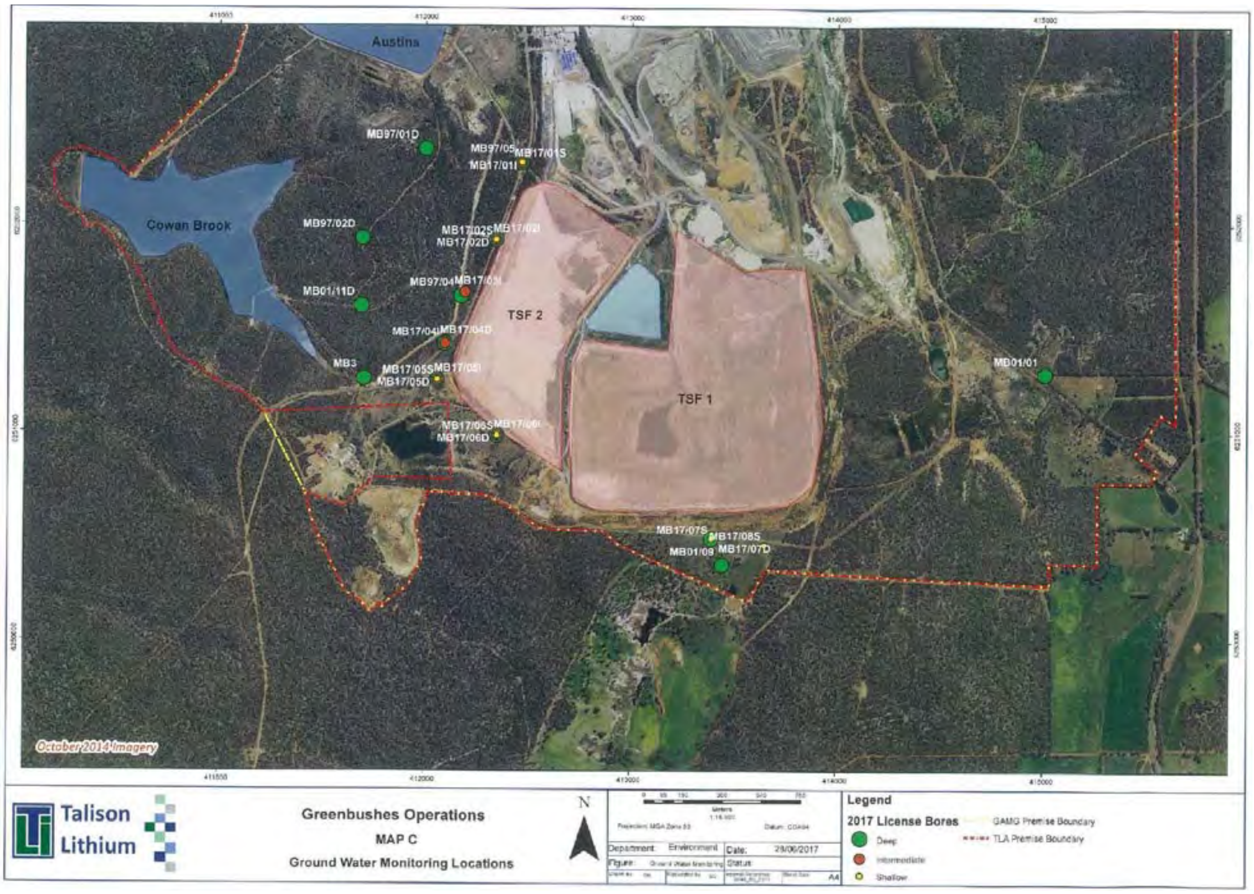


Figure 2: Groundwater Monitoring Locations

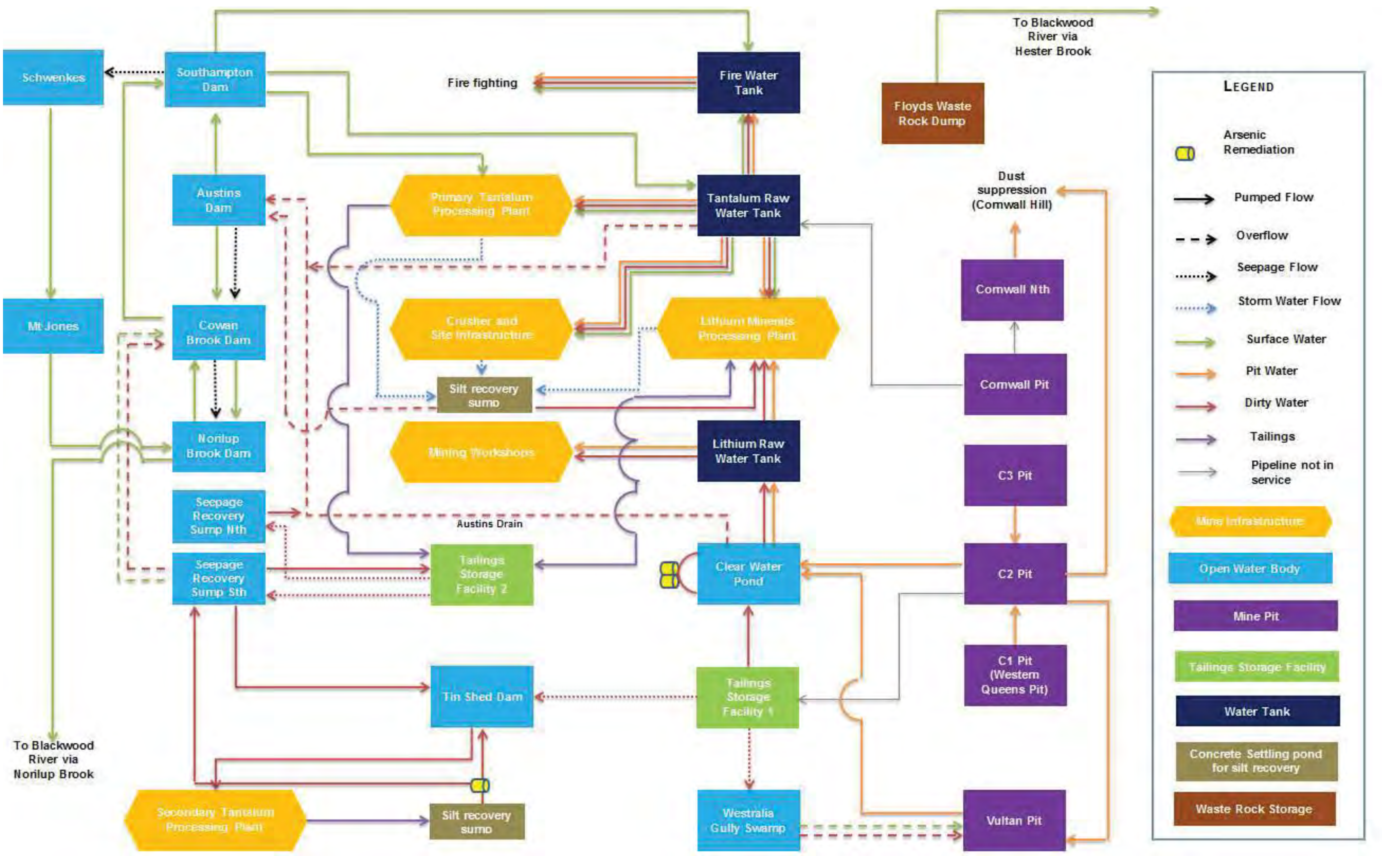


Figure 3: Site Water Circuit

2.0 ENVIRONMENTAL DATA

2.1 Rainfall & Evaporation

Greenbushes rainfall data is collected from the on-site Met Station, while the closest and most representative Bureau of Meteorology (BoM) rainfall data collection site to Greenbushes is Bridgetown (stations 009510 and 009617), located approximately 13km away. Monthly Greenbushes rainfall for the 2016/17 review period, previous review periods since 2006 and the long-term average for Bridgetown is presented in Table 2.

The average annual rainfall at Bridgetown based on data recorded between 1887 and August 2012 was 824.1mm (station 009510), and 721.4mm for data recorded from newer station between 1997 and June 2017 (station 009617). The annual rainfall recorded during the 2016/17 review period at Greenbushes was only 601.6mm, which is considerably lower than the previous five review periods. The previous five review periods recorded 747.2, 734.4, 849, 767.4 and 867.8mm, and the three years prior to the 2011/12 review period recorded less than 700mm.

No evaporation data is available for the Greenbushes site. The closest and most representative evaporation data for Greenbushes is recorded at the BoM Jarrahwood station (station 009842). The average annual evaporation recorded at Jarrahwood is 1,205mm (based on daily evaporation for each month from 1975 to 2015). The total monthly evaporation ranges between 42mm in June and 183mm in January. The total average annual evaporation exceeds average annual rainfall by about 380mm, although rainfall does exceed evaporation between the winter season months from May to September.

The long-term mean monthly rainfall averages recorded at Bridgetown and mean monthly evaporation averages recorded at Jarrahwood are presented in Figure 4.

2.2 Topography & Surface Drainage

The Greenbushes Mine is generally situated on a local topographic divide, with drainage mainly to the west towards Cowan Brook, a tributary of the Blackwood River. Both the active TSF2 and original TSF1 are located to the south-west of the Mine pits on the drainage divide. Maranup Ford Road is a public road that transects the active minesite, separating the mining and mineral processing areas from Austins-Southampton and Cowan Brook dams, the main water storages. Drainage on the eastern side of the divide where the hard rock waste dumps are located is towards Salt Water Gully, a tributary of Hester Brook and in turn the Blackwood River.

Surface water is impounded in constructed reservoirs/dams and TSFs. An open drain (Austins Return Drain) from the TSF decant pond (Clear Water Pond) to

Austins Dam forms part of the Mine Water Circuit. The catchment for the Cowan Brook Dam is predominantly within the Mine and this dam is used to supply makeup water into the water circuit via the Southampton Dam during the summer months. The Cowan Brook Dam overflows via Cowan Brook to Norilup Brook Dam during most winter seasons due to rainfall within the catchments.

2.3 Geology

The geology of the area has been inferred from borehole cuttings, creek-bed exposures and minor outcrops. Rocks are principally granofelsic and amphibolitic greenstones. The granofelsic rocks are finely banded and granular with gneissic to schistose textures containing (in the fresh state) biotite, hornblende, quartz and minor plagioclase.

The amphibolitic rocks are massive to schistose and contain hornblende, quartz and plagioclase. All of these rocks incorporate pods, lenses and bands of granite and granitic pegmatite sub-parallel to the foliation.

The Greenbushes ore body comprises Archaean rocks made up of a series of pegmatite dykes, trending north-northwest over a strike length of 7km, cross-cut by dolerite dykes. These rocks are locally faulted and sheared. To the west of the main group of pegmatites, the Archaean basement rocks are either extensively lateritised or underlie the alluvial Greenbushes Formation. This formation has been extensively worked for tin (cassiterite) in the past.

2.4 Hydrogeology

The hydrogeology of the Greenbushes area has not been investigated in any detail. However, extensive studies of the hydrogeology of other sites in the Darling Range (Peck and Williamson, 1987) show that the regolith is typically weathered to depths of 20m and occasionally up to 40m. The hydraulic conductivity of the deeper strata is typically in the order of 0.001m/d, but weathered basement rock, and faults/fractures within the basement, provide thin zones of much higher conductivity.

Whilst the permanent aquifer in the deeper strata and basement rocks is normally capable of yielding only small quantities of water, it has an important environmental role in sustaining vegetation in shallow groundwater areas. The deeper aquifer is locally confined in some areas, and water levels in some bores stand above ground level.

A perched aquifer system often develops during winter in the lateritic material at a depth of less than 5m, but disappears during summer as a result of losses by lateral flow, downward seepage and evapotranspiration. The perched aquifers are typically of low salinity, whilst the permanent deeper aquifers are brackish to saline.

Alluvium was mined for tin in the Greenbushes area more than 100 years ago. Whilst the alluvium may have been an aquifer of local importance, it has been disturbed and its present aquifer significance appears to be low.

The presence of large paper-bark trees along Maranup Ford Road suggests that the area has been swampy for many decades. The swamps are at the break of slope below the tailings dams, which is consistent with groundwater discharge, but any discharge is evidently at a low rate. Similar swamps occur in undisturbed areas of the jarrah forest due to the development of perched groundwater systems in the winter.

There is a large swampy area straddling the open drain (Austins Return Drain) between the TSF decant pond (Clear Water Pond) and Austins reservoir. The size of this swamp suggests that it is probably a groundwater discharge area. However, it is understood that this is actually the dredging path of previous mining operations.

Small drains and creeks may gain flow from underlying groundwater throughflow or lose water to the underlying strata, depending on the season.

Groundwater contours indicating groundwater flow have been determined from ongoing bore water level monitoring and are displayed in Figure 6 and Figure 7. The local groundwater flows towards the south-west and south-east, radiating out from the drainage divide upon which the mineral processing, mining facilities and TSFs are located. The TSF seepage recovery sumps are located at these drainage points.

2.5 Water Plans, Studies & Investigations

2.5.1 Surface Water Management Plan

Water management is an important aspect of the environmental management program for the Greenbushes Mine. TLA developed a Surface Water Management Plan (SWMP) for the Site in March 2012. This has been developed and implemented in accordance with the conditions of the DER Works Approval granted for the expansion of the Chemical Grade Lithium Processing Plant issued under the EP Act (Works Approval W4927/2011/1). Conditions are specified in the Works Approval pertaining to discharges of water, namely:

- W1: The works approval holder shall, prior to the expiry of the works approval, provide to the Director (Regional Manager, South West Region, Department of Environment and Conservation) a Surface Water Management Plan.
- W2: The works approval holder shall ensure that the Surface Water Management Plan required in Condition W1 shall include, but not limited to:
    - a survey of regional background water quality within the Norilup Brook Sub-catchment

- identification of environmental receptors and users of water within the Norilup Brook Sub-catchment downstream of the premises
- identification of all likely contaminants in waters discharged from the premises
- for each of the substances identified in part (iii) above, identification of the appropriate water quality guidelines or trigger values, using ANZECC Direct Toxicity Assessment where there is no specific guideline, or where water quality monitoring conducted to satisfy the conditions of the licence L4247 demonstrates that a trigger value has been exceeded during the period between 1 January 2008 and 31 December 2011.

TLA has met the above DER Works Approval conditions and subsequently updated the SWMP in July 2014 for re-submission to the DER. Details are provided in below sub-sections in relation to the actions TLA have undertaken in addressing Condition W2 of the DER Works Approval.

The SWMP can be directly referred to for further details. It is considered an adaptive document that is reviewed and updated annually to include new knowledge and changes with time. The summary of the water management interventions completed to date, and those further proposed in the updated/current version of the SWMP, are provided in Appendix 3.

2.5.2 Ecotoxicology of Lithium and Setting Lithium Trigger Value

TLA engaged the Centre of Excellence in Natural Resource Management (CENRM) in 2013 to undertake a study to identify appropriate water quality guidelines, or trigger values, for waters discharged from the Greenbushes Mine, using ANZECC Direct Toxicity Assessment (DTA) methodology. The aim of this study was to test the toxicity of lithium contained in waste water from the Mine under site-specific conditions (i.e. local species, local dilution water) using DTA. Acute EC_{50} values were calculated, and these used to derive water quality trigger values for lithium. The CENRM findings are summarised below:

CENRM collected effluents from the Austins-Southampton dams and used these to examine the effects of a range of effluent dilutions on three local species; Western Pygmy Perch, *Nannoperca vittata* (predator), water boatman, *Diaprepocoris barycephalus* (predominantly herbivore) and the freshwater crayfish, *Cherax preissi* (detritivore). Immobilization was used as an endpoint to determine an EC_{50} for each species (CENRM, 2013).

Background lithium concentrations in dilution waters collected from upstream of the Mine were low (mean of 0.03mg/L). Lithium concentrations in the experimental waters varied according to how much lithium was added, and ranged from 10.7mg/L in control water collected from the Austins-Southampton dams, to 340mg/L for experimental waters ‘spiked’ with the highest levels of lithium (CENRM, 2013).

Control mortality was zero for all experiments. The studies showed Boatman to be the least sensitive to lithium, with an EC_{50} value of 86.2mg/L after 96h exposure. Pygmy perch were the most sensitive (96h LC_{50} value of 41.9mg/L). Crayfish were not as sensitive as the Pygmy perch, with an EC_{50} value of 77.6mg/L after 96h exposure. Values of NOEC (no-observed-effect-concentration) ranged from 42mg/L for Pygmy perch to 85mg/L for crayfish (CENRM, 2013). However, the 96h EC_{50} values obtained in this study did not address the issue of sub-lethal and chronic effects of lithium on biodiversity, nor was the fact that the three species used in this study did not necessarily represent the full range of sensitivities in the field. To account for these short comings, values were extrapolated using a safety factor of 100x. This suggested the adoption of an interim trigger value of 0.42mg/L for lithium, however according to the ANZECC & ARMCANZ 2000 guidelines "Low Reliability Trigger Values should only be used as indicative interim working levels for interim guidance. The response that may result from exceedance of a low reliability trigger value would generally be to search for, or test for, more data of sufficient quality or to further assess the likely risk of exposure to the chemical. It is expected that low reliability trigger values are conservative, and the decision scheme may help to determine if local factors may increase or decrease the environmental risk" (CENRM, 2013).

UWA scientists observed both fish and crayfish to be swimming freely in Austins Dam where lithium levels of up to 12mg/L have been recorded. As it is not known whether lithium contained in mine effluent has impacted downstream ecological communities, or whether invertebrates found at such downstream sites have bio-accumulated lithium, CENRM recommended that an appropriate management response to the interim trigger value would be to carry out a full ecological and bioaccumulation study.

The CENRM was engaged again in 2014 to undertake these additional studies with a view to setting a Lithium Trigger Value. The survey was carried out at four near-downstream sites of the Mine in the Norilup catchment and four additional far-downstream sites in the Hester Brook sub-catchment. At each site, the content of heavy metals in water and sediment was measured, a macrofaunal survey was undertaken, and fish and crayfish were collected and potential heavy metal bioaccumulation in their flesh was measured (CENRM, 2014).

The ecological data collected during this study support the suggestion that substances contained in the Mine effluent, even at their maximum concentrations immediately below Cowan Dam, have not had any significant ecological consequences. The majority of ecological indicators, including species diversity, the number of species, and the average species evenness at each location, showed no significant differences between locations. The only indicator showing a small difference was the total number of individuals at each location but, given the relatively high level of variability in this indicator, the long-term biological significance of even this indicator seems questionable (CENRM, 2014).

Based on the results of this ecological study, the previously recommended precautionary interim trigger value of 0.42mg/L for lithium, reflecting a 100 times safety factor, could no longer be justified and it was suggested that regulatory authorities adopt a much less stringent trigger value for lithium in effluents from the Greenbushes Mine.

Although it is the ultimate responsibility of regulatory authorities to determine an acceptable trigger value for lithium, results suggest that current maximum levels of lithium in Austins Dam (12mg/L) and Cowan Brook (5.7mg/L) are causing no long-term ecological harm to downstream biological communities, and these facts should be taken into account when setting trigger values (CENRM, 2014).

The findings from the two CENRM studies have been provided to regulators, and in the July 2016 amendment of Licence L4247 /1991/13 limits were set for lithium in Norilup Brook Dam, located downstream from Cowan Brook Dam. The lithium limits are on a reducing scale from 7mg/L in the 2016/2017 reporting period down to 2mg/L in the 2025/2026 reporting period.

A further requirement of the amended licence is the commencement of annual ecological assessments downstream of the premises, including Norilup Brook. This assessment is to include metal concentrations in sediment, macroinvertebrate abundance and diversity, abundance and diversity of aquatic fauna and assessment of bioaccumulation of contaminants. CENRM have been commissioned to continue to conduct these studies, with all but the bioaccumulation assessments carried out during spring 2016. The bio-accumulation assessments, which require animal ethics approval to collect the species for testing, will commence with the 2017 survey.

2.5.3 TSF Integrated Geophysics & Hydrogeological Investigation

TLA commissioned GHD to investigate possible seepage flow paths from the tailing storage facilities (TSF) into the groundwater. The original scope of the geophysical survey was reduced to a first stage investigation to include identification of vertically orientated preferential flow paths (e.g. bedrock fractures), by the airborne geophysics interpretation and a GEM2 survey which was conducted along traverses on accessible tracks in western areas of the tailings storage facility. A second stage was carried out, involving geophysical logging of monitoring bores to commence assessing possible horizontally orientated preferential flow paths in the weathered regolith, and a third stage completed in February 2014 to better understand and develop the tools to identify the distribution and impacts derived from the tailings waters on the groundwater system. The GHD findings from this staged geophysics and hydrogeological investigation are summarised below.

The following was concluded by GHD from the Stage 1 Integrated Geophysics and Hydrogeological Investigation (GHD, 2013a):

- The groundwater information indicates that mine and the TSF are situated on a groundwater divide with westerly groundwater flow direction indicated on western margins of the Mine/tailings storage (and vice-versa easterly flow on the eastern margins).
- Groundwater flow could occur within the fractures (faults and joints) and dykes within bedrock, within the overlying weathered profile and within sedimentary units overlying/incised into the bedrock (formerly mined/dredged). However, the continuity of the aquifers and vertical hydraulic connectivity between aquifers is not well understood (as detailed geological, drilling information is variable and geophysical logs are absent).
- The preliminary hydrogeochemistry review (selected major ions and metals) indicates that there is insufficient evidence to attribute the observed groundwater chemistry to tailings seepage impacts on the groundwater.
- Although some potential vertically orientated preferential pathways (bedrock fractures and dykes) were inferred through the airborne geophysical survey preliminary interpretation, and the preliminary interpretation of the GEM2 geophysical survey indicated some potential horizontally orientated preferential pathways, the absence of the down hole logging results limited the interpretation of the GEM2 survey geophysical anomalies and correlation of this with the observed groundwater chemistry.
- Further work is needed to resolve the likely relative contributions of bedrock and regolith preferential paths to groundwater flow.

The underlying aim of the above integrated geophysics and hydrogeological investigation was to better understand the water quality around the mining operation so that TLA can plan for future mine management and ultimately mine closure. However, during this Stage 1 Integrated Geophysics and Hydrogeological Investigation, it became apparent that a number of boreholes were poorly understood. Hence, Stage 2 (Geophysical Logging of Monitoring Bores) was undertaken to better understand the bore well construction and current condition.

The following was concluded by GHD from Stage 2 (Geophysical Logging of Monitoring Bores) of the integrated geophysics and hydrogeological investigation (GHD, 2013b):

- The key results were, of the 60 bores intended for logging, 56 bores could be geophysically logged. All bores were logged as deep as physically possible with the depth logged, varying from 22% to 189% of the expected drill depth.
- There is generally good correlation between the recent drilling on TSF2 (GHD, March 2013) and the downhole geophysics.
- The integrity of the entire length of the blank casing above the top screen level and below standing water level (SWL) was logged in 45 bores. Bores MB07/01 and MB1 are interpreted to have casing breaks above the well screens. In addition, MB1 has longer than site standard casing lengths of 6 metres. The longer screen length may be intentional or it may indicate fractured casing below the standard screen length.

- The bottom of the screens for bores MB01/09, MB05/01, MB05/02, MB07/01, MB97/3 and MB97/4 were not accessible due to potential blockage or siltation. These bores may benefit from flushing.
- It was not possible to obtain any information from logging about the location of the bore screen in some bores because of damage to the casing above the well screen or lack of water in the hole for tool operation. However, the Stage 2 work has identified that the majority of the bores are in reasonable condition and well understood.

The primary aim of the Stage 3 Integrated Geophysics and Hydrogeological Investigation (GHD, 2014a) was to interpret the TLA hydrogeochemical database to better understand and develop the tools to identify the distribution and impacts derived from the tailings waters on the groundwater system. The geochemical assessment involved studying laboratory analysis data supplied by TLA covering 31 monitoring bores and 11 surface monitoring locations. Alongside this data, the existing drilling and geophysical information was interpreted. The GHD findings are summarised below.

The hydrogeological information indicates that a shallow aquifer, coincident with a former water course and historic mining dredge channel, is likely to be in hydraulic connection and underlies parts of the tailings facilities (TSF1 and TSF2). The shallow aquifer is also inferred as hydraulically connected to surface water features, i.e. swamps/dams, and toe drains around the tailings facilities (GHD, 2014a).

Furthermore, the hydrogeological information supports that a weathered basement profile (clays), generally 20 to 50m thick is present over the area and is considered likely to underlie the tailings storage facility and shallow aquifer. The clays should limit downwards migration of tailings waters, although the presence of less weathered basement-highs, which may transmit waters into the bedrock aquifer, cannot be excluded (GHD, 2014a).

The geochemistry assessment of 31 monitoring bores indicates the following:

- A total of 6 of the 31 monitoring bores reflect impacts considered as derived from the tailings and circuit waters based on major ions and ionic ratios.
- Lithium concentrations were elevated in 2 of the 6 impacted wells which was attributed to the tailings and circuit waters (MB1@ ~3mg/L and MB05/01@ ~0.3mg/L). Otherwise, the distribution of lithium reflected background concentrations (GHD, 2014a).

The results from four monitoring bores indicates that the shallow aquifer appears to be impacted from tailings waters although the extent and fate of the impacts is not well defined (GHD, 2014a).

In general across 27 locations, the deep aquifer does not appear to be impacted, however the geochemical signature in two monitoring bores (MB1 and MB05/01) reflects either tailings water impacts to the deep aquifer or ingress of shallow aquifer waters due to poor well integrity. GHD recommends replacing these two monitoring bores which show tailings impacts (GHD, 2014a).

To action this recommendation, TLA has commenced including groundwater monitoring data from additional monitoring bore MB01/13, which is adjacent MB05/01, to provide further downstream of TSF2 groundwater quality data; and considers MB01/09 to be representative of the groundwater quality of MB1 which has been interpreted to have casing breaks above the well screens.

2.5.4 Mapping of Shallow Aquifer

GHD completed an assessment of the groundwater impacts derived from the tailings facilities (TSF1 and TSF2) at the Greenbushes Mine in September 2014. The findings indicated that although tailings water impacts were generally not recognised in the deeper aquifer (weathered basement - clays), some indications of impacts were identified in the overlying shallow aquifer (GHD, 2014b).

The extent of the shallow aquifer appears coincident with a former water course and historic mining dredge channel and is likely to underlie parts of the tailings facilities. The shallow aquifer is also inferred as hydraulically connected to surface water features (e.g. swamps/dams, and toe drains around the tailings facilities). As a consequence, the shallow aquifer likely acts as a preferential pathway for tailings impacted water migration, however, the extent and migration of the shallow impacts is not well understood given the following (GHD, 2014b):

- The lateral extent and depth of the shallow aquifer is not sufficiently defined.
- Lack of dedicated monitoring bores within the shallow aquifer.
- The groundwater migration direction of the shallow aquifer is not confirmed (e.g. unknown fate of impacts).

The mapping study comprised a site inspection at selected areas to record the outcrop of sandy lithology at the surface and the associated surface water drainage lines. Intrusive ground investigations were not undertaken. Field information and outcrop of sandy lithology, basement material and seepage/drainage was recorded directly onto aerial photos. The areas selected for mapping comprised the following (GHD, 2014b):

- The margins of the TSF's.
- Creek lines/waterways which emanate from the margins of the TSF's.
- Creek lines/waterways which emanate from the tailings water storage dams (e.g. Cowan Brook and Austins dams).

The updated extent of the shallow aquifer is presented in Appendix 4 (Figure 1), displaying the mapped extent of surface water flows and inferred shallow groundwater flow directions based on the topography and likely groundwater discharge boundaries. The key findings are that excluding the southern area (south of TSF1), the shallow aquifer does not appear to represent a pathway for migration of tailings water impacts to off-site locations. The shallow aquifer groundwater flow appears to be captured by the dams and interception drains.

However, within the southern area (south of TSF1), it is likely that groundwater/tailings water is migrating within the shallow aquifer to off-site locations (GHD, 2014b).

2.5.5 New Monitoring Bores Installed in 2017

Construction for the lift and re-buttressing of TSF2 is underway. New monitoring bores were installed in Q2 of 2017 as part of this project. The locations for new bores have been determined by GHD based on the findings from their aquifer studies and DER Licence requirements for additional groundwater monitoring in association with the changes to TSF2. Eight new bore locations have been commissioned with screening at varying depths to monitor shallow, intermediate and deep aquifers. MB1, which down-hole geophysics identified damaged casing, has been replaced with a new bore MB17/07 which includes shallow and deep screens. MB05/01, MB05/02, MB97/3 and MB97/4 have been destroyed by the TSF2 expansion and replaced by bore locations MB17/01, MB17/02, MB17/03 and MB17/04. MB17/05, MB17/06 and MB17/08 are all new bore monitoring locations to further assess groundwater conditions.

2.5.6 Lithium & Arsenic Remediation

Lithium

The removal of lithium from water is a complex process and there is limited literature available on the subject. Pilot studies completed by Talison during 2014 have confirmed Reverse Osmosis (RO) technology as the only viable process for the removal of lithium and other contaminants; including arsenic, from the process water.

Options for the management of RO brine have been explored. The additional environmental risks and costs associated with solvent extraction (SX) have ruled this out as a process for the selective removal of lithium from the RO reject stream. Approaches have been made to a number of organisations that have ocean outfalls in the South West region, but these have been unsuccessful.

During 2016, a second RO pilot study involving the crystallisation of RO brine to produce a spadable waste was conducted. A third and final pilot study is currently in progress to obtain a process guarantee ahead of the final decision to build an RO Plant. At this time, the RO Plant is expected to be operational by the end of 2018.

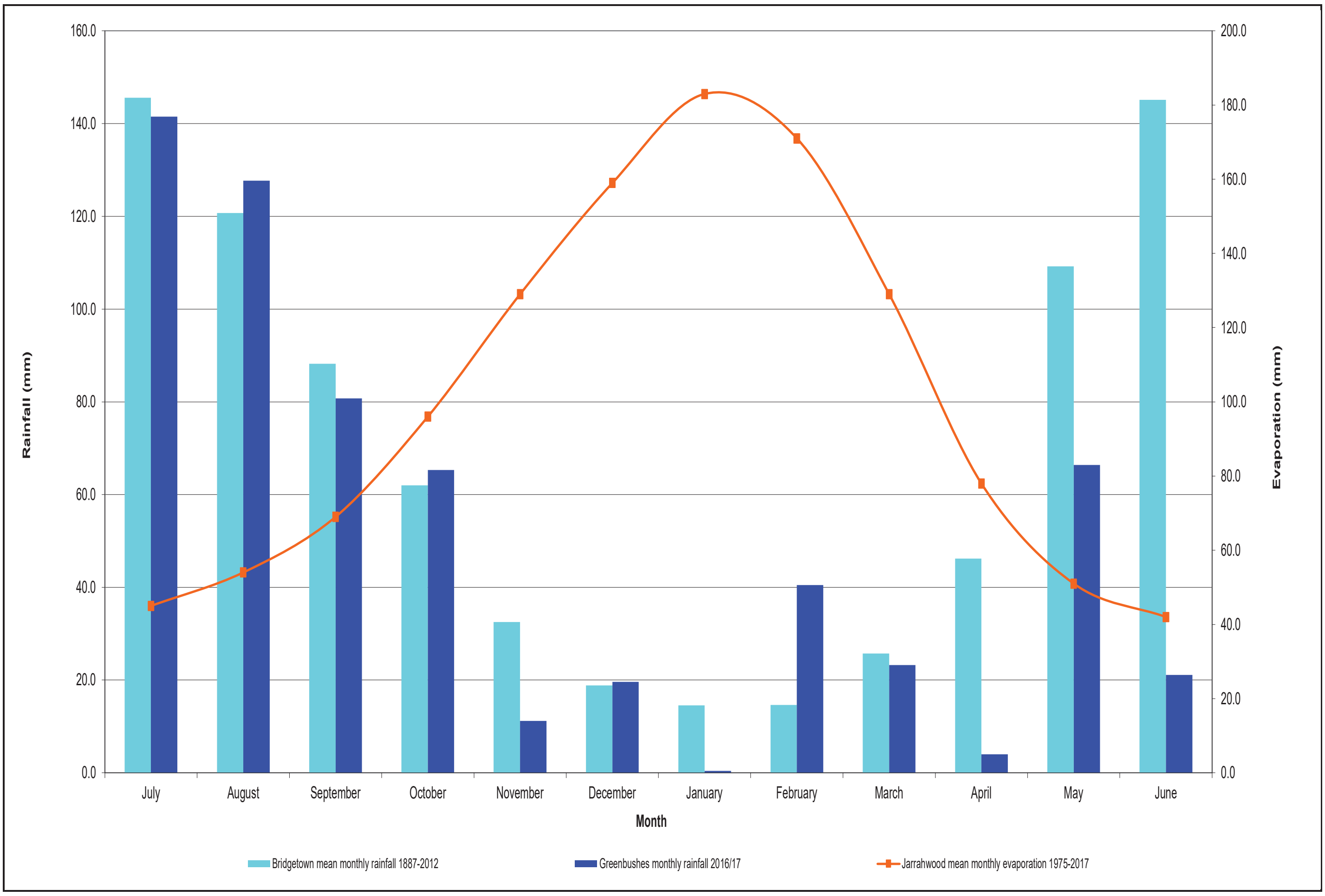
Arsenic

The primary source of arsenic in the Mine Water Circuit was historically from the Secondary Tantalum Processing activities, contained within the Tin Shed Dam. The main current sources of arsenic in the Mine Water Circuit are from the Primary Lithium Processing activities and pit dewatering. However, the increase of arsenic in the Mine Water Circuit since 2010 appears to be associated with the increased volumes of spodumene ore (high-purity lithium ore) being mined and processed to produce Chemical Grade spodumene.

The increasing trend in arsenic levels was identified by TLA in late 2012 when an Arsenic Water Treatment Unit (AWTU) was purchased with the capacity to treat 120m^3/hr of water. The AWTU uses calcium hypochlorite, ferric sulphate and a catalytic filter media to produce a stable ferric arsenate compound (crystalline scorodite It was commissioned in early 2013. A second unit with the capacity to treat 180m^3/hour was delivered in May 2013 and was commissioned in June 2013. Both units are located at the Clear Water Pond (CWP) and normally recirculate water from the CWP. However, when water is transferred to the CWP from the pits, the units are reconfigured to treat the incoming pit water. During 2013/14, there were a number of issues that prevented the units from operating continuously. This resulted in reduced run-time and also delayed the optimisation of the units. These issues have now been resolved, resulting in improved performance. Arsenic levels are monitored closely by TLA at weekly water management meetings and if the arsenic increasing trends are not arrested, further controls will be investigated. GAMG commissioned a 120m^3/hr AWTU unit in 2014.

Table 2: Monthly Rainfall at Greenbushes and Bridgetown (mm)

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Greenbushes													
2006/07	122.8	158.6	51.8	32.4	12.8	9.4	23.4	10.4	28.8	77.2	45.6	109.4	682.6
2007/08	188.2	126.6	92.8	34.4	7.0	33.0	1.0	3.0	42.0	60.2	151.4	88.0	827.6
2008/09	154.6	22.8	67.0	43.2	40.4	24.4	0.8	21.0	7.2	0.8	98.8	182.4	663.4
2009/10	154	118.9	139.9	10.8	57.2	1.8	1.5	0.3	13.1	40.6	74.9	46.4	659.4
2010/11	101.2	53.6	26.8	19.8	40.6	18.2	85.6	2.6	0.4	113.6	64.0	135.2	661.6
2011/12	159.6	131.4	106.2	51.4	37	25.4	45	18.4	0.1	36.3	99.8	138.4	849.0
2012/13	52.2	94.6	119	33.4	71.4	54.2	3.8	15.8	34.2	22.4	189.2	77.2	767.4
2013/14	130.7	168.6	206.0	35.4	42.6	0.2	2.2	0.0	24.2	4.8	162.9	90.2	867.8
2014/15	188.2	173	75.4	31	25.2	10.2	0.2	1.4	28.8	80.8	63	57.2	734.4
2015/16	111	76.8	37.5	24.4	2.5	5.8	136.9	6.3	59.3	75.7	121.4	89.6	747.2
2016/17	141.5	127.7	80.7	65.3	11.2	19.6	0.4	40.5	23.2	4	66.4	21.1	601.6
Average	136.7	113.9	91.2	34.7	31.6	18.4	27.3	10.9	23.8	46.9	103.4	94.1	732.9
Bridgetown Averages													
1887-2012	145.6	120.7	88.2	62.0	32.5	18.8	14.5	14.6	25.7	46.2	109.2	145.1	824.1
1997-2017	124.3	113.8	92.6	42.9	30.7	18.3	16.9	12.9	20.9	49.1	100.8	103.7	721.4



RAINFALL AND EVAPORATION MEAN MONTHLY AVERAGES FIGURE 4

3.0 GROUNDWATER MONITORING

3.1 Groundwater Levels

As presented in Table 1 (Water Monitoring Programme), the DER licences require Standing Water Level (SWL) measurements from groundwater monitoring bores to be recorded on a quarterly basis. TLA complied with this requirement during the 2016/17 review period.

The quarterly 2016/17 SWL measurements for the currently installed monitoring bores are presented in Table 3. Historical readings are presented graphically in Figure 5, with monitoring bore locations shown in Figure 2. The currently installed (pre-existing) monitoring bores added to the updated DER Licence L4247/1991/13 (July 2016) as regional TSF2 monitoring bores (MB97/1, MB97/2 & MB01/11) are included in Table 3 and Figure 5. Monitoring bores MB97/3, MB05/01 & MB05/2 were destroyed by the TSF2 buttressing activities associated with embankment raises in Q3-2017 and will be replaced by new monitoring bores, as described in Section 1.4 (Water Monitoring Locations).

The water levels in the monitoring bores range between 228mAHD (MB3) and 257mAHD (MB1 & MB97/5) depending on position around the perimeter of the TSFs, as the TSFs are situated on a groundwater divide with groundwater flow direction indicated to be downstream from the western and eastern margins. Groundwater level contours are displayed in Figure 6 and Figure 7. Site groundwater flow is indicated to be towards the south-west and south-east, radiating out from the drainage divide upon which the mineral processing, mining facilities and TSFs are located. Water levels are lowest down the valley towards the Cowan Brook Reservoir (MB3). The TSF seepage recovery sumps are located at these drainage points.

As displayed in Figure 5, the water levels in the monitoring bores have remained relatively stable since the commencement of monitoring, showing seasonal fluctuations whereby water levels reach a maximum at the end of winter in October, then decline to the lowest point at the end of summer in April. Monitoring bore MB05/01 displayed an increasing trend in water levels of approximately 5m between 2010 and 2013, thought to be from seepage through the base of the TSF2 wall, which is collected by the outer wall toe drains. It is understood that some of the TSF2 surface seepage is entering MB05/01 via the shallow sand (old tailings/ dredge path) aquifer in this area, as discussed in Section 2.5.4 (Mapping of Shallow Aquifer). This has been considered to be the case since 2013 when GHD reported the bottom of screens for several bores including MB05/01 to be potentially blocked, as discussed in Section 2.5.3 (TSF Integrated Geophysics & Hydrogeological Investigation). Due to MB05/01 not providing representative groundwater level measurements, nearby monitoring bore MB01/13 has been used since the 2013/14 review period to substantiate the groundwater level trends in the area of MB05/01. As shown in Figure 5, MB01/13 displays relatively stable water levels.

The shallower (higher) groundwater levels in monitoring bores MB97/5 & MB97/1 than MB01/13, MB05/01 & MB05/02, which are further downstream on the drainage divide in terms of groundwater flow direction, indicate that the groundwater flow reaching these downstream bores along the perimeter of TSF2 is coming from the south-west direction via upstream seepage from the Austins Return Drain (through the shallow sand aquifer), rather than TSF2 groundwater seepage.

Table 3: Groundwater Level Readings for Monitoring Bores (mAHD & mbgl)

Monitoring Bores on Previous or Current DER Licence(s)																
Date	**MB1**		**MB3**		**MB97/3**		**MB97/4**		**MB01/1**		**MB01/9**		**MB05/1**		**MB05/2**	
	mAHD	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*
Jul-16	254.89	1.61	228.59	0.8	235.53	1.78	236.48	8.81	236.03	0.72	254.18	3.14	250.31	2.36	245.29	1.74
Oct-16	255.26	1.24	229.39	0	237.31	0	237.51	7.78	236.75	0	254.59	2.73	250.65	2.02	245.36	1.67
Jan-17	254.44	2.06	228.79	0.6	235.95	1.36	237.53	7.76	236.34	0.41	253.55	3.77	250.17	2.5	245.4	1.63
Apr-17	254.03	2.47	228.25	1.14	-	-	236.85	8.44	235.59	1.16	252.95	4.37	-	-	-	-

Validation Bores to MB05/1				
Date	**MB01/13**		**MB97/5**	
	mAHD	*mbgl*	*mAHD*	*mbgl*
Jul-16	243.44	7.67	256.34	0.45
Oct-16	244.23	6.88	256.79	0
Jan-17	244.21	6.9	255.91	0.88
Apr-17	244.13	6.98	255.94	0.85

Monitoring Bores Added to Current DER Licence (July 2016)						
Date	**MB97/1**		**MB97/2**		**MB01/11**	
	mAHD	*mbgl*	*mAHD*	*mbgl*	*mAHD*	*mbgl*
Jul-16	241.64	7.66	232.25	18.29	233.27	20.92
Oct-16	241.67	7.63	231.93	18.61	233.08	21.11
Jan-17	242.2	7.1	232.18	18.36	233.89	20.3
Apr-17	242.11	7.19	233.37	17.17	233.18	21.01

Note: mbgl = metres below ground level
mAHD = metres Australian Height Datum

3.2 Groundwater Quality

Groundwater quality monitoring was completed in accordance with Table 1 (Water Monitoring Programme) during the 2016/17 review period. Water samples were collected by Greenbushes staff and analysed by the internal Greenbushes Laboratory (GBL) and independently by SGS laboratory services (SGS), with analyses for radionuclides sub-contracted to Australian Radiation Services (ARS).

The quarterly 2016/17 groundwater quality measurements for the currently installed monitoring bores are presented in Table 4 (GBL data). Historical readings are presented graphically in Figures 8 to 16, with monitoring bore locations shown in Figure 2. The currently installed (pre-existing) monitoring bores added to the updated DER Licence L4247/1991/13 (July 2016) as regional TSF2 monitoring bores (MB97/1, MB97/2 & MB01/11) are included in Table 4 but not presented graphically at this point in time. Monitoring bores MB97/3, MB05/01 & MB05/2 were destroyed by the TSF2 buttressing activities associated with embankment raises in Q3-2017 and will be replaced by new monitoring bores, as described in Section 1.4 (Water Monitoring Locations). Monitoring bore MB01/13 was added to the water monitoring programme in 2013/14 as a validation bore to MB05/01 due to it being identified to have the bottom length of screening potentially blocked and also receiving surface water infiltration via the shallow sand (old tailings/ dredge path) aquifer in the local area.

The water quality results in Table 4 are compared against the 2011 *Australian Drinking Water Guidelines* (ADWG), developed by the National Health and Medical Research Council (NHMRC) in collaboration with the Natural Resource Management Ministerial Council (NRMMC), and the 2000 *Australian and New Zealand Environment and Conservation Council Guidelines* for Irrigation (ANZECC Guidelines for Irrigation), including both agricultural irrigation water long-term trigger value (LTV) and short-term trigger value (STV) for heavy metals and metalloids. As requested by the DER, water quality results have also been compared against ANZECC Guidelines for Livestock and ANZECC Guidelines for Freshwater Aquatic Ecosystems (95% protection level).

The Surface Water Management Plan (SWMP) for the Greenbushes operation can be referred to for further details on the Mine Water Circuit and associated water storage reservoirs. The Mine potential contaminant sources and possible pathways, as reported in the SWMP and considered the focus of this WMR report, are summarised in Appendix 2. It is important to note that the Greenbushes Mine occurs in a mineralised area, therefore, it is expected that the background concentrations of certain analytes will occur at elevated levels above those in certain areas of the natural environment.

3.2.1 Chemical Analysis

The GBL groundwater quality monitoring results for the 2016/17 review period are presented in Table 4, including comparisons against ADWG and ANZECC guidelines values. As ADWG values have the most stringent threshold/trigger levels, results have initially been compared against ADWG values, followed by ANZECC Guidelines for Irrigation. The raw historical groundwater monitoring data for all the parameters is provided in Appendix 5.

Basic Parameters

The historical trends for pH, electrical conductivity (EC), sulphate (SO_4), chloride (Cl) and SO_4:Cl ratio in each monitoring bore since the commencement of groundwater monitoring are displayed in Figures 8 to 16. Historical groundwater quality trends observed in monitoring bores are summarised in Table 5, with italics representing trend changes since the previous 2015/16 review period.

The pH values recorded in the monitoring bores varied between 5.1 (MB97/1) and 7.77 (MB01/13) over the 2016/17 review period, and when compared with historical data generally display relatively similar and stable trends. The pH levels are generally lower, within the 5 to 6 range, in the bores bordering the western perimeter of TSF2.

Measurements of EC (measure of salinity) in the monitoring bores ranged between 606µS/cm (MB05/02) and 8,230µS/cm (MB97/3) for the TSF perimeter bores, and up to 14,240µS/cm for the western regional monitoring bores (MB01/11 and MB97/2 – *these regional monitoring bores are not discussed again until the end of the Metals & Metalloids sub-section*). The highest EC values in TSF perimeter bores MB97/3 and MB97/4 is likely attributed to them being the two bores in closest proximity to the TSF2 decant collection and downstream seepage recovery sump points. The EC has increased by 3,000µS/cm in MB97/3 and MB97/4 since 2010, considered to be associated with the increased seepage rates from the TSF2 seepage collection drain via the shallow sand (old tailings/ dredge path) aquifer in this area, as discussed in Section 2.5.4 (Mapping of Shallow Aquifer).

In line with EC values, the highest concentrations of sodium (Na) and chloride (Cl) are recorded in MB97/3 and MB97/4, and highest concentrations of sulphate (SO_4) in MB3 and MB97/3. These bores are all located within close proximity to the TSF seepage recovery points, which exist at the low points of natural drainage divide upon which the TSFs are constructed (refer to groundwater flow directions displayed in Figures 6 and 7). As displayed in Figure 15 and summarised in Table 5, the increasing sulphate concentrations in bore MB05/01 peaked during the review period. These sulphate values and trends are not confirmed by MB01/13 (Figure 16) which is in close proximity to MB05/01. As discussed in Section 3.1 (Groundwater Levels), the bottom length of screening in MB05/01 has been identified to be potentially blocked and receiving surface water infiltration via the shallow sand (old tailings/ dredge path) aquifer in the local area, thus not providing representative groundwater results.

In order to characterise the groundwater type in the area, an Expanded Durov Diagram has been created using the historical cation/anion chemical analysis results for the monitoring bores (see Figure 17). The diagram shows that the groundwater in the majority of bores is Cl- and Na+ dominant (end point water), with the groundwater in some bores falling into the category of Cl- dominant and no dominant cation (reverse ion exchange of NaCl waters). The ratio of SO_4 to Cl (SO_4:Cl) is often a useful indicator of industrial activity. However, it must be noted that an increase in this ratio above the background level can also result from oxidation of naturally occurring organic material or sulphide minerals following a fall of the water table (i.e. seasonally or climatically driven).

Historically, the SO_4:Cl ratio has remained relatively stable and low in all monitoring bores except MB1 and MB05/01. Monitoring bore MB1, located at the TSF1 seepage collection sump point, typically records SO_4:Cl ratio values between 0.3 and 0.4. MB05/01, located north-west of TSF2, has been recording an increasing trend in SO_4 and SO_4:Cl values since 2011, with SO_4 levels peaking at 250mg/L in mid-2016 and the SO_4:Cl ratio 0.9 (Figure 15). Based on the adjacent bores to MB1 (MB01/09) and MB05/01 (MB01/13) recording relatively low SO_4 and SO_4:Cl values, it is questionable as to whether these results are an indicative measure of TSF seepage into the underlying groundwater. As discussed in Section 2.5.3 (TSF Integrated Geophysics & Hydrogeological Investigation), MB1 and MB05/01 have been reported to have damaged casing and therefore it is likely that surface water runoff is able to enter these bores and subsequently cause non-representative groundwater results to be recorded. Therefore, the higher SO_4:Cl ratio values recorded for MB1 and MB05/01 are considered to be more representative of surface water runoff mixing with the groundwater in these bores, and therefore the groundwater monitoring results in nearby MB01/09 and MB01/13 should be alternatively referred to for representative groundwater results. Nevertheless, the results in the entirety do indicate the pathway of seepage from the TSF seepage collection drains to adjacent bores via the shallow sand (old tailings/ dredge path) aquifer in the local area, as discussed in Section 2.5.4 (Mapping of Shallow Aquifer).

Excluding the non-representative groundwater results recorded from damaged monitoring bores MB1 and MB05/01, MB3 continued to record the highest SO_4:Cl ratio values (up to 0.2, Figure 9). MB3 is located downstream of the TSF2 seepage recovery sump and the drainage pathway towards the Cowan Brook.

Metals & Metalloids

As discussed in Section 2.5.6 (Lithium & Arsenic Remediation), the key metals or metalloids of focus for TLA to reduce in the Mine Water Circuit are lithium (Li) and arsenic (As), for which the remediation process has commenced. Therefore, historical graphical trends have been included in Appendix 6 for these two analytes.

The concentration of lithium (Li) recorded in monitoring bore MB1 remained elevated during the 2016/17 review period, and MB05/01 for the third consecutive review period recorded increasing Li values. The concentration of Li recorded in these two bores is considerably higher than in other TSF2 monitoring bores, with MB05/01 recording the highest value of 4.7mg/L in January 2017 and MB1 maintaining similar levels to the past decade (up to 3.8mg/L in July 2015). While the ADWG does not specify a level for Li, the lithium level specified in the ANZECC Guidelines for Irrigation is 2.5mg/L.

Based on the knowledge that bores MB1 and MB05/01 have damaged casings, the substantially higher Li readings in these two bores is considered to be attributed to them receiving surface water infiltration from the TSF seepage collection drains via the shallow sand (old tailings/ dredge path) aquifer in the local area, as opposed to TSF seepage into the deeper underlying groundwater. This is because the adjacent bores MB01/09 (located 100m south of MB1) and MB01/13 (located 50m west of MB05/01) have recorded negligible (<0.05mg/L) Li concentrations to date. Nevertheless, the fact MB05/01 continues the increasing trend in SO_4 and recording Li values >2.5mg/L due to surface water infiltration from the TSF2 seepage collection drain, indicates that the increased rate of tailings disposal in the northern portion of TSF2 has directly resulted in increased seepage rates into the downstream shallow sand (old tailings/ dredge path) aquifer.

The elevated arsenic levels in the western regional monitoring bore MB97/1, added to the updated DER Licence (July 2016), is difficult to assess considering the historical nature of the site which is acknowledged in the DER Licence (“Lithium has been mined since 1983, however historical mining operations at the Premise date back to tin mining in 1888 ad tantalum mining in the 1940’s”). As per the Appendix 7 “Investigation of Soil and Aquifers” report (Peck & Associates, 1998), it was determined that there were Arsenic enriched soils at around 8-10 meters in this location and there was nothing to suggest that the Arsenic was connected to the TSF at this time. However, a review of the historical graphical trends for arsenic, TDS, pH and lithium (Appendix 8), and considering TSF2 was commissioned in 2006 including the open drain (Austins Return Drain) which directs process water north-westerly from the TSF decant pond (Clear Water Pond) into the Austins Dam, there appears to be a connection between the altered TSF2 process water stream and the water quality measured in MB97/1 (the closest monitoring bore to Austins Dam). As displayed in Appendix 8, the

TDS and lithium levels have decreased since 2006 (TDS from 4,000 to 1,000mg/L; and Li from 0.2 to 0.05mg/L), while the arsenic levels have increased (from <0.05 to 0.25mg/L).

The concentration of other trace metals and major ions are relatively low and consistent across the monitoring bores. While concentrations of copper (Cu), zinc (Zn) and lead (Pb) are typically non-detectable, the following bores continued to record values for certain metals/metalloids above the ADWG and/or ANZECC Guidelines for Irrigation during the 2016/17 review period:

- MB1 – manganese (Mn) (0.36mg/L) and iron (Fe) (16.4mg/L), plus nutrient phosphorus (P) (0.43mg/L).
- MB3 – only Fe (0.44mg/L), plus nutrient P (0.27mg/L).
- MB97/3 – Mn (1.8mg/L), arsenic (As) (0.011mg/L) and nickel (Ni) (0.038mg/L), plus nutrient P (0.25mg/L).
- MB97/4 – Mn (1.5mg/L), Ni (0.12mg/L) and cobalt (Co) (0.081mg/L), plus nutrient P (0.39mg/L).
- MB01/01 – Mn (0.93mg/L) and Fe (0.32mg/L), plus nutrient P (0.16mg/L).
- MB01/09 – Mn (0.67mg/L) and Fe (0.86mg/L), plus nutrient P (0.16mg/L).
- MB05/02 – Fe (41mg/L) and cadmium (Cd) (0.007mg/L), plus nutrient P (0.48mg/L).
- MB05/01 – Mn (0.97mg/L) and Fe (7.3mg/L), plus nutrient P (0.18mg/L).
- MB01/13 – only Fe (3.1mg/L), plus nutrient P (0.37mg/L).
- MB97/1 – Mn (0.35mg/L), Fe (10.4mg/L), As (0.22mg/L), Cd (0.005mg/L) and Ni (0.021mg/L), plus nutrient P (0.58mg/L).
- MB97/2 – Mn (7.9mg/L), Fe (49.4mg/L), Co (0.075mg/L) and Ni (0.09mg/L), plus nutrient P (0.75mg/L).
- MB01/11 – Mn (1.3mg/L), Fe (0.35mg/L), As (0.021mg/L) and Ni (0.05mg/L), plus nutrient P (0.34mg/L).

When compared to historical data (Appendix 5), these values have remained relatively similar and stable over time and are thus likely to represent a combination of background levels plus further contributions from TSF seepage, with the greatest suite of elevated values (EC, TDS, Mn, As, Ni, Fe, Co, Cd & P) recorded in TSF2 perimeter monitoring bores MB97/3 & MB97/4 and western regional monitoring bores MB97/1, MB97/2 & MB01/11. TSF2 perimeter monitoring bores MB97/3 & MB97/4 are in closest proximity to the TSF2 seepage recovery sump points.

The elevated arsenic levels in the western regional monitoring bore MB97/1, added to the updated DER Licence (July 2016), is difficult to assess considering the historical nature of the site which is acknowledged in the DER Licence ("Lithium has been mined since 1983, however historical mining operations at the Premise date back to tin mining in 1888 ad tantalum mining in the 1940's"). As per the Appendix 7 "Investigation of Soil and Aquifers" report (Peck & Associates, 1998), it was determined that there were Arsenic enriched soils at around 8-10 meters in this location and there was nothing to suggest that the Arsenic was connected to the TSF at this time. However, a review of the historical graphical trends for arsenic, TDS, pH and lithium (Appendix 8), and considering TSF2 was commissioned in 2006 including the open drain (Austins Return Drain) which directs process water north-westerly from the TSF decant pond (Clear Water Pond) into the Austins Dam, there appears to be a connection between the altered TSF2 process water stream and the water quality measured in MB97/1 (the closest monitoring bore to Austins Dam). As displayed in Appendix 8, the TDS and lithium levels have decreased since 2006 (TDS from 4,000 to 1,000mg/L; and Li from 0.2 to 0.05mg/L), while the arsenic levels have increased (from <0.05 to 0.25mg/L). The underlying reason for the elevated arsenic levels in MB97/1 will require further investigation shall the DER request.

The majority of monitoring bores continued to record iron (Fe) levels greater than the ADWG value of 0.3mg/L, with MB05/02 and MB97/2 recording Fe values significantly higher than other bores (up to 50mg/L). Further details on the sources and pathways of minesite contaminants are provided in Appendix 2.

Radioactive Elements

SGS laboratory results are used for radioactive elements thorium (Th) and uranium (U), as the detection limits are lower than those at GBL. SGS results indicate that concentrations of both Th and U were below the detection limits (<0.005mg/L) for all monitoring bores.

3.2.2 Radionuclide Activity

As indicated in Table 1, the DER licences also require the measurement of Radium-226 (Ra-226) and Radium-228 (Ra-228) at 6-monthly intervals. TLA engages Australian Radiation Services (ARS) for radionuclide analysis, as recommended by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for radioactivity measurements.

Radionuclide activity was recorded in all monitoring bores during the 2016/17 review period, as presented in Table 6. Radium occurs naturally in the environment, and is a decay product of uranium and thorium. The highest Ra-226 and Ra-228 concentration values recorded during the review period were in the monitoring bores located near the TSF2 seepage recovery sump points. All levels continued to remain below the ANZECC trigger values, with the highest average values recorded in monitoring bore MB97/4 for both Ra-226 (0.81Bq/L) and Ra-228 (1.42Bq/L).

Table 4: Groundwater Quality Results for Monitoring Bores

Date	Field pH	EC	TDS	Fe	Na	K	Ca	Mg	Cl	CO_3	HCO_3	SO_4	NO_3	As	Cd	Co	Cu	Mn	Ni	P	Li	Zn	Pb	Th#	U#
ADWG	**6.5-8.5*	**1000*	**500*	**0.3*	**180*	*-*	*-*	*-*	**250*	*-*	*-*	*500*	*50*	*0.01*	*0.002*	*-*	*2*	*0.5*	*0.02*	*-*	*-*	**3*	*0.01*	*-*	*0.02*
ANZECC – Irrigation LTV	*-*	*-*	*600*	*0.2*	*460*	*-*	*-*	*-*	*700*	*-*	*-*	*-*	*-*	*0.1*	*0.01*	*0.05*	*0.2*	*0.2*	*0.2*	*0.05*	*2.5*	*2*	*2*	*-*	*0.01*
ANZECC – Irrigation STV	*-*	*-*	*1000-2000*	*10*	*-*	*-*	*-*	*-*	*700*	*-*	*-*	*-*	*-*	*2*	*0.05*	*0.1*	*5*	*10*	*2*	*0.8*	*2.5*	*5*	*5*	*-*	*0.1*
ANZECC – Livestock	*-*	*-*	*1000-2000*	*-*	*-*	*-*	*1000*	*-*	*-*	*-*	*-*	*1000-2000*	*1500*	*0.5-5*	*0.01*	*1*	*0.4-5*	*-*	*1*	*-*	*-*	*20*	*0.1*	*-*	*0.2*
ANZECC – Freshwater (95%)	*-*	*-*	*2000-5000*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*700*	*13-24*	*0.2*	*-*	*1.4*	*1900*	*11*	*-*	*-*	*8*	*3.4*	*-*	*-*
Monitoring Bores on Previous or Current DER Licence(s)																									
MB1																									
Jul-16	6.34	1008	571	16.4	140	5.7	20.1	23	207	0	115	75	<0.2	0.004	<0.005	0.008	<0.01	0.326	<0.005	0.14	3.2	<0.005	<0.05	0.002	<0.001
Oct-16	6.51	911	467	14.6	121	4.8	18.6	21.4	198	0	100	49	<0.2	0.004	<0.005	0.009	<0.01	0.328	<0.005	<0.06	2	<0.005	<0.05	<0.001	<0.001
Jan-17	7.2	731	420	11.1	101	5	15.1	16.7	154	0	103	48.4	<0.2	0.003	<0.005	<0.005	<0.01	0.246	0.016	0.3	2.3	0.01	<0.05	<0.001	<0.001
Apr-17	6.18	852	504	11.7	111	4.7	18.2	21.4	177	0	121	57	<0.2	0.005	<0.005	<0.005	<0.01	0.356	0.005	0.43	2.3	<0.005	<0.05	<0.001	<0.001
MB3																									
Jul-16	6.31	1836	969	0.011	296	2.2	17.6	30.9	450	0	114	65.4	<0.2	0.002	<0.005	<0.005	<0.01	0.039	<0.005	0.06	0.02	0.058	<0.05	<0.001	<0.001
Oct-16	6.1	2640	1400	0.019	499	3.1	18.3	34.5	646	0	214	122	<0.2	0.003	<0.005	<0.005	<0.01	0.144	0.007	0.11	0.04	0.024	<0.05	<0.001	<0.001
6.2	6.67	2570	1480	0.425	519	3.8	25.8	36.7	671	0	230	129	<0.2	0.002	0.005	<0.005	<0.01	0.177	0.015	0.16	0.04	0.05	<0.05	<0.001	<0.001
Apr-17	6.77	2630	1520	0.436	498	4.1	30.4	34.1	675	0	232	130	<0.2	0.004	<0.005	<0.005	<0.01	0.172	0.008	0.27	0.04	0.031	<0.05	<0.001	<0.001
MB97/3																									
Jul-16	5.63	7400	4380	0.121	1250	16.4	131	192	2420	0	71	118	<0.2	0.011	<0.005	0.022	<0.01	1.8	0.032	0.23	0.07	<0.005	<0.05	<0.005	<0.005
Oct-16	5.73	8230	4360	0.058	1100	15.9	121	180	2260	0	70	114	<0.2	0.011	<0.005	0.02	<0.01	1.7	0.033	0.25	0.06	<0.005	<0.05	<0.005	<0.005
Jan-17	5.65	8170	4200	0.052	1140	15.8	120	181	2280	0	39	120	<0.2	0.009	<0.005	<0.005	<0.01	1.7	0.038	<0.06	0.06	0.045	<0.05	<0.005	<0.005
Apr-17	Bore no longer in service due to TSF expansion – to be replaced with MB17/04 when TSF expansion completed (refer to Figure 2)																								
MB97/4																									
Jul-16	5.31	6370	3620	0.091	492	12.6	197	387	2180	0	45	13.2	<0.2	0.002	<0.005	0.081	<0.01	1.5	0.108	0.39	0.13	0.026	<0.05	<0.001	<0.001
Oct-16	5.64	7050	3860	0.076	516	11.7	170	350	2020	0	162	16.8	<0.2	0.002	<0.005	0.072	<0.01	1.3	0.096	0.2	0.13	0.034	<0.05	<0.001	<0.001
Jan-17	5.25	7030	3640	0.095	479	12.8	198	391	2160	0	34	19.9	<0.2	<0.001	<0.005	0.044	<0.01	1.5	0.115	<0.06	0.13	0.106	<0.05	0.003	<0.001
Apr-17	6.31	7010	3520	0.133	486	12	179	367	2100	0	50	21.7	<0.2	0.002	<0.005	0.036	<0.01	1.4	0.111	<0.06	0.13	0.04	<0.05	<0.001	<0.001
MB01/01																									
Jul-16	6.28	2540	1580	0.247	224	5	119	121	719	0	232	41.8	<0.2	0.002	<0.005	0.01	<0.01	0.896	0.007	<0.06	0.1	<0.005	<0.05	<0.001	<0.001
Oct-16	6.16	2525	1520	0.27	230	5.2	125	122	715	0	235	41	<0.2	0.001	<0.005	0.011	<0.01	0.925	0.006	<0.06	0.1	<0.005	<0.05	<0.001	<0.001
Jan-17	5.9	2408	1500	0.319	225	5.1	120	120	730	0	229	40	<0.2	0.001	<0.005	0.005	<0.01	0.927	0.01	0.16	0.1	<0.005	<0.05	<0.001	<0.001
Apr-17	7.08	2544	1460	0.321	226	5.7	127	112	681	0	214	41.1	<0.2	0.002	<0.005	0.008	<0.01	0.927	0.009	<0.06	0.1	<0.005	<0.05	<0.001	<0.001
MB01/09																									
Jul-16	6.71	688	404	0.798	64	2.5	34.2	27	163	0	92	3.7	<0.2	0.001	<0.005	<0.005	<0.01	0.671	<0.005	0.07	0.03	<0.005	<0.05	<0.001	<0.001
Oct-16	6.78	704	425	0.737	63	2.6	34.3	26.6	158	0	98	3.8	<0.2	0.001	<0.005	0.005	<0.01	0.632	<0.005	<0.06	0.03	<0.005	<0.05	<0.001	<0.001
Jan-17	6.65	661	414	0.67	63	2.4	32.6	26.7	164	0	101	4.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.643	0.01	<0.06	0.02	0.014	<0.05	<0.001	<0.001
Apr-17	6.46	693	441	0.86	64	2.5	33.2	26.8	166	0	103	5	<0.2	0.001	<0.005	<0.005	<0.01	0.674	<0.005	0.16	0.02	<0.005	<0.05	<0.001	<0.001
MB05/02																									
Jul-16	5.69	606	312	40.9	74	0.62	2.6	8.8	167	0	34	4.3	<0.2	0.005	<0.005	<0.005	<0.01	0.026	<0.005	0.15	0.01	<0.005	<0.05	<0.001	<0.001
Oct-16	6.45	627	308	37.6	73	0.89	4.8	8.6	164	0	35	3.9	<0.2	0.006	0.007	0.005	<0.01	0.032	<0.005	0.08	<0.01	0.008	<0.05	<0.001	<0.001
Jan-17	5.4	637	326	38.9	71	0.77	3.2	9.3	209	0	0	4.4	<0.2	0.003	0.005	0.006	<0.01	<0.005	0.016	0.48	0.02	0.012	<0.05	<0.001	<0.001
Apr-17	Bore no longer in service due to TSF expansion – to be replaced with MB17/02 when TSF expansion completed (refer to Figure 2)																								

Date	Field pH	EC	TDS	Fe	Na	K	Ca	Mg	Cl	CO_3	HCO_3	SO_4	NO_3	As	Cd	Co	Cu	Mn	Ni	P	Li	Zn	Pb	Th#	U#
ADWG	**6.5-8.5*	**1000*	**500*	**0.3*	**180*	*-*	*-*	*-*	**250*	*-*	*-*	*500*	*50*	*0.01*	*0.002*	*-*	*2*	*0.5*	*0.02*	*-*	*-*	**3*	*0.01*	*-*	*0.02*
ANZECC – Irrigation LTV	*-*	*-*	*600*	*0.2*	*460*	*-*	*-*	*-*	*700*	*-*	*-*	*-*	*-*	*0.1*	*0.01*	*0.05*	*0.2*	*0.2*	*0.2*	*0.05*	*2.5*	*2*	*2*	*-*	*0.01*
ANZECC – Irrigation STV	*-*	*-*	*1000-2000*	*10*	*-*	*-*	*-*	*-*	*700*	*-*	*-*	*-*	*-*	*2*	*0.05*	*0.1*	*5*	*10*	*2*	*0.8*	*2.5*	*5*	*5*	*-*	*0.1*
ANZECC – Livestock	*-*	*-*	*1000-2000*	*-*	*-*	*-*	*1000*	*-*	*-*	*-*	*-*	*1000-2000*	*1500*	*0.5-5*	*0.01*	*1*	*0.4-5*	*-*	*1*	*-*	*-*	*20*	*0.1*	*-*	*0.2*
ANZECC – Freshwater (95%)	*-*	*-*	*2000-5000*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*700*	*13-24*	*0.2*	*-*	*1.4*	*1900*	*11*	*-*	*-*	*8*	*3.4*	*-*	*-*
MB05/01																									
Jul-16	6.9	1497	827	3.1	236	5.9	25.9	31.3	252	0	91	244	<0.2	0.001	<0.005	<0.005	<0.01	0.974	<0.005	0.18	2.7	<0.005	<0.05	<0.001	<0.001
Oct-16	6.89	1317	643	6.6	206	4.8	18.9	23.3	230	0	84	154	<0.2	0.001	<0.005	0.005	<0.01	0.539	<0.005	<0.06	2.7	<0.005	<0.05	<0.001	<0.001
Jan-17	6.06	1382	832	7.3	229	6.7	21.7	27.7	235	0	151	198	<0.2	<0.001	<0.005	<0.005	<0.01	0.43	0.009	0.1	4.7	0.029	<0.05	<0.001	<0.001
Apr-17	Bore no longer in service due to TSF expansion – to be replaced with MB17/01 when TSF expansion completed (refer to Figure 2)																								
Validation Bores to MB05/1																									
MB01/13																									
Jul-16	6.67	1711	857	2.5	147	4	69.5	50.7	366	0	136	28.7	<0.2	0.007	<0.005	<0.005	<0.01	0.133	<0.005	<0.06	0.05	<0.005	<0.05	<0.001	<0.001
Oct-16	7.77	1514	842	2.7	155	3.9	69.7	56.1	384	0	134	29	<0.2	0.006	<0.005	<0.005	<0.01	0.147	<0.005	0.1	0.04	<0.005	<0.05	<0.001	<0.001
Jan-17	6.86	2044	869	2	155	4.3	66.9	53.8	399	0	136	27.4	<0.2	0.006	<0.005	0.007	<0.01	0.109	<0.005	0.1	0.06	<0.005	<0.05	<0.001	<0.001
Apr-17	6.88	1479	888	3.1	150	4	65.7	53.9	382	0	153	31	<0.2	0.008	<0.005	<0.005	<0.01	0.148	0.006	0.37	0.04	<0.005	<0.05	<0.001	<0.001
MB97/5																									
Jul-16	6.83	1690	971	4.6	254	1.8	46	46.8	372	0	265	54.6	<0.2	0.001	<0.005	<0.005	<0.01	0.398	<0.005	0.15	0.03	<0.005	<0.05	<0.001	<0.001
Oct-16	6.16	1762	908	3.7	252	2.5	49.1	45.8	364	0	285	53.2	<0.2	0.002	<0.005	0.005	<0.01	0.337	<0.005	0.18	0.03	<0.005	<0.05	<0.001	<0.001
Jan-17	6.22	1658	975	4.4	247	1.9	44.5	46.6	364	0	298	54.3	<0.2	<0.001	0.005	<0.005	<0.01	0.367	0.015	<0.06	0.02	0.022	<0.05	<0.001	<0.001
Apr-17	6.1	1650	980	4.5	245	1.8	43.7	45.8	363	0	301	55.8	<0.2	0.001	<0.005	<0.005	<0.01	0.38	<0.005	0.3	0.03	<0.005	<0.05	<0.001	<0.001
Monitoring Bores Added to Current DER Licence (July 2016)																									
MB97/1																									
Jul-16	5.48	1659	904	6.3	271	4.2	15.8	31	439	0	32	75.1	<0.2	0.124	<0.005	0.011	<0.01	0.289	0.016	0.21	0.05	<0.005	<0.05	<0.001	<0.001
Oct-16	5.10	1911	1020	7	297	5	24.3	37.6	488	0	30	74.4	<0.2	0.113	<0.005	0.014	<0.01	0.327	0.013	0.16	0.05	<0.005	<0.05	<0.001	<0.001
Jan-17	5.22	1920	1120	10.4	311	4.5	20	40.3	531	0	33	74.2	<0.2	0.17	0.005	0.011	<0.01	0.347	0.021	0.26	0.05	0.03	<0.05	<0.001	<0.001
Apr-17	5.72	1839	1040	8.2	289	4.6	24.4	35.9	494	0	37	73.6	<0.2	0.224	0.005	<0.005	<0.01	0.305	0.017	0.58	0.05	0.02	<0.05	<0.001	<0.001
MB97/2																									
Jul-16	6.09	11050	5720	31.3	1310	18.4	142	417	3280	0	204	99.1	<0.2	0.005	<0.005	0.062	<0.01	7.2	0.072	0.36	0.21	0.04	<0.05	<0.001	<0.001
Oct-16	5.77	11020	5240	19.8	1180	19.4	145	415	2920	0	181	101	<0.2	0.003	<0.005	0.075	<0.01	6.4	0.09	0.38	0.23	0.046	<0.05	<0.001	<0.001
Jan-17	5.77	11160	5820	29.9	1250	19.6	138	418	3280	0	118	61.4	<0.2	0.001	<0.005	0.026	<0.01	6.9	0.064	<0.06	0.21	0.097	<0.05	<0.001	<0.001
Apr-17	6.43	11250	5760	49.4	1150	19.2	137	412	3260	0	336	45.2	<0.2	0.004	<0.005	<0.005	<0.01	7.9	0.022	0.75	0.18	0.036	<0.05	<0.001	<0.001
MB01/11																									
Jul-16	6.04	13390	6780	0.175	2130	15.4	153	239	3920	0	135	122	<0.2	0.015	<0.005	0.034	<0.01	1.3	0.032	0.34	0.07	<0.005	<0.05	<0.001	<0.001
Oct-16	5.96	13390	6800	0.198	1890	16	153	237	3780	0	141	119	<0.2	0.015	<0.005	0.033	<0.01	1.2	0.033	0.22	0.07	0.006	<0.05	<0.001	<0.001
Jan-17	5.65	14240	7500	0.281	2070	18.7	145	235	4120	0	147	123	<0.2	0.013	<0.005	0.009	<0.01	1.2	0.05	<0.06	0.07	0.092	<0.05	<0.001	<0.001
Apr-17	6.53	13550	7120	0.353	1840	15.8	153	239	3940	0	150	126	<0.2	0.021	<0.005	<0.005	<0.01	1.3	0.034	<0.06	0.07	0.007	<0.05	<0.001	<0.001

Note: All concentrations in mg/L with the exception of pH and EC (μS/cm).
Green indicates *Australian Drinking Water Guidelines* (NHMRC, 2011) values, with * indicating aesthetic value only (as opposed to heath). **Note**: there is no DER requirement to demonstrate compliance with these values.
# Indicates where SGS data has been used instead of GBL data to improve LOR.

Table 5: Historical Groundwater Quality Trends Observed in Monitoring Bores

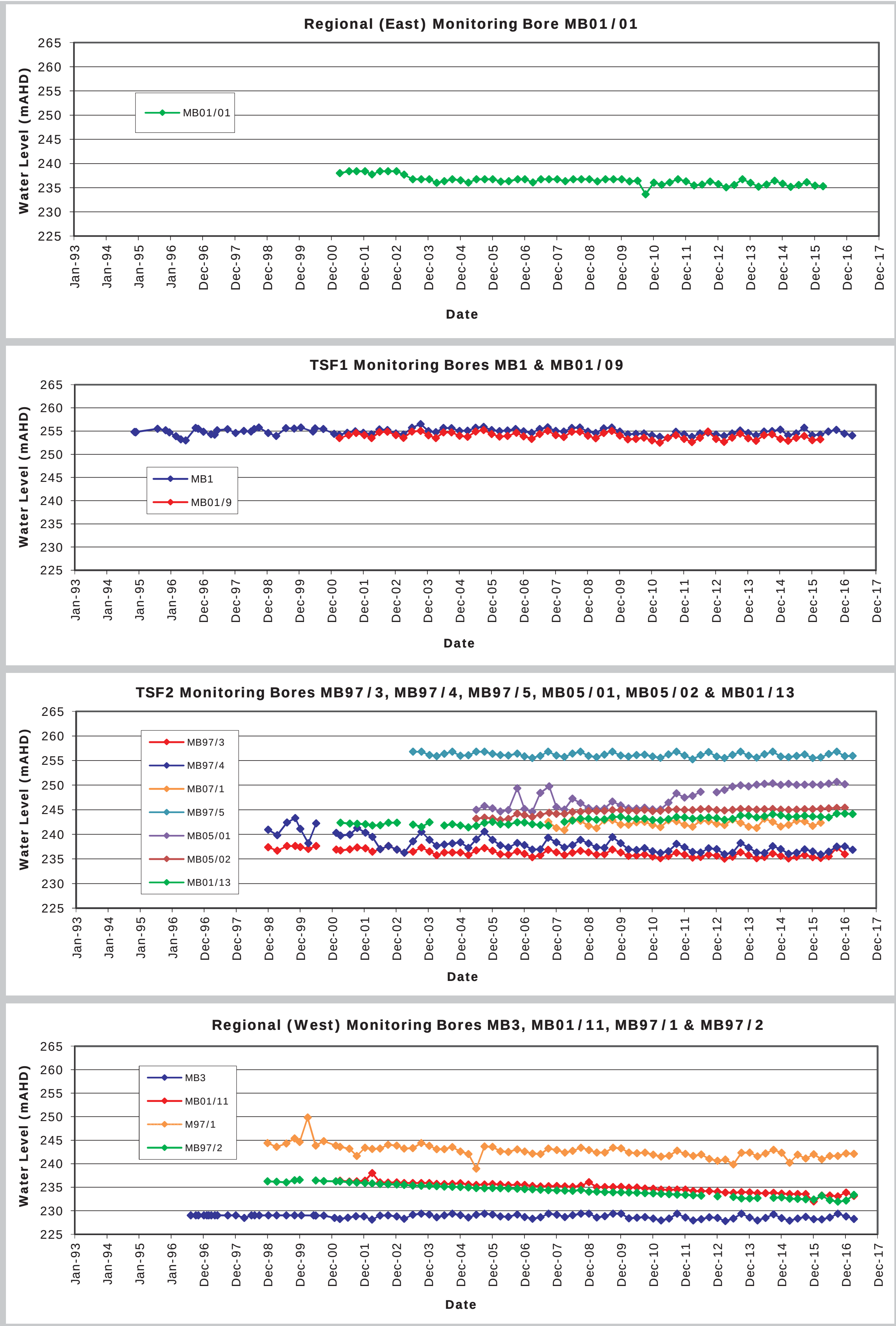
Bore ID	pH	EC	Cl	SO_4	SO_4:Cl
MB1 (bore casing damaged)	Slight Increasing	Stable	Stable	Relatively Stable	*Relatively Stable*
MB3	Relatively Stable	Decreasing	Decreasing	*Relatively Stable*	Slight Increasing
MB97/3	Relatively Stable	Increasing	Increasing	Stable	Stable
MB97/4	Relatively Stable	Increasing	Increasing	Stable	Stable
MB01/01	Relatively Stable	Stable	Stable	Stable	Stable
MB01/09 (validation bore to MB1)	Relatively Stable	Stable	Stable	Stable	Slight Decreasing
MB05/02	Relatively Stable	Stable	Stable	Stable	*Slight Decreasing*
MB05/01 (bore casing damaged)	*Increasing*	Slight Increasing	Relatively Stable	Increasing	Increasing
MB01/13 (validation bore to MB05/01)	Relatively Stable	Stable	Stable	Slight Decreasing	Slight Decreasing

Note: The trends in *italics* represent trend status updates since the previous 2015/16 review period

Table 6: Radionuclide Activity in Groundwater Monitoring Bores (Bq/L)

Bore ID	Ra-226			Ra-228		
	Jul-16	**Jan-17**	**Average**	**Jul-16**	**Jan-17**	**Average**
MB1	0.026	0.013	0.020	0.064	0.061	0.063
MB3	0.042	0.026	0.034	<0.078	0.060	<0.069
MB97/3	0.298	0.253	0.276	0.428	0.331	0.380
MB97/4	0.810	0.622	0.716	1.420	1.100	1.260
MB01/01	0.010	0.020	0.015	<0.18	0.060	<0.120
MB01/09	0.005	0.004	0.005	<0.14	<0.086	<0.113
MB05/01	0.097	0.068	0.082	0.208	0.110	0.159
MB05/02	0.092	0.086	0.089	<0.16	0.117	<0.139
MB01/13	0.022	0.017	0.019	0.071	0.046	0.059
Trigger Value	**5Bq/L**			**2Bq/L**		

Note: The Ra-226 and Ra-228 trigger values are obtained from the Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values, which exist for irrigation and livestock water. MDL=Minimum Detection Limit



GROUNDWATER LEVEL HYDROGRAPHS FIGURE 5

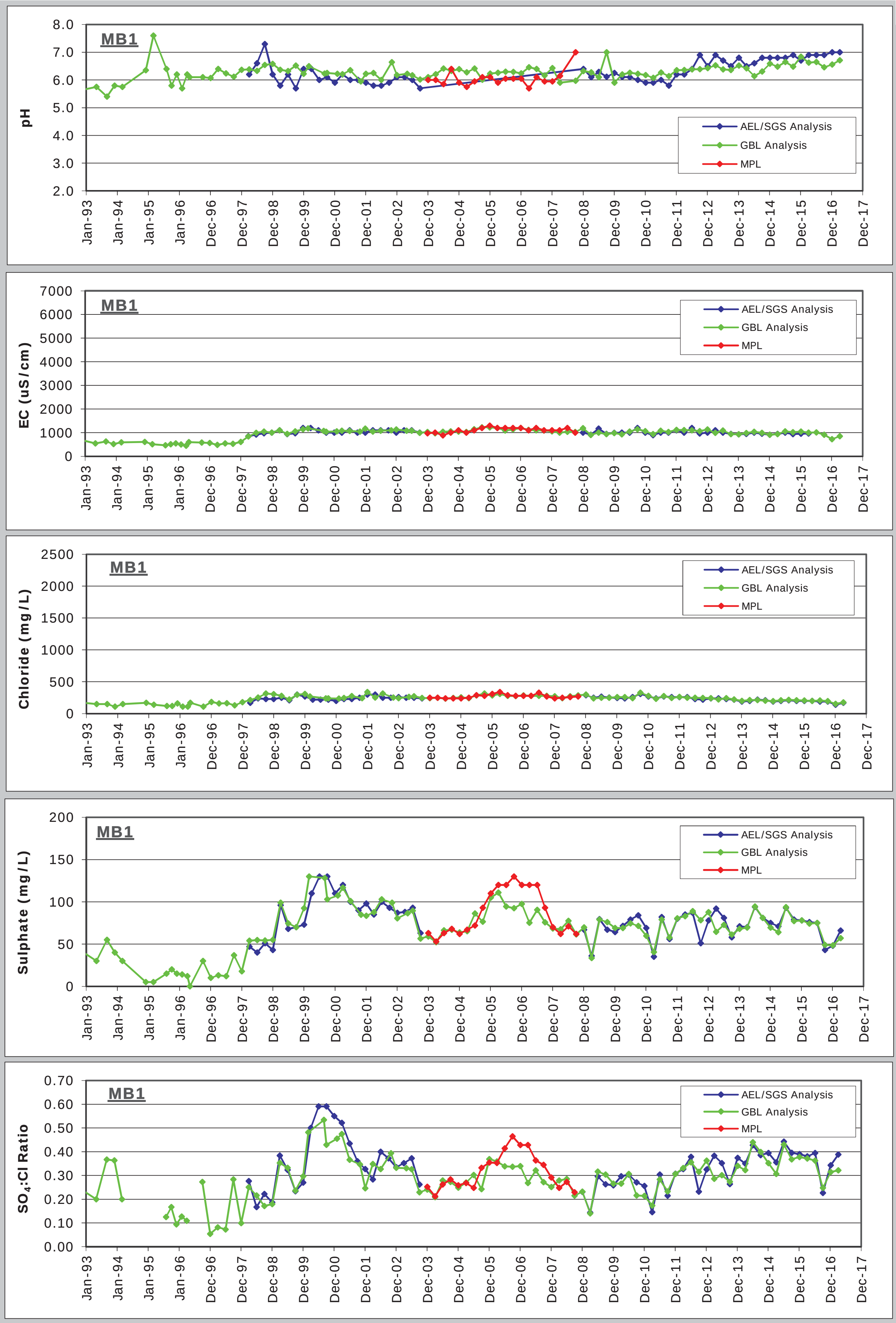
July

October

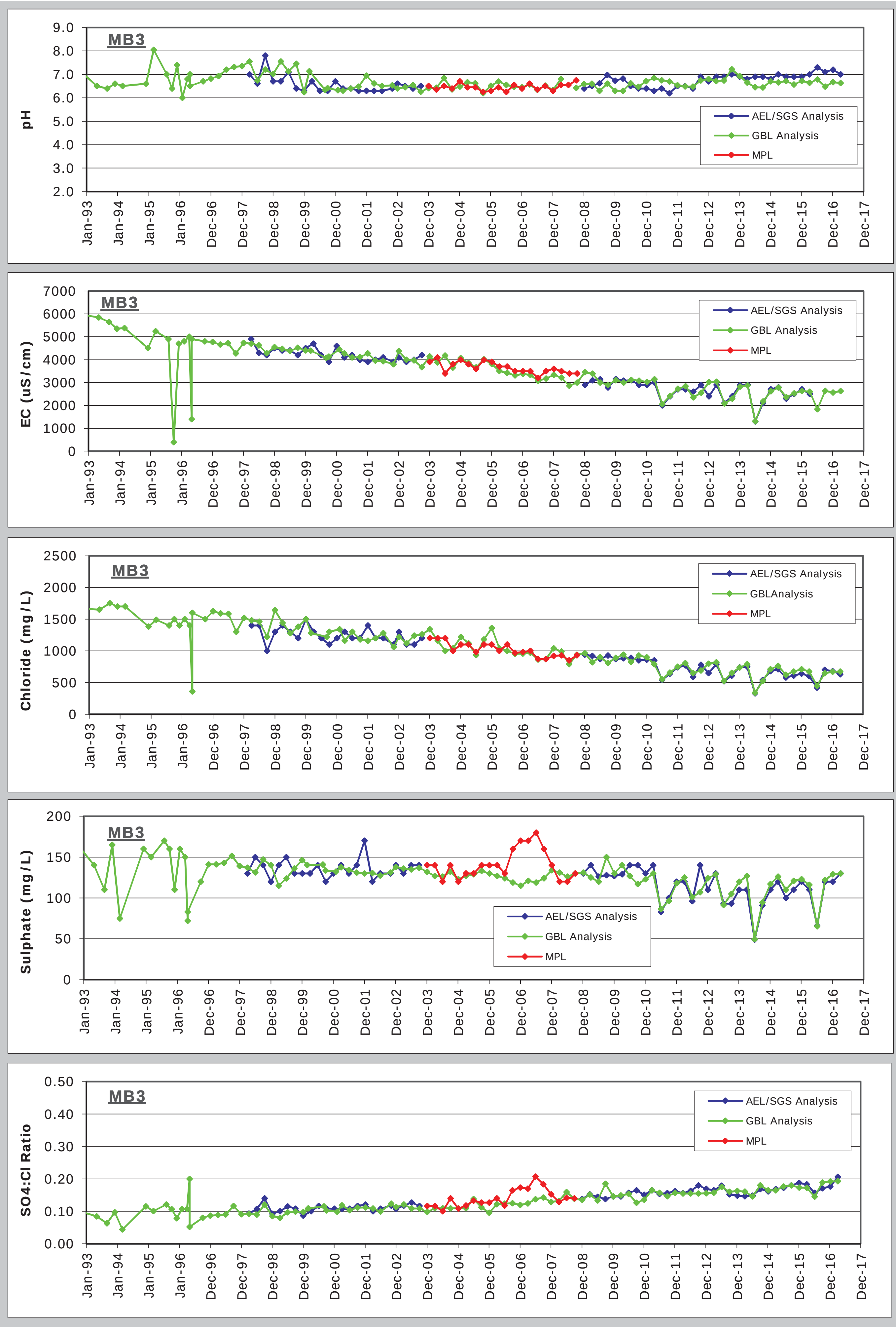
GROUNDWATER CONTOURS FIGURE 6

January

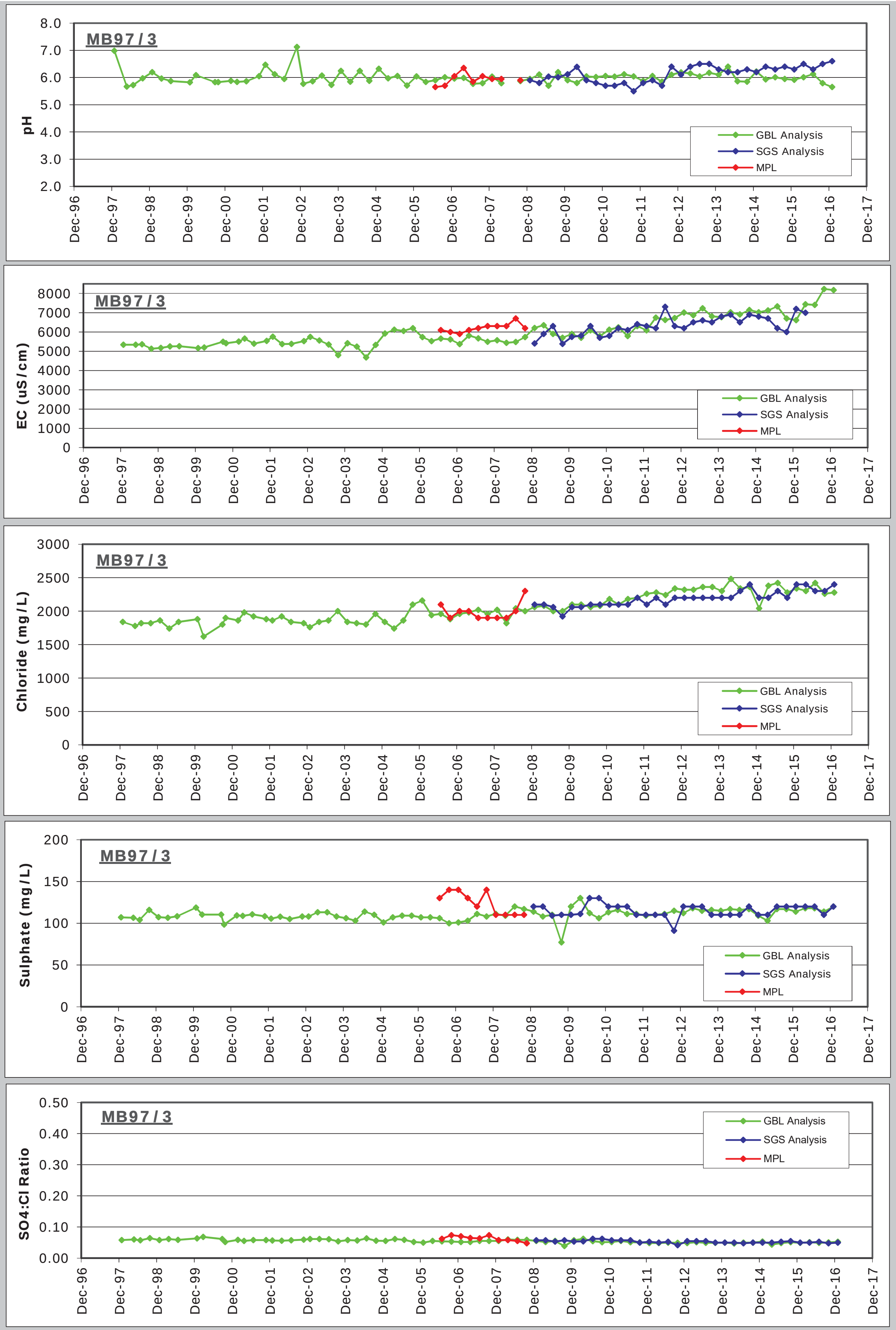
April



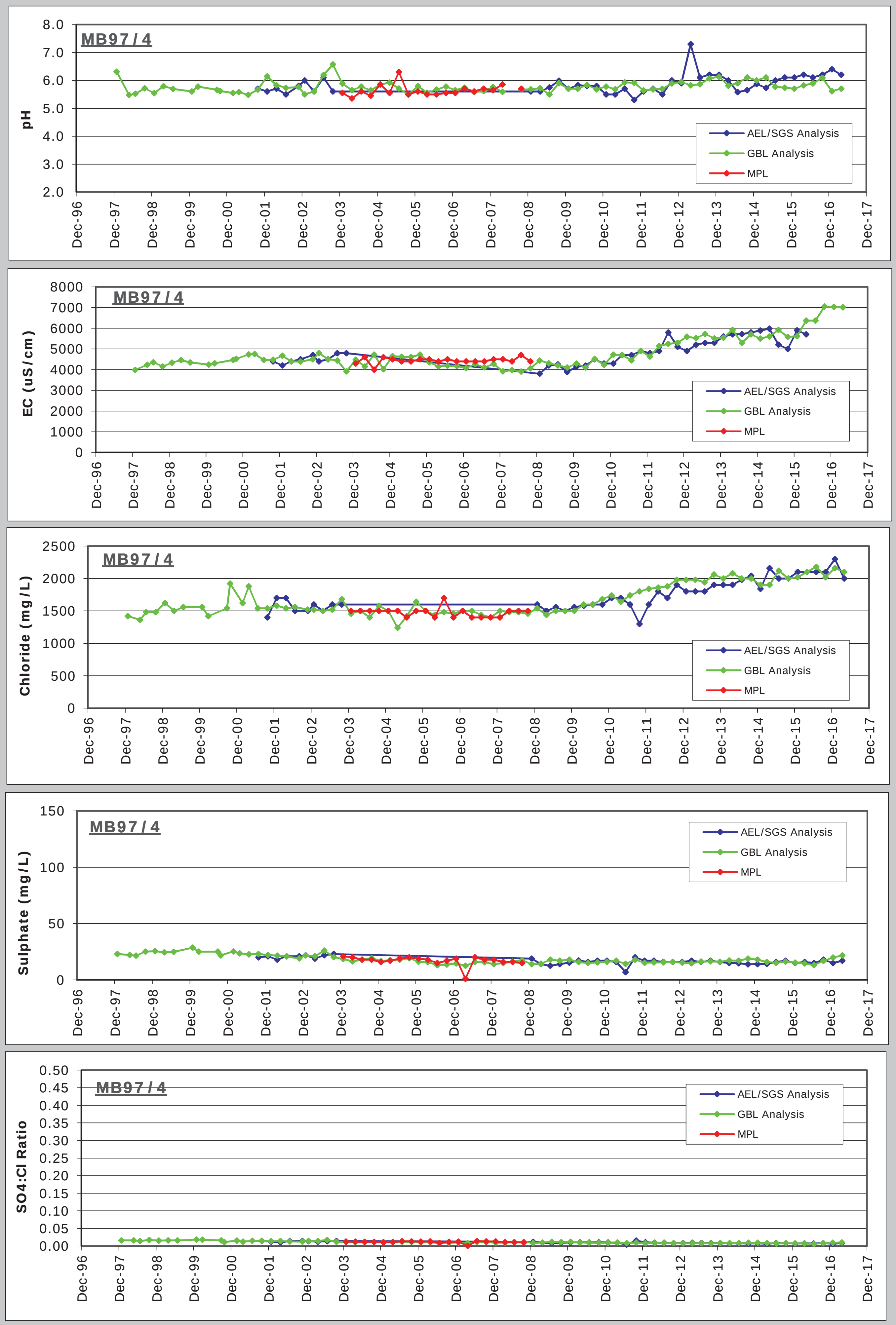
WATER QUALITY MONITORING - MB1 FIGURE 8



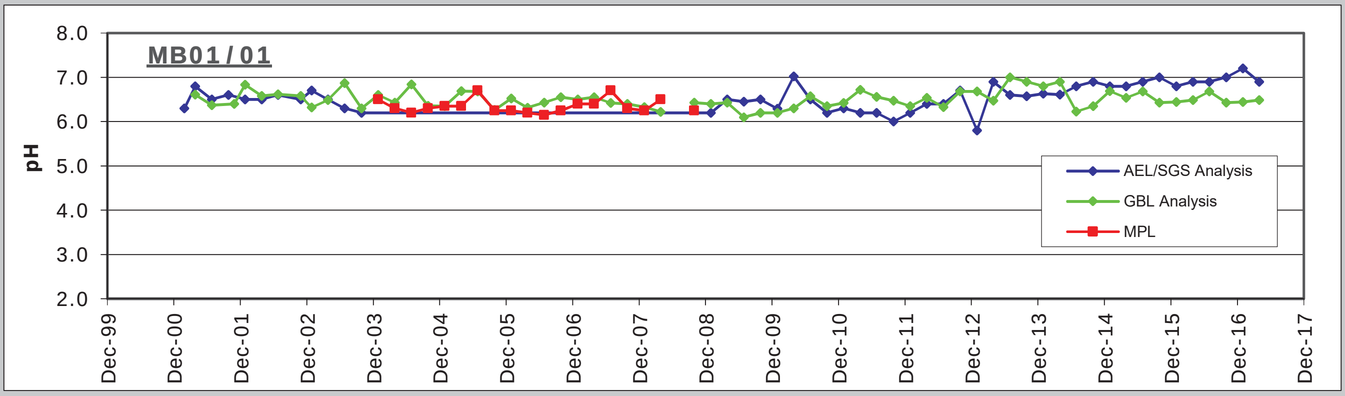
WATER QUALITY MONITORING - MB3 FIGURE 9

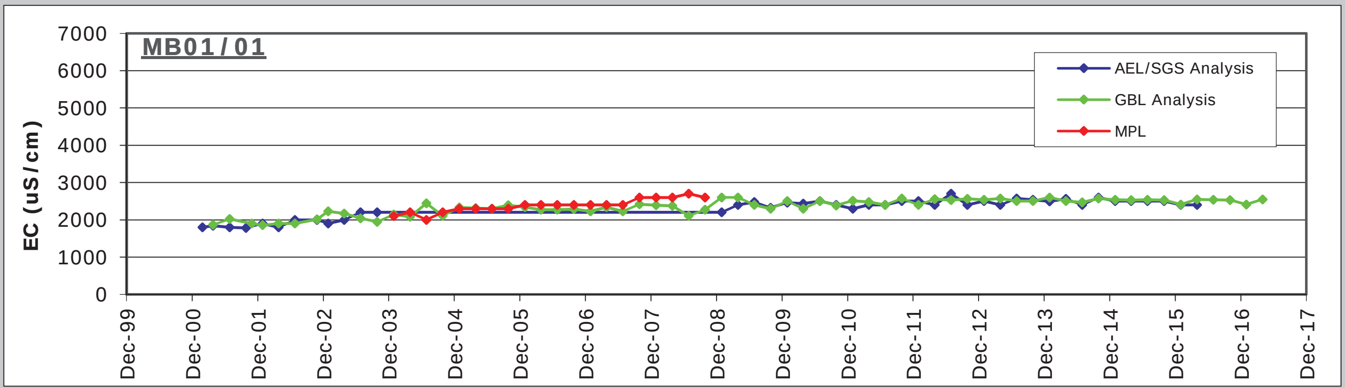


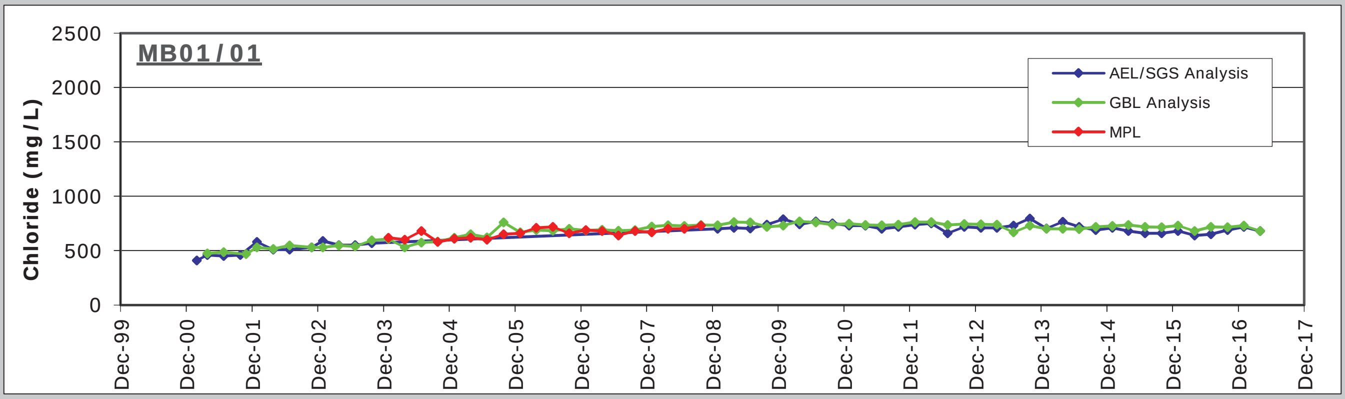
WATER QUALITY MONITORING - MB97 / 3 FIGURE 10

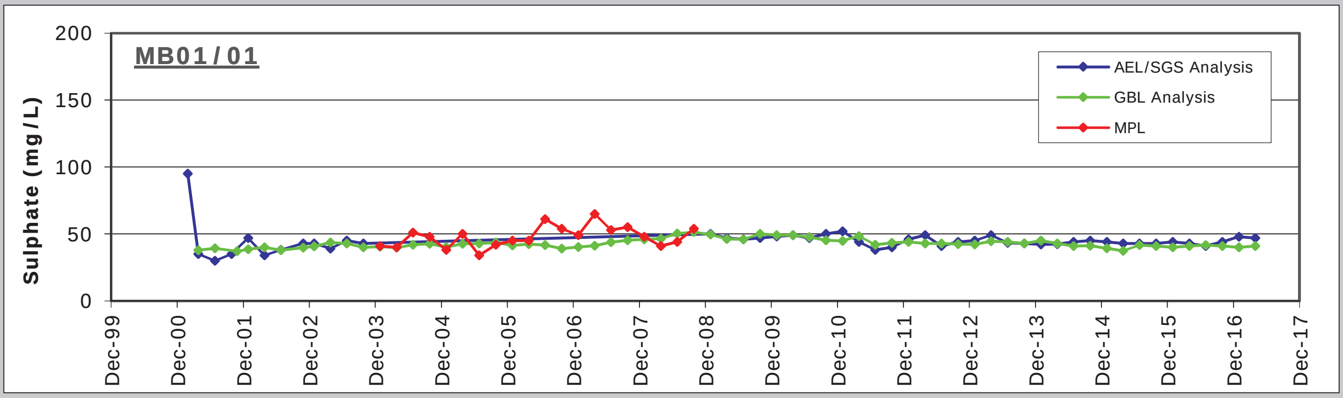


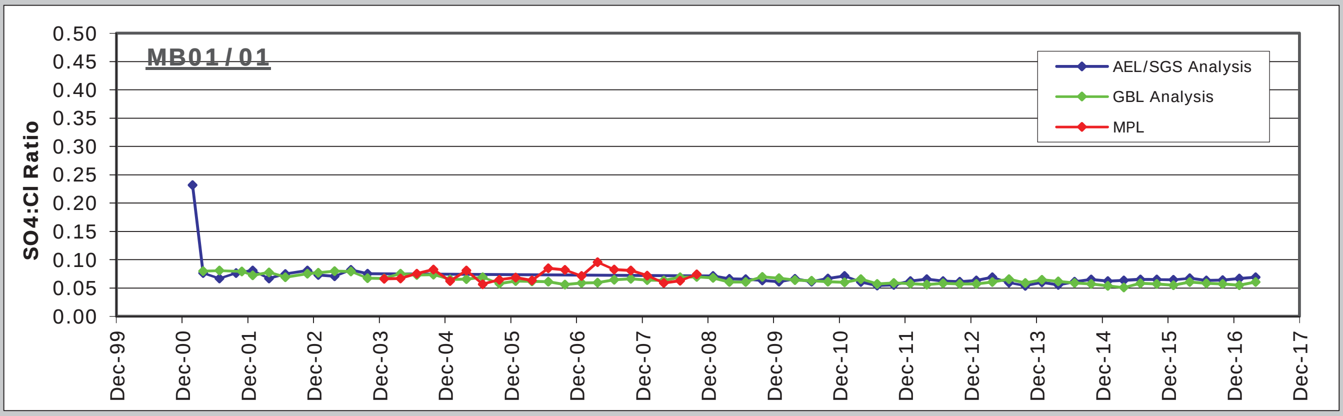
WATER QUALITY MONITORING - MB97 / 4 FIGURE 11



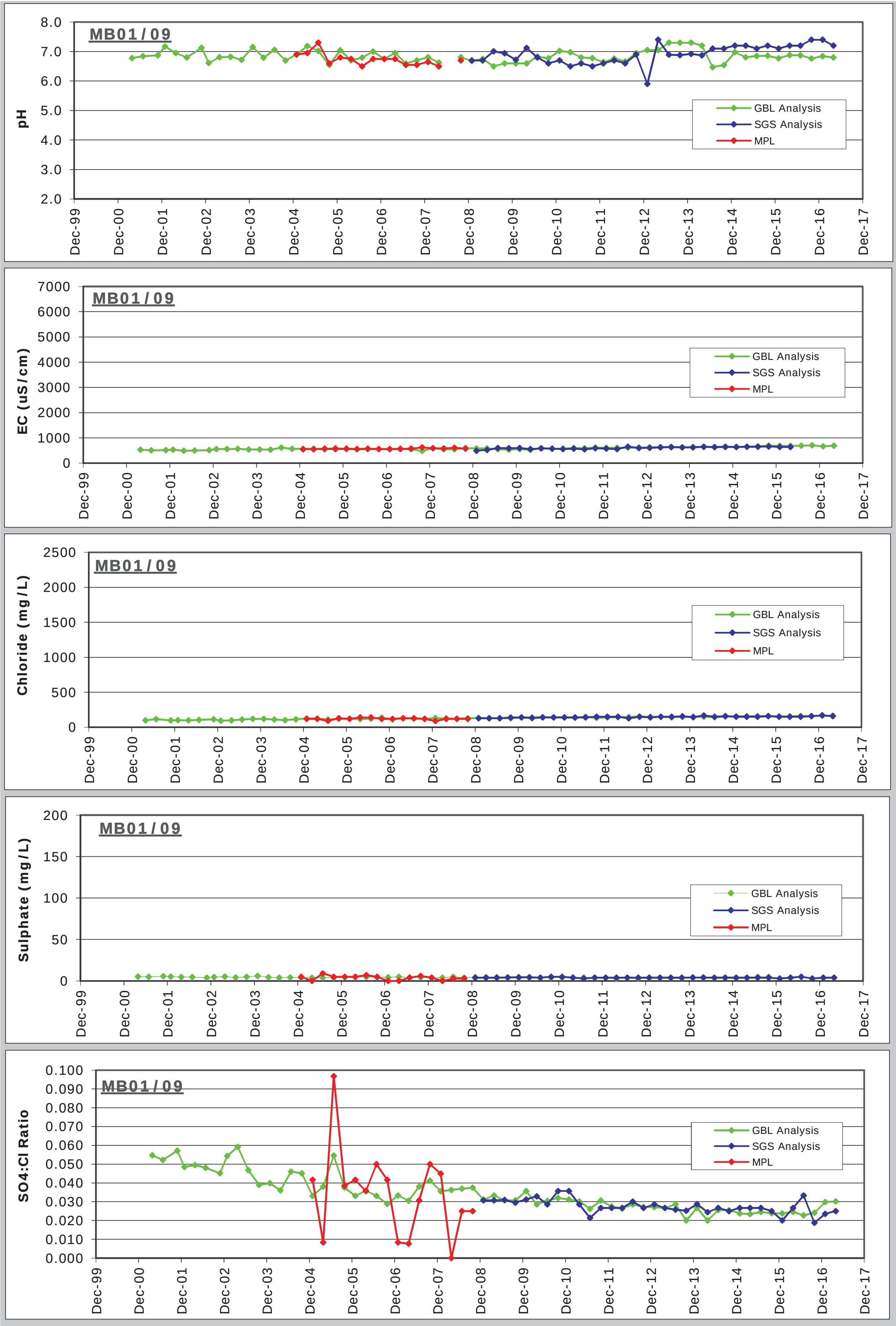




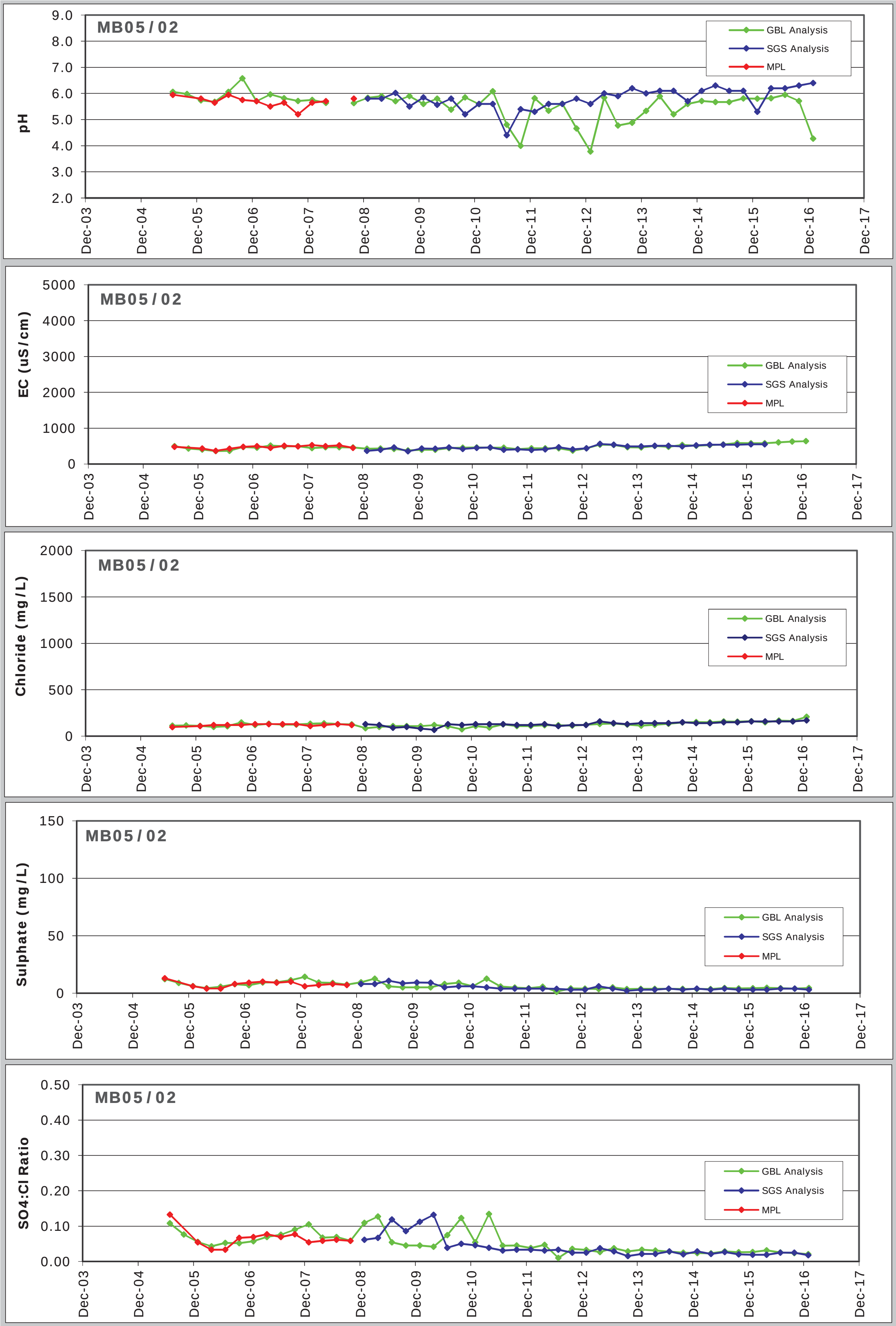




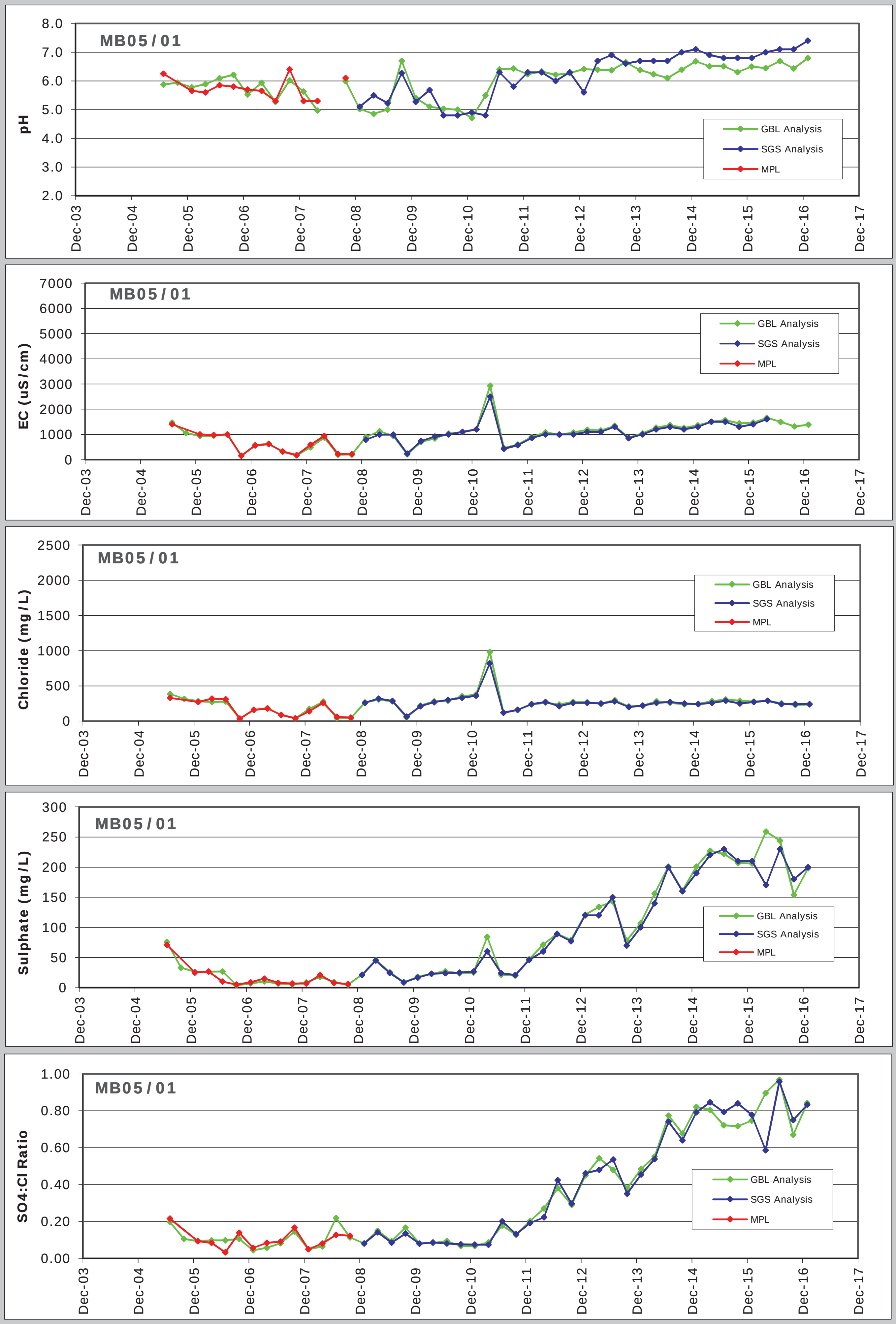
WATER QUALITY MONITORING - MB01/01 FIGURE 12



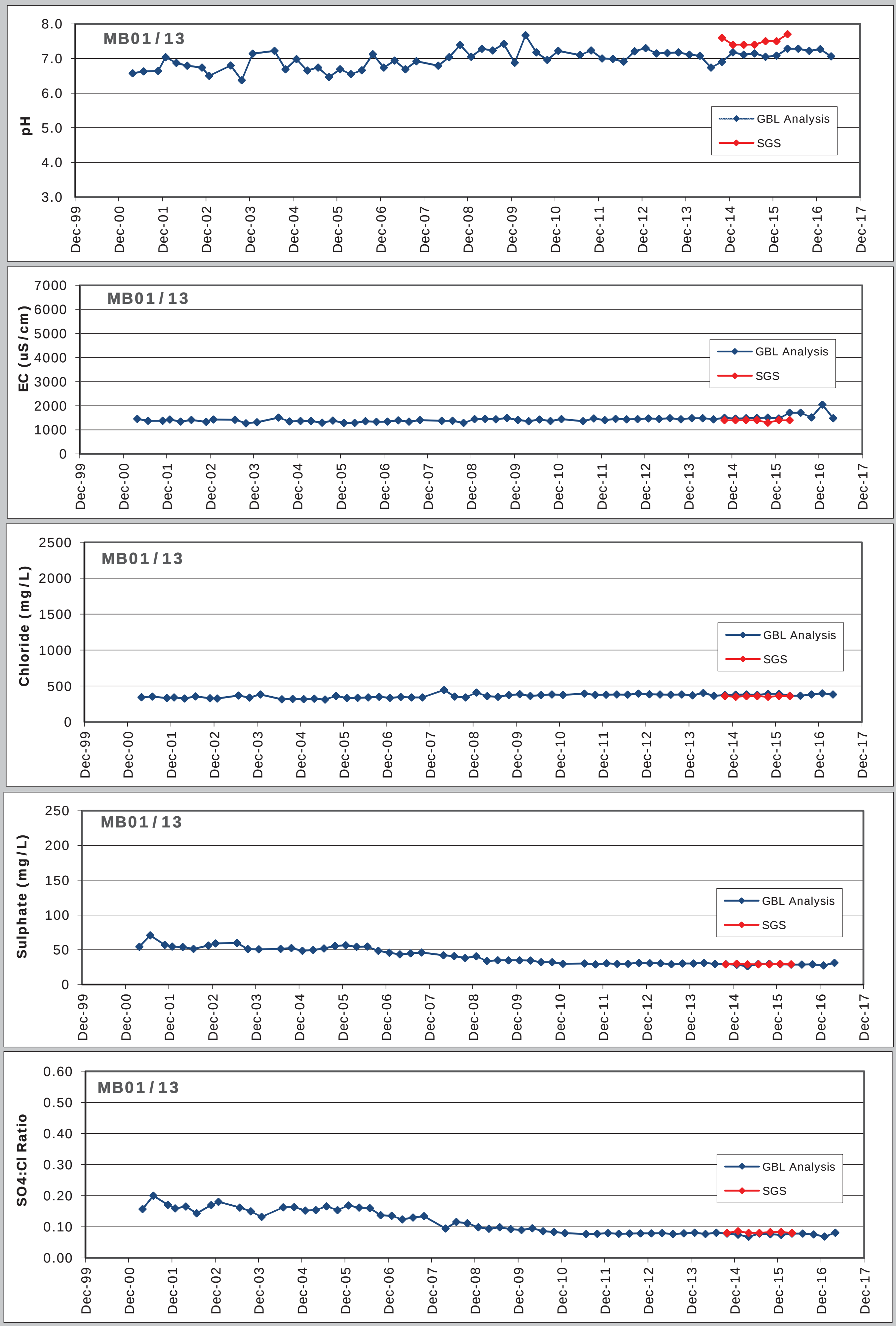
Water Quality Monitoring - MB01/09 FIGURE 13



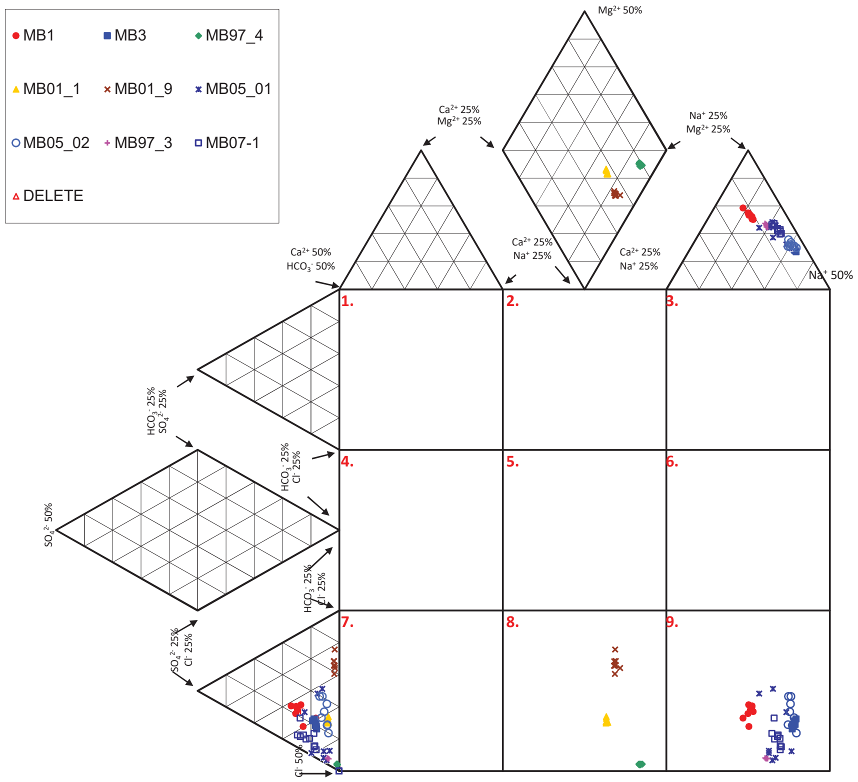
WATER QUALITY MONITORING - MB05 / 02 FIGURE 14



WATER QUALITY MONITORING - MB05/01 FIGURE 15



WATER QUALITY MONITORING - MB01/13 FIGURE 16



WATER TYPE SUB-FIELDS

1. HCO_3^- and Ca^{2+} dominant, frequently indicates recharging waters in limestone, sandstone and many other aquifers.

2. HCO_3^- dominant and eight Mg^{2+} dominant or cations indiscriminant, with Mg^{2+} dominant or Ca^{2+} and Mg^{2+} important, indicates waters often associated with dolomites; where Ca^{2+} and Na^+ are important partial ion exchange may be indicated.

3. HCO_3^- and Na^+ dominant, normally indicates ion-exchanged waters although the generation of CO_2 at depth can produce HCO_3^- where Na^+ is dominant under certain circumstances.

4. SO_4^{2-} dominant or anions indiscriminant and Ca^{2+} dominant, Ca^{2+} and SO_4^{2-} dominant frequently indicates a recharge water in lavas and gypiferous deposits; otherwise a mixed water or a water exhibiting simple dissolution may be indicated.

5. No dominant anion or cation, indicates waters exhibiting simple dissolution or mixing.

6. SO_4^{2-} dominant or anions indiscriminant and Na^+ dominant, is a water type not frequently encountered and indicates probable mixing influences.

7. Cl^- and Ca^{2+} dominant, is infrequently encountered unless cement pollution is present in a well; otherwise the waters may result from reverse ion exchange of Na^+ - Cl^- waters.

8. Cl^- dominant and no dominant cation indicates that the groundwaters may be related to reverse ion exchange of Na^+ - Cl^- waters.

9. Cl^- and Na^+ dominant frequently indicates end-point waters. The Durov diagram does not permit much distinction between Na^+ - Cl^- waters.

Expanded Durov Diagram

Figure 17

Date: 23/05/17

Project: Greenbushes

Project No: S12009

Description: Groundwater Monitoring

Client: Talison Lithium Australia Pty Ltd

HydroCHEM 2.0

4.0 SURFACE WATER MONITORING

Surface water quality monitoring was completed in accordance with Table 1 (Water Monitoring Programme) during the 2016/17 review period. The surface water monitoring results for the Austins-Southampton, Cowan Brook and Norilup dams are discussed below. Water samples were collected by Greenbushes staff and analysed by the internal Greenbushes Laboratory (GBL) and independently by SGS laboratory (SGS), with analyses for radionuclides sub-contracted to Australian Radiation Services (ARS).

4.1 Austins-Southampton Dams

Local reservoirs form part of the Mine Water Circuit (Figure 2). Water for mineral processing is obtained from the Austins-Southampton dams, which are fed from a drainage channel (Austins Drain) that receives excess water flows from the Clear Water Pond (CWP) and general site runoff, and from water returned to the circuit from the Cowan Brook Dam as required during summer. The dams are linked by a valve and display similar water quality values.

4.1.1 Chemical Analysis

Seasonal fluctuations in water quality at Southampton Dam are caused by rainfall events in winter months (increased dilution) and evaporation in summer months (increased concentration). Southampton Dam water samples are collected from the Southampton pump station within the Austins-Southampton reservoir system (refer to sampling point in Figure 1). The Austins-Southampton dams water quality monitoring results for the 2016/17 review period are presented in Table 8, including comparisons against ADWG and ANZECC Guidelines.

Basic Parameters

The historical trends for pH, electrical conductivity (EC), sulphate (SO_4), chloride (Cl) and SO_4:Cl ratio since the commencement of surface water monitoring are displayed in Figure 18, and the raw historical surface water monitoring data for all the parameters is provided in Appendix 5.

During the 2016/17 review period, the pH ranged between 7.88 and 8.89 in Southampton Dam, and between 7.77 and 8.68 in Austins Dam. The EC concentrations ranged between 1,365µS/cm and 1,718µS/cm in Southampton Dam, and between 1337µS/cm and 1740µS/cm in Austins Dam. Therefore, the stable historical trends continued, with slight increase in pH since 2012. The slight ranges in recorded values are due to seasonal influences, with the slightly higher values recorded following the drier summer period and decreasing into winter which experiences increased rainfall runoff events.

The SO_4 concentrations in Southampton Dam increased from 2004 to 2010 (peaking in May 2009 - 345mg/L), and have gradually decreased back to within historical ranges since the 2010/11 review period, ranging between 152 and 180mg/L during the 2016/17 review period. The SO_4 concentrations in the dams have always remained below the ADWG value (500mg/L).

The ratio of SO_4 to Cl (SO_4:Cl), often used as an indicator of industrial activity, follows the same trend as SO_4 concentrations in Southampton Dam. While these values are higher in Southampton Dam by comparison to other surface water sampling points, they have gradually decreased back to within historical ranges since the 2010/11 review period.

The gradual decreasing return of SO_4 concentrations to within historical ranges since the 2010/11 review period is attributed to TLA producing a lot more chemical grade product than technical grade in recent years. Production of technical grade product includes an attrition step which uses sulphuric acid (H_2SO_4). Process improvements have resulted in a reduction in H_2SO_4 in the processing circuit and SO_4 levels are decreasing as a result.

Metals & Metalloids

As discussed in Section 2.5.6 (Lithium & Arsenic Remediation), the key metals or metalloids of focus for TLA to reduce in the Mine Water Circuit are lithium (Li) and arsenic (As), for which the remediation process has commenced. Therefore, historical graphical trends have been included in Appendix 6 for these two analytes.

The concentration of lithium (Li) in both the Austins-Southampton dams exceed the trigger level specified in the ANZECC Guidelines for Irrigation (2.5mg/L). Historically, there has been a trend of increasing lithium concentrations since the 2002/03 review period, when the maximum recorded Li concentration in Southampton Dam was 4.3mg/L. During the 2016/17 review period, the Li concentrations recorded in Southampton Dam ranged between 9.8 and 11.9mg/L, which is similar to the values recorded during the previous six review periods, marking a turning point to the increasing trend (i.e. as per Appendix 6, the maximum Li concentration recorded during the 2015/16 review period was 12.5mg/L, 10.7mg/L in 2014/15, 12.1mg/L in 2013/14, 12.0mg/L in 2012/13, 11.4mg/L in 2011/12, 12.0mg/L in 2010/11 and 9.7mg/L in 2009/10). The Li concentration recorded in Austins Dam during 2016/17 ranged between 10mg/L and 12.9mg/L.

With the exception of arsenic (As), and minor extent iron (Fe), the concentration of all other trace metals and major ions recorded in the Southampton Dam are low and below the ADWG values. The arsenic values recorded in the Austins-Southampton dams during 2016/17 continued to be above the ADWG value of 0.01mg/L. Arsenic ranged from 0.046 to 0.15mg/L in Southampton Dam, and from 0.067mg/L to 0.18mg/L in Austins Dam. As displayed in Appendix 6, there has been an increasing trend of arsenic levels in the Mine Water Circuit since 2010, with the highest level recorded in April 2016 (0.185mg/L). The elevated arsenic levels in the Mine Water Circuit since 2010 appears to be associated with the increased volumes of spodumene ore being mined and processed to produce chemical grade spodumene.

As detailed in Section 2.5.6 (Lithium & Arsenic Remediation), the increasing trend in arsenic levels was identified by TLA in 2012 and in early 2013 an Arsenic Water Treatment Unit (AWTU) was installed, followed by a second unit in June 2013, and a third unit was installed and commissioned by GAMG in early 2015. Both TLA units recirculate water in and out of the CWP. During 2013/14 there were a number of issues that prevented the units from operating continuously. This resulted in reduced run-time and also delayed the optimisation of the units. These issues have now been resolved, including alteration of the configuration of the units so that they recirculate water out of the CWP when they are not being used to treat water coming into the circuit from the mining pits. Arsenic levels are monitored closely by TLA at weekly water management meetings and if the arsenic increasing trends are not arrested, further controls will be investigated.

Radioactive Elements

SGS laboratory results indicate that the concentrations of both Th and U in Southampton Dam are low, with <0.005mg/L values recorded during the review period.

4.1.2 Radionuclide Activity

Radionuclide activity recorded in the Austins-Southampton dams during the 2016/17 review period is presented in Table 7. The data indicates that radionuclide activity continued to remain stable and below the trigger values in the Austins-Southampton dams.

Table 7: Radionuclide Activity in Austins-Southampton Dams (Bq/L)

Surface Water ID	Ra-226		Ra-228	
	Jul-16	**Jan-17**	**Jul-16**	**Jan-17**
Southampton	0.004	0.002	<0.13	<0.16
Austins	0.003	0.005	<0.15	<0.14
Trigger Value	**5Bq/L**		**2Bq/L**	

Note: The Ra-226 and Ra-228 trigger values are obtained from the Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values for irrigation water. MDL= Minimum Detectable Limit

Table 8: Surface Water Quality Results for Austins-Southampton Dams

Parameter	*ADWG*	*ANZECC – Irrigation LTV*	*ANZECC – Irrigation STV*	*ANZECC – Livestock*	*ANZECC – Freshwater (95%)*	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17
Southampton Dam																
Redox Potential	-	-	-	-	-	94	8	9	38	-25	-77	-8	-49	14	24	-
Dissolved Oxygen	-	-	-	-	*9.5*	10.0	8.9	9.1	9.8	7.7	8.5	9.1	7.4	9.9	9.3	-
Field - pH	**6.5-8.5*	-	-	-	-	8.51	8.08	7.88	7.89	8.43	8.89	8.67	8.53	8.7	8.6	8.47
EC	**1000*	-	-	-	-	1624	1440	1447	1483	1365	1404	1471	1585	1627	1685	1718
TDS	**500*	*600*	*1000-2000*	*1000-2000*	*2000-5000*	923	773	811	762	769	776	834	986	921	969	960
Fe	**0.3*	*0.2*	*10*	-	-	0.273	0.24	0.146	0.216	0.282	0.098	0.084	0.073	0.06	0.071	0.094
Na	**180*	*460*	-	-	-	259	233	218	208	217	218	229	237	250	258	253
K	-	-	-	-	-	10	9	9	8.3	8.7	8.9	9.2	9.4	9.5	10	9.6
Ca	-	-	-	*1000*	-	26.1	26	26.8	25.9	26.6	27	26.5	24.7	26.1	27.3	26.4
Mg	-	-	-	-	-	25.6	22.3	20.7	20	20.7	21.4	22.5	23.5	27.1	27.8	27.6
Cl	**250*	*700*	*700*	-	-	302	260	245	228	233	240	243	290	274	314	383
CO_3	-	-	-	-	-	0.92	0	1.19	2.74	4.28	5.62	8.11	0	7.14	2.39	0
HCO_3	-	-	-	-	-	238	209	186	176	183	185	183	207	191	216	108
SO_4	*500*	-	-	*1000-2000*	-	152	155	170	162	170	173	180	175	174	180	174
NO_3	*50*	-	-	*1500*	*700*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.45	<0.2	<0.2	0.28
As	*0.01*	*0.1*	*2*	*0.5-5*	*13-24*	0.116	0.085	0.077	0.052	0.046	0.057	0.092	0.126	0.13	0.15	0.141
Cd	*0.002*	*0.01*	*0.05*	*0.01*	*0.2*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Co	-	*0.05*	*0.1*	*1*	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cu	*2*	*0.2*	*5*	*0.4-5*	*1.4*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn	*0.5*	*0.2*	*10*	-	*1900*	0.056	0.044	0.018	0.018	0.039	0.042	0.032	0.051	0.051	0.049	0.056
Ni	*0.02*	*0.2*	*2*	*1*	*11*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005
PO_4	-	*0.05*	*0.8-12*	-	-	<0.06	0.06	<0.06	<0.06	0.07	<0.06	<0.06	0.09	0.18	0.13	<0.06
Li	-	*2.5*	*2.5*	-	-	11.9	10.7	10.6	9.8	10.2	10.3	10.7	10.7	10.6	10.9	10.3
Zn	**3*	*2*	*5*	*20*	*8*	<0.005	<0.005	<0.005	<0.005	<0.005	0.068	0.009	0.005	<0.005	<0.005	<0.005
Pb	*0.01*	*2*	*5*	*0.1*	*3.4*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Th#	-	-	-	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-
U#	*0.02*	*0.01*	*0.1*	*0.2*	-	0.002	-	-	0.003	-	-	0.003	-	-	0.004	-
Austins Dam																
Redox Potential	-	-	-	-	-	81	1	2	21	-34	-62	-35	7	4	36	-
Dissolved Oxygen	-	-	-	-	*9.5*	10.4	9.2	8.7	10.2	7.2	8.2	8.2	8.7	11.0	8.5	-
Field - pH	**6.5-8.5*	-	-	-	-	8.14	7.97	7.91	7.77	8.33	8.67	8.47	8.45	8.68	8.56	8.41
EC	**1000*	-	-	-	-	1630	1389	1416	1356	1337	1384	1468	1584	1623	1700	1740
TDS	**500*	*600*	*1000-2000*	*1000-2000*	*2000-5000*	919	772	791	741	748	762	822	902	928	1000	968
Fe	**0.3*	*0.2*	*10*	-	-	0.038	0.077	0.072	0.029	0.065	0.042	0.012	0.008	0.043	0.119	0.132
Na	**180*	*460*	-	-	-	257	226	214	199	203	210	223	234	253	258	257
K	-	-	-	-	-	10.4	9	9	8.3	8.5	8.7	9.1	9.3	9.8	10.2	9.9
Ca	-	-	-	*1000*	-	27.6	26.5	26.7	25.8	27.3	29.4	30.2	29.7	30.2	30.8	31.4
Mg	-	-	-	-	-	23.9	21	20.1	19.1	19.8	21	22.3	23.8	26.8	27.2	27.4
Cl	**250*	*700*	*700*	-	-	277	243	233	215	220	228	236	285	277	299	343
CO_3	-	-	-	-	-	2.43	0	0	4.14	2.77	7.6	9.37	11.2	11.3	5.18	0
HCO_3	-	-	-	-	-	214	196	182	162	178	175	183	188	187	214	182
SO_4	*500*	-	-	*1000-2000*	-	192	175	178	167	171	176	181	182	188	195	201
NO_3	*50*	-	-	*1500*	*700*	<0.2	<0.2	0.25	<0.2	<0.2	<0.2	<0.2	0.47	<0.2	<0.2	<0.2
As	*0.01*	*0.1*	*2*	*0.5-5*	*13-24*	0.147	0.118	0.087	0.067	0.074	0.08	0.151	0.179	0.175	0.132	0.091
Cd	*0.002*	*0.01*	*0.05*	*0.01*	*0.2*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Co	-	*0.05*	*0.1*	*1*	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Parameter	*ADWG*	*ANZECC – Irrigation LTV*	*ANZECC – Irrigation STV*	*ANZECC – Livestock*	*ANZECC – Freshwater (95%)*	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17
Cu	*2*	*0.2*	*5*	*0.4-5*	*1.4*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn	*0.5*	*0.2*	*10*	*-*	*1900*	0.024	0.018	0.053	<0.005	0.037	0.091	0.104	0.129	0.145	0.137	0.144
Ni	*0.02*	*0.2*	*2*	*1*	*11*	<0.005	<0.005	<0.005	<0.005	<0.005	0.011	0.008	<0.005	<0.005	<0.005	<0.005
PO_4	*-*	*0.05*	*0.8-12*	*-*	*-*	0.82	0.1	<0.06	<0.06	<0.06	<0.06	<0.06	0.14	0.21	0.22	<0.06
Li	*-*	*2.5*	*2.5*	*-*	*-*	12.9	11.2	10.6	9.7	9.8	10	10.6	10.7	11.1	11.2	10.9
Zn	**3*	*2*	*5*	*20*	*8*	0.048	<0.005	<0.005	<0.005	<0.005	0.013	0.011	0.01	<0.005	<0.005	<0.005
Pb	*0.01*	*2*	*5*	*0.1*	*3.4*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Th#	*-*	*-*	*-*	*-*	*-*	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-
U#	*0.02*	*0.01*	*0.1*	*0.2*	*-*	0.004	-	-	0.004	-	-	0.003	-	-	0.003	-

Note: All concentrations in mg/L with the exception of redox potential (mV), pH and EC (µS/cm).
Green indicates *Australian Drinking Water Guidelines* (NHMRC, 2011) values, with * indicating aesthetic value only (as opposed to heath). Note: there is no DER requirement to demonstrate compliance with these values.
# Indicates where SGS data has been used instead of GBL data to improve LOR.

4.2 Cowan Brook Dam

The Cowan Brook Dam is located on a creek and receives overflow during the wet winter months from the Austins Dam spillway to the north, in addition to overflow from the TSF2 seepage collection sump to the east, which is minimised by TLA through maximising the pumping capacity to return the majority of the water to the processing circuit. Historically seepage from below the Austins Dam wall has flowed to a tributary of the Cowan Brook. A solar pump was installed at the seepage pond in early 2016 and the water is now being returned to the dam. The Cowan Brook Dam is used to supply make-up water into the water circuit via the Southampton Dam during the summer months (see Figure 2).

During some winters when there are concerns for the replenishment of water levels in Cowan Brook Dam, water is pumped back to Cowan Brook Dam from the downstream Norilup Dam. This only commences when Norilup Dam is full and overflowing.

4.2.1 Chemical Analysis

Seasonal fluctuations in water quality at Cowan Brook Dam are caused by rainfall events in winter months (increased dilution) and evaporation in summer months (increased concentration). Cowan Brook Dam water samples are collected near the spillway at the north-west corner of the dam wall within the Cowan Brook reservoir system (refer to sampling point in Figure 1). The Cowan Brook Dam water quality monitoring results for the 2016/17 review period are presented in Table 10, including comparisons against ADWG and ANZECC Guidelines.

Basic Parameters

The historical trends for pH, electrical conductivity (EC), sulphate (SO_4), chloride (Cl) and SO_4:Cl ratio since the commencement of surface water monitoring are displayed in Figure 18, and the raw historical surface water monitoring data for all the parameters is provided in Appendix 5.

During the 2016/17 review period, the pH varied between 7.47 and 8.75, continuing the long-term gradual increasing trend. The EC concentrations ranged between 1,591µS/cm and 1,794µS/cm, remaining stable since the slight increase during the 2010/11 review period.

Similar to Southampton Dam, SO_4 concentrations (and SO_4:Cl ratio) in Cowan Brook Dam increased from 1999 to 2010 (peaking in March 2010 - 168mg/L), and have remained stable with a slight decrease since the 2010/11 review period, ranging between 118mg/L and 129mg/L during the 2016/17 review period. The SO_4 concentrations in the dams have always remained below the ADWG value (500mg/L).

The stabilisation and slight decrease of SO_4 concentrations since the 2010/11 review period, together with a coinciding gradual increase in pH, is attributed to TLA producing a greater quantity of chemical grade product than technical grade in recent years. Production of technical grade product includes an attrition step which uses sulphuric acid (H_2SO_4). Process improvements have resulted in a reduction in H_2SO_4 in the processing circuit and SO_4 levels are decreasing as a result.

Metals & Metalloids

As discussed in Section 2.5.6 (Lithium & Arsenic Remediation), the key metals or metalloids of focus for TLA to reduce in the Mine Water Circuit are lithium (Li) and arsenic (As), for which the remediation process has commenced. Therefore, historical graphical trends have been included in Appendix 6 for these two analytes.

While the concentrations of lithium (Li) in Cowan Brook Dam are typically half those measured in the Southampton Dam (showing that the higher Li concentrations are contained within the process water circuit), they still exceed the trigger level specified in the ANZECC Guidelines for Irrigation (2.5mg/L). The concentrations of Li recorded in Cowan Brook Dam over the 2016/17 review period were between 6.4 and 7.3mg/L, similar to the previous 2015/16 review period (between 6.8 and 7.7mg/L) and slightly higher than the maximum values recorded during earlier review periods (i.e. as per Appendix 6, 5.5mg/L in 2009/10, 6.2mg/L in 2010/11, 6.6mg/L in 2011/12, 6.5mg/L in 2012/13 and 7.2mg/L in 2013/14), thus marking a turning point to the long-term trend of increasing lithium concentrations.

The concentration of all trace metals and major ions recorded in the Cowan Brook Dam are below the ADWG values. The arsenic values recorded in Cowan Brook Dam during the 2016/17 review period continued to be around 0.005mg/L, which is half the ADWG value (0.01mg/L), with the maximum recorded value being 0.018mg/L in October 2014. When compared to historical data (Appendix 5 and 6), these values have typically remained stable over time.

As detailed in Section 2.5.6 (Lithium & Arsenic Remediation), the increasing trend in arsenic levels within the Southampton Dam has been noted by TLA. In response, TLA installed x2 Arsenic Water Treatment Unit (AWTU) systems in 2013. Arsenic levels are monitored closely by TLA at weekly water management meetings and if the arsenic increasing trends are not arrested, further controls will be investigated.

Radioactive Elements

SGS laboratory results indicate that concentrations of both Th and U in Cowan Brook Dam are low, with <0.001mg/L values recorded during the review period.

4.2.2 Radionuclide Activity

Radionuclide activity recorded in Cowan Brook Dam during the 2016/17 review period is presented in Table 9, indicating that radionuclide activity continued to remain relatively stable and below the trigger values in the Cowan Brook reservoir.

Table 9: Radionuclide Activity in Cowan Brook Dam (Bq/L)

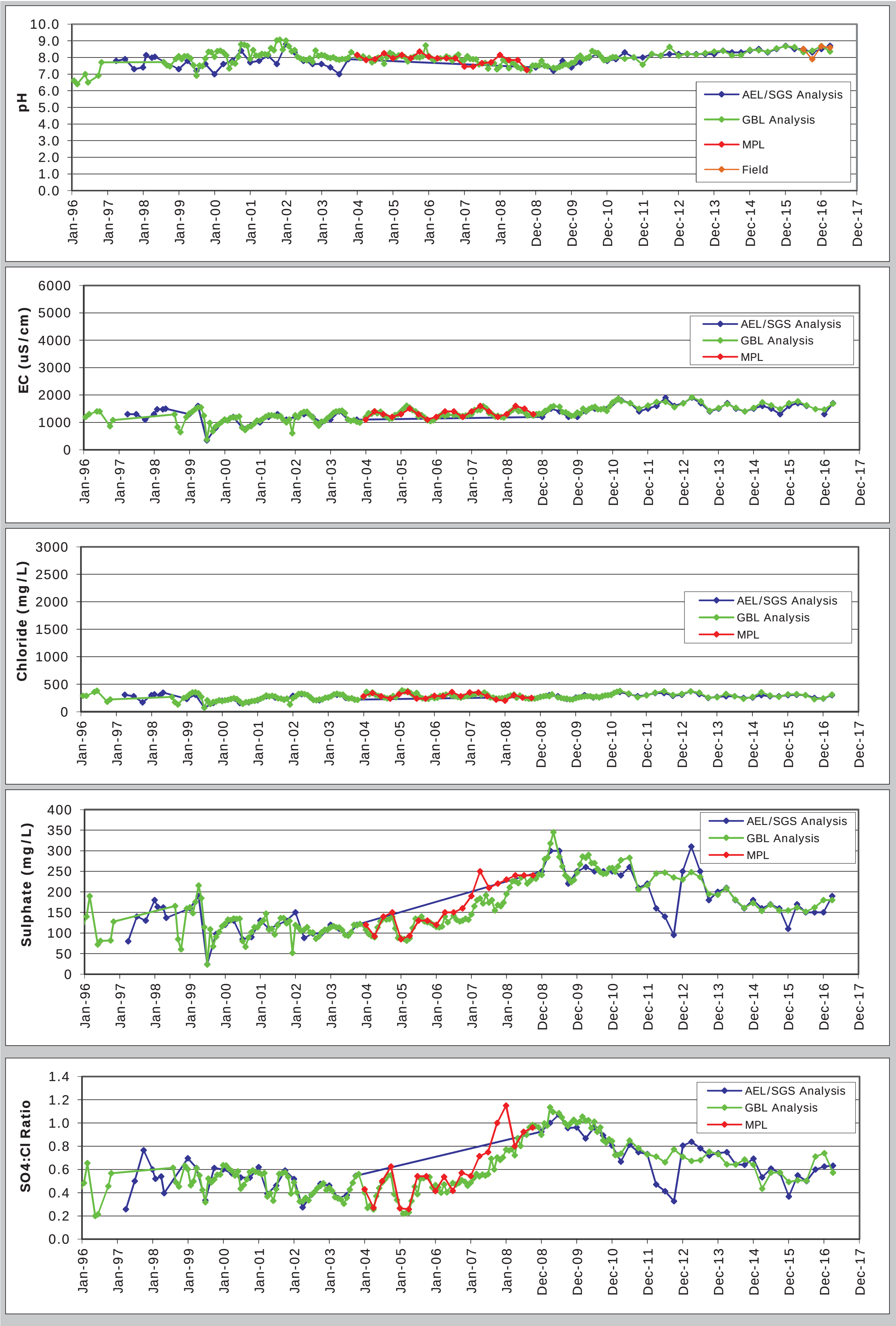
Surface Water ID	Ra-226		Ra-228	
	Jul-16	Jan-17	Jul-16	Jan-17
D2	0.007	0.008	<0.22	<0.12
Trigger Value	**5Bq/L**		**2Bq/L**	

Note: The Ra-226 and Ra-228 trigger values are obtained from the Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values for irrigation water. MDL= Minimum Detectable Limit

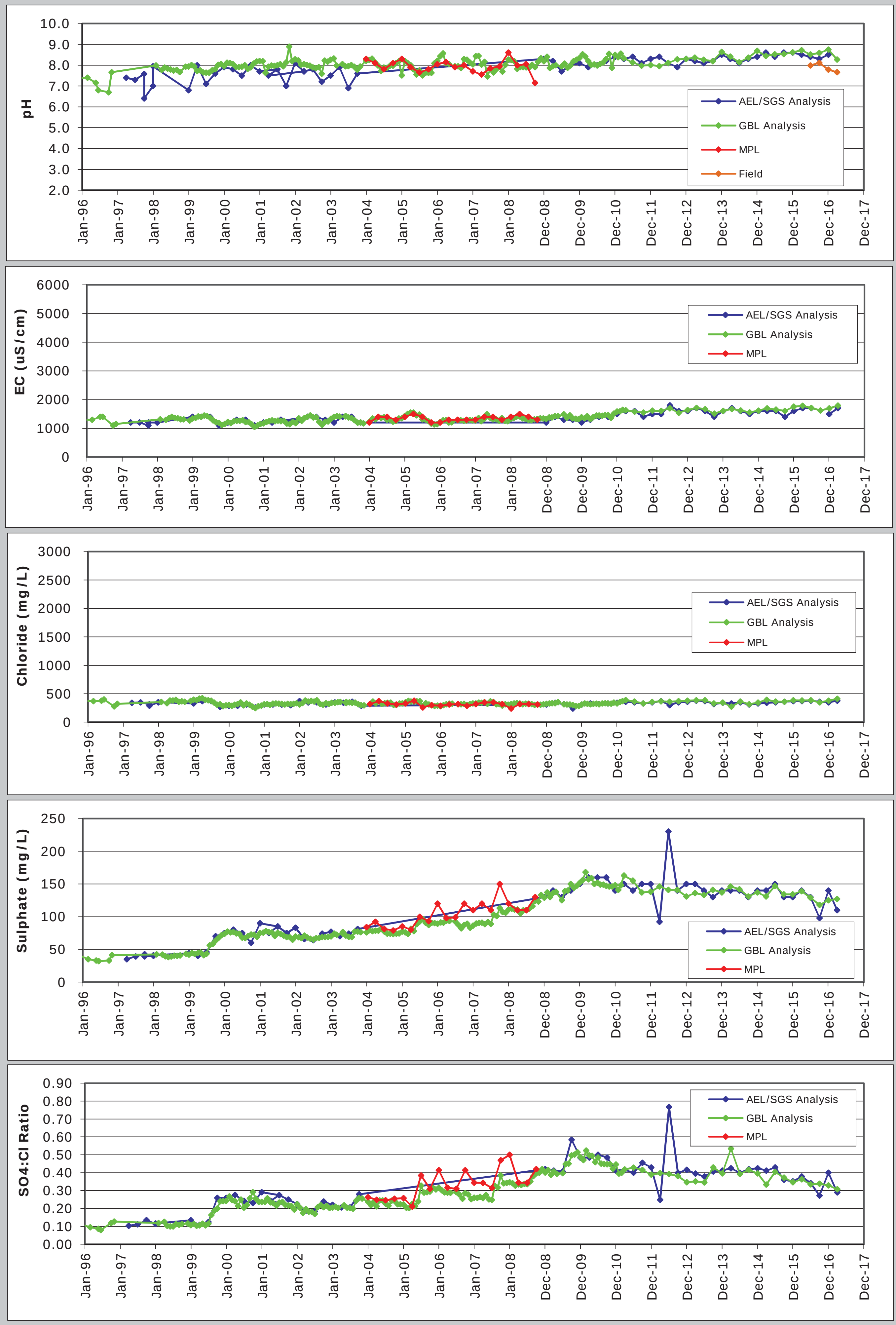
Table 10: Surface Water Quality Results for Cowan Brook Dam

Parameter	*ADWG*	*ANZECC – Irrigation LTV*	*ANZECC – Irrigation STV*	*ANZECC – Livestock*	*ANZECC – Freshwater (95%)*	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17
Redox Potential	-	-	-	-	-	153	57	37	75	5	-3	8	20	-12	22	-
Dissolved Oxygen	-	-	-	-	**9.5**	10.6	8.9	9.5	9.7	8.0	8.5	8.3	8.5	8.4	9.3	-
Field pH	**6.5-8.5*	-	-	-	-	7.99	7.79	7.47	8.11	8.17	8.75	7.78	8.38	7.86	7.66	7.71
EC	**1000*	-	-	-	-	1708	1591	1689	1624	1632	1609	1698	1771	1773	1794	1770
TDS	**500*	*600*	*1000-2000*	*1000-2000*	*2000-5000*	945	873	889	859	883	886	921	1040	972	1000	954
Fe	**0.3*	*0.2*	*10*	-	-	0.019	0.043	0.037	0.037	0.043	0.022	<0.005	<0.005	0.019	0.033	0.022
Na	**180*	*460*	-	-	-	266	250	251	244	252	249	258	260	268	269	269
K	-	-	-	-	-	7.9	7.2	7.4	7	7.3	7.4	7.6	7.6	7.8	8	8
Ca	-	-	-	*1000*	-	24.8	23.7	24.4	24.1	25.2	24.6	24.8	23.9	24.8	24.8	24.3
Mg	-	-	-	-	-	36	33.4	33.8	33	33.9	34.1	35.5	35.3	37.1	37	36.9
Cl	**250*	*700*	*700*	-	-	386	386	383	349	364	375	380	406	394	413	411
CO_3	-	-	-	-	-	4.21	4.7	6.37	4.74	8.58	14.1	8.42	8.17	7.48	0	-
HCO_3	-	-	-	-	-	143	134	130	133	132	118	138	142	146	167	167
SO_4	*500*	-	-	*1000-2000*	-	129	118	119	118	120	121	125	123	127	127	128
NO_3	*50*	-	-	*1500*	*700*	<0.2	0.31	<0.2	<0.2	<0.2	<0.2	0.22	<0.2	<0.2	<0.2	0
As	*0.01*	*0.1*	*2*	*0.5-5*	*13-24*	0.003	0.001	0.002	0.003	0.003	0.004	0.004	0.005	0.005	0.004	0.005
Cd	*0.002*	*0.01*	*0.05*	*0.01*	*0.2*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Co	-	*0.05*	*0.1*	*1*	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Cu	*2*	*0.2*	*5*	*0.4-5*	*1.4*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Mn	*0.5*	*0.2*	*10*	-	*1900*	<0.005	0.005	0.006	0.006	0.014	0.018	0.016	0.012	0.008	0.015	0.01
Ni	*0.02*	*0.2*	*2*	*1*	*11*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	-
PO_4	-	*0.05*	*0.8-12*	-	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.1	<0.06	-
Li	-	*2.5*	*2.5*	-	-	7.3	6.7	6.6	6.4	6.6	6.5	6.8	6.7	7.1	7.1	6.8
Zn	**3*	*2*	*5*	*20*	*8*	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	0.006	0.012	<0.005	<0.005	-
Pb	*0.01*	*2*	*5*	*0.1*	*3.4*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Th#	-	-	-	-	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-
U#	*0.02*	*0.01*	*0.1*	*0.2*	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-

Note: All concentrations in mg/L with the exception of redox potential (mV), pH and EC (µS/cm).
Green indicates *Australian Drinking Water Guidelines* (NHMRC, 2011) values, with * indicating aesthetic value only (as opposed to heath). Note: there is no DER requirement to demonstrate compliance with these values.
# Indicates where SGS data has been used instead of GBL data to improve LOR.



WATER QUALITY MONITORING - SOUTHAMPTON DAM FIGURE 18



WATER QUALITY MONITORING - COWAN BROOK DAM FIGURE 19

4.3 Norilup Dam

The Cowan Brook Dam overflows via Cowan Brook to Norilup Dam during most winter seasons due to rainfall within the catchments, hence the Norilup Dam has downstream connectivity to the Mine Water Circuit and the reason for it being added to the water monitoring programme (Table 1) in the updated DER Licence (July 2016).

4.3.1 Chemical Analysis

Like Cowan Brook Dam, seasonal fluctuations in water quality at Norilup Dam are caused by rainfall events in winter months (increased dilution) and evaporation in summer months (increased concentration). Norilup Dam water samples are collected from the Norilup pump station (refer to sampling point in Figure 1). The Norilup Dam water quality monitoring results for the 2016/17 review period are presented in Table 12, including comparisons against the DER Licence limit values. The raw historical surface water monitoring data for all the parameters is provided in Appendix 5.

Basic Parameters

During the 2016/17 review period, the pH varied between 7.73 and 8.9, and the EC concentrations ranged between 788µS/cm and 1,693µS/cm.

The SO_4 concentrations in Norilup Dam (up to 62mg/L during the 2016/17 review period) are lower than in Austins-Southampton dams (180mg/L) and Cowan Brook Dam (129mg/L) due to this reservoir being further downstream from the Mine Water Circuit.

Metals & Metalloids

As discussed in Section 2.5.6 (Lithium & Arsenic Remediation), the key metals or metalloids of focus for TLA to reduce in the Mine Water Circuit are lithium (Li) and arsenic (As), for which the remediation process has commenced. Therefore, historical graphical trends have been included in Appendix 6 for these two analytes.

Compared to Austins-Southampton dams and Cowan Brook Dam, the levels of both lithium and arsenic in Norilup Dam are below guideline and DER limit values, indicating elevated levels are not flowing downstream into the Blackwood River. The highest lithium level recorded in Norilup Dam over the 2016/17 review period was 2.3mg/L, which is below the trigger level specified in the ANZECC Guidelines for Irrigation (2.5mg/L), and below the DER Licence limit (5mg/L).

The concentration of all trace metals and major ions recorded in Norilup Dam are below guideline and DER limit values. The arsenic values recorded in Norilup Dam during the 2016/17 review period continued to be around 0.001mg/L, which is 10-fold lower than the DER Licence limit and ADWG value (0.01mg/L).

Radioactive Elements

SGS laboratory results indicate that concentrations of both Th and U in Cowan Brook Dam are low, with <0.001mg/L values recorded during the review period.

4.3.2 Radionuclide Activity

Radionuclide activity recorded in Norilup Dam during the 2016/17 review period is presented in Table 11, indicating that radionuclide activity continued to remain relatively stable and below the trigger values in all reservoirs.

Table 11: Radionuclide Activity in Cowan Brook Dam (Bq/L)

Surface Water ID	Ra-226		Ra-228	
	Jul-16	Jan-17	Jul-16	Jan-17
D2	0.035	0.004	<0.130	<0.140
Trigger Value	**5Bq/L**		**2Bq/L**	

Note: The Ra-226 and Ra-228 trigger values are obtained from the Australian and New Zealand Environment and Conservation Council (ANZECC) trigger values for irrigation water. MDL= Minimum Detectable Limit

Table 12: Surface Water Quality Results for Norilup Dam

Parameter	*DER Licence Limit values*	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17
Redox Potential	-	105	22	79	72	5	-14	-35	25	45	54	-
Dissolved Oxygen	-	10.4	10.3	9.7	8.7	10.2	12.4	9.9	9.0	11.2	9.1	-
Field pH	*6 - 9*	8.40	8.35	7.69	8.21	8.80	7.58	8.8	7.73	8.79	8.9	7.75
EC	-	1693	1163	1039	857	788	821	1030	1190	1209	1300	1358
TDS	-	873	603	547	430	406	460	551	704	637	729	694
Fe	-	0.121	0.218	0.292	0.245	0.186	0.219	0.177	0.119	0.125	0.108	0.074
Na	-	249	179	154	120	116	135	157	170	183	193	197
K	-	4.9	3.4	4	2.4	2.2	2.4	2.7	3	3.2	3.5	3.2
Ca	-	26.4	18.6	14.7	11.9	11.5	13.7	15.4	17	18.3	19.1	19
Mg	-	42.5	29.8	22.4	19.7	19.4	22.7	25.3	27.2	29.3	30.3	30.8
Cl	-	446	308	242	202	202	233	251	322	301	331	368
CO_3	-	0	0	0	0	3.71	11.4	9.55	3.52	6.43	4.12	-
HCO_3	-	91	70	77	60	51	38	51	79	77	91	67
SO_4	-	62	40.2	53.5	27.1	20.3	24.2	27.1	27.4	30.4	31.8	35.9
NO_3	-	<0.2	0.34	0.23	<0.2	<0.2	0.69	<0.2	<0.2	<0.2	<0.2	0
As	*0.01*	0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
Cd	*0.002*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Co	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Cu	*2*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Mn	*0.5*	0.009	0.022	0.024	0.021	0.033	0.046	0.043	0.047	0.037	0.025	0.02
Ni	*0.02*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
PO_4	-	<0.06	0.11	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.06	-
Li	*5*	2.2	1.1	2.3	0.67	0.24	0.3	0.38	0.43	0.46	0.5	0.51
Zn	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-
Pb	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-
Th#	-	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-
U#	*0.017*	<0.001	-	-	<0.001	-	-	<0.001	-	-	<0.001	-

Note: All concentrations in mg/L with the exception of redox potential (mV), pH and EC (µS/cm).
Green indicates *DER Licence L4247/1991/13 (July 2016)* limit values.
# Indicates where SGS data has been used instead of GBL data to improve LOR.

5.0 SUMMARY AND CONLUSIONS

5.1 Summary

Monitoring of the groundwater and surface water resources downstream of the Mine Water Circuit (i.e. TSF & Process Dam areas) were conducted in accordance with the Water Monitoring Programme (Table 1) under the DER licences (L4247/1991/13 and L8501/2010/2) during the 2016/17 review period.

5.1.1 Groundwater Monitoring

Groundwater level measurements and water quality samples were collected by Greenbushes staff and analysed by the internal Greenbushes Laboratory (GBL) and independently by SGS laboratory services (SGS), with analyses for radionuclides sub-contracted to Australian Radiation Services (ARS).

The majority of the new proposed monitoring bores captured under the updated DER Licence L4247/1991/13 (July 2016) were not installed at the time this WMR report was prepared due to the TSF2 buttressing activities associated with embankment raises still undergoing completion at the time this report was prepared. Therefore, only the groundwater monitoring bores sampled during the previous 2015/16 review period, in addition to the pre-existing regional TSF2 monitoring bores (MB97/1, MB97/2 & MB01/11) added to the updated DER Licence, were monitored during this 2016/17 review period.

The water levels in the monitoring bores have remained relatively stable since the commencement of monitoring in 1997, showing seasonal fluctuations whereby water levels reach a maximum at the end of winter in October, then decline to the lowest point at the end of summer in April.

The pH values recorded in the monitoring bores varied between 5.10 (MB97/1) and 7.77 (MB01/13) over the 2016/17 review period, and when compared with historical data generally display relatively similar and stable trends. The pH levels are generally lower, within the 5 to 6 range, in the bores bordering the western perimeter of TSF2.

Measurements of EC (measure of salinity) in the monitoring bores ranged between 606µS/cm (MB05/02) and 8,230µS/cm (MB97/3) for the TSF perimeter bores, and up to 14,240µS/cm for the western regional monitoring bores (MB01/11 and MB97/2). The highest EC values in TSF perimeter bores MB97/3 and MB97/4 is likely attributed to them being the two bores in closest proximity to the TSF2 decant collection and downstream seepage recovery sump points. The EC has increased by 3,000µS/cm in MB97/3 and MB97/4 since 2010, considered to be associated with the increased seepage rates from the TSF2 seepage collection drain via the shallow sand (old tailings/ dredge path) aquifer in area.

Analysis and review of the salinity, chloride, sulphate and SO_4:Cl ratio data for the monitoring bores suggests that seepage is occurring southwards from both the original TSF1 and active TSF2 cells, and via the open drain (Austins Return Drain) which directs water north-westerly from the TSF decant pond (Clear Water Pond) into the Austins Dam. Furthermore, TSF2 seepage captured within the constructed recovery sump is able to overflow into a natural drainage line which flows westerly to the Cowan Brook Dam. Hence, there is an opportunity for the excess water from TSF2 to drain to the Cowan Brook Dam or into the underlying groundwater. However, it is important to note that TLA makes proactive efforts to increase the pumping capacity from the TSF2 seepage collection sump, resulting in the maximum return of the water to the processing circuit except during peak rainfall events when it still overflows. When the current program of works on TSF2 are completed, overflows from this sump are expected to cease.

The concentration of lithium (Li) recorded in monitoring bore MB1 remained elevated during the 2016/17 review period, and MB05/01 for the third consecutive review period recorded increasing Li values. The concentration of Li recorded in these two bores is considerably higher than in other TSF2 monitoring bores, with MB05/01 recording the highest value of 4.7mg/L in January 2017 and MB1 maintaining similar levels to the past decade (up to 3.8mg/L in July 2015). While the ADWG does not specify a level for Li, the lithium level specified in the ANZECC Guidelines for Irrigation is 2.5mg/L.

Based on the knowledge that bores MB1 and MB05/01 have damaged casings, the substantially higher Li readings in these two bores is considered to be attributed to them receiving surface water infiltration from the TSF seepage collection drains via the shallow sand (old tailings/ dredge path) aquifer in the local area, as opposed to TSF seepage into the deeper underlying groundwater. This is because the adjacent bores MB01/09 (located 100m south of MB1) and MB01/13 (located 50m west of MB05/01) have recorded negligible (<0.05mg/L) Li concentrations to date. Nevertheless, the fact MB05/01 continues the increasing trend in SO_4 and recording Li values >2.5mg/L due to surface water infiltration from the TSF2 seepage collection drain, indicates that the increased rate of tailings disposal in the northern portion of TSF2 has directly resulted in increased seepage rates into the downstream shallow sand (old tailings/ dredge path) aquifer.

Except for the elevated arsenic levels in the western regional monitoring bore MB97/1, added to the updated DER Licence (July 2016), the concentration of other trace metals and major ions are relatively low and consistent across the monitoring bores. While concentrations of copper (Cu), zinc (Zn) and lead (Pb) are typically non-detectable, the following bores continued to record values for certain metals/metalloids above the ADWG and/or ANZECC Guidelines for Irrigation during the 2016/17 review period:

- MB1 – manganese (Mn) (0.36mg/L) and iron (Fe) (16.4mg/L), plus nutrient phosphorus (P) (0.43mg/L).
- MB3 – only Fe (0.44mg/L), plus nutrient P (0.27mg/L).
- MB97/3 – Mn (1.8mg/L), arsenic (As) (0.011mg/L) and nickel (Ni) (0.038mg/L), plus nutrient P (0.25mg/L).
- MB97/4 – Mn (1.5mg/L), Ni (0.12mg/L) and cobalt (Co) (0.081mg/L), plus nutrient P (0.39mg/L).
- MB01/01 – Mn (0.93mg/L) and Fe (0.32mg/L), plus nutrient P (0.16mg/L).
- MB01/09 – Mn (0.67mg/L) and Fe (0.86mg/L), plus nutrient P (0.16mg/L).
- MB05/02 – Fe (41mg/L) and cadmium (Cd) (0.007mg/L), plus nutrient P (0.48mg/L).
- MB05/01 – Mn (0.97mg/L) and Fe (7.3mg/L), plus nutrient P (0.18mg/L).
- MB01/13 – only Fe (3.1mg/L), plus nutrient P (0.37mg/L).
- MB97/1 – Mn (0.35mg/L), Fe (10.4mg/L), As (0.22mg/L), Cd (0.005mg/L) and Ni (0.021mg/L), plus nutrient P (0.58mg/L).
- MB97/2 – Mn (7.9mg/L), Fe (49.4mg/L), Co (0.075mg/L) and Ni (0.09mg/L), plus nutrient P (0.75mg/L).
- MB01/11 – Mn (1.3mg/L), Fe (0.35mg/L), As (0.021mg/L) and Ni (0.05mg/L), plus nutrient P (0.34mg/L).

When compared to historical data, these values have remained relatively similar and stable over time and are thus likely to represent a combination of background levels plus further contributions from TSF seepage, with the greatest suite of elevated values (EC, TDS, Mn, As, Ni, Fe, Co, Cd & P) recorded in TSF2 perimeter monitoring bores MB97/3 & MB97/4 and western regional monitoring bores MB97/1, MB97/2 & MB01/11. TSF2 perimeter monitoring bores MB97/3 & MB97/4 are in closest proximity to the TSF2 seepage recovery sump points, and as explained above the elevated arsenic (As) levels in MB97/1 is considered to be due to it being the closest monitoring bore to Austins Dam which receives process water directly via the open drain (Austins Return Drain) from the TSF decant pond (Clear Water Pond).

The concentrations of radioactive elements thorium (Th) and uranium (U) continued to remain below the detection limits (<0.05mg/L) for all monitoring bores during the review period.

The highest radium (Ra) concentration values recorded during the review period were in the monitoring bores located near the TSF seepage collection points. However, all levels continued to remain significantly below the ANZECC radionuclide activity trigger values for irrigation water.

5.1.2 Surface Water Monitoring

Analysis and review of the surface water monitoring data highlights that the water quality of the Austins-Southampton dams is affected by use in the Mine Water Circuit for water supply, including Southampton Dam receiving return process water from the TSF decant pond (Clear Water Pond) via the open drain (Austins Return Drain).

The Cowan Brook Dam is located on a creek and receives overflow during the wet winter months from the Austins Dam spillway to the north, in addition to overflow from the TSF2 seepage collection sump to the east, which is minimised by TLA through maximising the pumping capacity to return the majority of the water to the processing circuit. Historically seepage from below the Austins Dam wall has flowed to a tributary of the Cowan Brook. A solar pump was installed at the seepage pond in early 2016 and the water is now being returned to the dam. TLA returns the TSF2 seepage water to the circuit all year round and allow it to temporarily overflow the spillway to the Cowan Brook Dam during peak flows (i.e. rainfall events during winter months). When the current program of works on TSF2 are completed, there should be no overflows to Cowan Brook Dam from this sump except under extreme circumstances (e.g. power failures to upstream pumps).

Seasonal water quality fluctuations in the Austins-Southampton, Cowan Brook Dam and Norilup dam reservoirs are caused by rainfall events in winter months (increased dilution) and evaporation in summer months (increased concentration).

During the 2016/17 review period, the pH in the reservoirs ranged between 7.47 and 8.9, and the EC concentrations between 788µS/cm and 1,794µS/cm, continuing the stable historical trends, with slight gradual increasing trend. The SO_4 concentrations in Southampton Dam increased from 2004 to 2010 (peaking in May 2009 - 345mg/L), and have gradually decreased back to within historical ranges since the 2010/11 review period, ranging between 152 and 180mg/L during the 2016/17 review period. Likewise, the SO_4 concentrations in Cowan Brook Dam have remained stable with a slight decrease since the 2010/11 review period, ranging between 118mg/L and 129mg/L during the 2016/17 review period. The SO_4 concentrations in the dams have always remained below the ADWG value (500mg/L).

The stabilisation and slight decrease of SO_4 concentrations since the 2010/11 review period, together with a coinciding gradual increase in pH, is attributed to TLA producing a greater quantity of chemical grade product than technical grade in recent years. Production of technical grade product includes an attrition step which uses sulphuric acid (H_2SO_4). Process improvements have resulted in a reduction in H_2SO_4 in the processing circuit and SO_4 levels are decreasing as a result.

The concentration of lithium (Li) in the Austins-Southampton and Cowan Brook reservoirs exceed the trigger level specified in the ANZECC Guidelines for Irrigation (2.5mg/L). Historically, there has been a trend of increasing lithium concentrations since the 2002/03 review period. During the 2016/17 review period, the Li concentrations recorded in Southampton Dam ranged between 9.8 and 11.9mg/L, and between 9.7 and 12.9mg/L in Austins Dam. This is similar to the values recorded during the previous six review periods, marking a turning point to the increasing trend (i.e. the maximum Li concentration recorded during the 2015/16 review period was 12.5mg/L, 10.7mg/L in 2014/15, 12.1mg/L in 2013/14, 12.0mg/L in 2012/13, 11.4mg/L in 2011/12, 12.0mg/L in 2010/11 and 9.7mg/L in 2009/10). The concentrations of Li recorded in Cowan Brook Dam over the 2016/17 review period were between 6.4 and 7.3mg/L, similar to the previous 2015/16 review period (between 6.8 and 7.7mg/L) and slightly higher than the maximum values recorded during earlier review periods, thus confirming a turning point to the long-term trend of increasing lithium concentrations in the Mine Water Circuit.

With the exception of arsenic (As), and minor extent iron (Fe), the concentration of all other trace metals and major ions recorded in the Austins-Southampton dams are low and below the ADWG values. The arsenic values recorded during 2016/17 continued to be above the ADWG value of 0.01mg/L, ranging from 0.046 to 0.15mg/L in Southampton Dam and between 0.067 and 0.18mg/L in Austins Dam. The maximum recorded value in Cowan Brook Dam was 0.005mg/L during the review period. When compared to historical data, these values have typically remained stable over time; however, there has been a further increasing trend of arsenic levels in the Mine Water Circuit since 2010, with the highest level recorded in Southampton Dam in April 2016 (0.185mg/L). The elevated arsenic levels in the Mine Water Circuit since 2010 appears to be associated with the increased volumes of spodumene ore being mined and processed to produce chemical grade spodumene.

The increasing trend in arsenic levels was identified by TLA in 2012 and in early 2013 an Arsenic Water Treatment Unit (AWTU) was installed, followed by a second unit in June 2013, and a third unit was installed and commissioned by GAMG in early 2015. Both TLA units recirculate water in and out of the CWP. During 2013/14 there were a number of issues that prevented the units from operating continuously. This resulted in reduced run-time and also delayed the optimisation of the units. These issues have now been resolved, including alteration of the configuration of the units so that they recirculate water out of the CWP when they are not being used to treat water coming into the circuit from the mining pits. Arsenic levels are monitored closely by TLA at weekly water management meetings and if the arsenic increasing trends are not arrested, further controls will be investigated.

The concentrations of radioactive elements thorium (Th) and uranium (U) continued to remain near or below the detection limits (<0.005mg/L) in the reservoirs during the review period, and radium (Ra) levels also indicated that radionuclide activity continued to remain relatively stable and below the trigger values in both reservoirs.

5.2 Concluding Remarks and Recommendations

The existing water monitoring programme (Table 1) for the DER licences L4247/1991/13 and L8501/2010/2 is sufficient to monitor both surface water and groundwater potential impacts from Greenbushes mining and processing operations.

The elevated lithium levels in the Austins-Southampton and Cowan Brook dams continue to be an ongoing concern due to the connectivity of these reservoirs to the downstream areas of the Norilup Brook catchment. As detailed in Section 2.5, TLA has made significant advances since the 2013/14 review period in the implementation the Surface Water Management Plan (SWMP) to manage water usage and quality on site and subsequently minimise downstream impacts, and as a result also address the requirements of the DER. This has resulted in the implementation of the majority of actions detailed in Appendix 3 (SWMP Water Management Interventions), including the following key actions:

- Ecotoxicology of Lithium on Environmental Receptors Study – completed.
- Bioaccumulation of Heavy Metals Study and Setting Lithium Trigger Value – completed.
- Reduction of Arsenic Levels in Process Water – commenced/ongoing.
- Reduction of Lithium Levels in Process Water – a reverse osmosis plant to recover lithium is scheduled to be operational in late 2018.

Based on the continued compliance of TLA with Table 1 (Water Monitoring Programme) and the overall requirements of the DER licences, the 2016/17 review period recording similar water monitoring results to previous review periods, and TLA's ongoing commitment to the implementation of the Surface Water Management Plan (SWMP), there are no additional water monitoring recommendations at this point in time for the upcoming 2017/18 review period. The underlying reason for the elevated arsenic levels in MB97/1 will require further investigation if the DER requests.

The new proposed monitoring bores captured under the updated DER Licence L4247/1991/13 (July 2016) will be installed when the TSF2 buttressing activities associated with embankment raises are completed during the 2017/18 review period, and these new monitoring bores can therefore be included in the next WMR report.

6.0 REFERENCES

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APPENDIX 1

DER Licences

Government of **Western Australia**
Department of **Environment Regulation**

Your ref:	L4247/1991/13
Our ref:	2012/007164
Enquiries:	Louise Lavery
Phone:	08 93337438
Email:	Louise.Lavery@DER.wa.gov.au

Mr Steve Green
Mining Manager
Talison Lithium Australia Pty Ltd
PO Box 31
GREENBUSHES WA 6254

Attention: Ms Lydia Perenzin

Dear Mr Green

***ENVIRONMENTAL PROTECTION ACT 1986* – AMENDMENT TO LICENCE**

Licence: L4247/1991/13
Premises: Talison Lithium Mine

Further to my letter dated 8 April 2016, please find enclosed your amended *Environmental Protection Act 1986* licence.

If you have any questions or objections relating to the licence, please do not hesitate to contact the enquiries officer above on (08) 9333 7438 for clarification or discussion of any grievances you have.

If you are concerned about, or object to any aspect of the amendment, you may lodge an appeal with the Minister for the Environment within 21 days from the date on which this licence is received. The Office of the Appeals Convenor can be contacted on 6467 5190 to find out the procedure and fee.

Members of the public may also appeal the amendments. The Appeals Registrar at the Office of the Appeals Convenor can be contacted after the closing date of appeals to check whether any appeals were received.

Yours sincerely

Tim Gentle
Manager Licensing – Resource Industries, South
Officer delegated under Section 20
of the *Environmental Protection Act 1986*

15 July 2016

enc: L4247/1991/13
cc: Shire of Bridgetown-Greenbushes; notifications to DMP, DOH, DOW, P&W, Water Corporation

TL0571 v2.0

Government of **Western Australia**
Department of **Environment Regulation**

Licence

Environmental Protection Act 1986, Part V

Licensee: Talison Lithium Australia Pty Ltd

Licence: L4247/1991/13

Registered office: Level 4
37 St Georges Terrace
PERTH WA 6000

ACN: 139 401 308

Premises address: Talison Lithium Mine
Mining Tenements M01/3, M01/6, M01/7, M01/16, G01/1 and G01/02
Maranup Ford Road
GREENBUSHES WA 6254
as depicted in Schedule 1.

Issue date: Thursday, 12 December 2013

Commencement date: Saturday, 14 December 2013

Expiry date: Sunday, 13 December 2026

Prescribed premises category
Schedule 1 of the *Environmental Protection Regulations 1987*

Category number	Category description	Category production or design capacity	Approved Premises production or design capacity
5	Processing of ore	50 000 tonnes or more per year	2,300,000 tonnes beneficiated per annual period 5,000,000 tonnes of tailings deposited per annum

Conditions
This Licence is subject to the conditions set out in the attached pages.

Tim Gentle
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Contents

Introduction

This Introduction is not part of the Licence conditions.

DER's industry licensing role
The Department of Environment Regulation (DER) is a government department for the state of Western Australia in the portfolio of the Minister for Environment. DER's purpose is to advise on and implement strategies for a healthy environment for the benefit of all current and future Western Australians.

DER has responsibilities under Part V of the *Environmental Protection Act 1986* (the Act) for the licensing of prescribed premises. Through this process DER regulates to prevent, control and abate pollution and environmental harm to conserve and protect the environment. DER also monitors and audits compliance with works approvals and licence conditions, takes enforcement action as appropriate and develops and implements licensing and industry regulation policy.

Licence requirements
This Licence is issued under Part V of the Act. Conditions contained within the Licence relate to the prevention, reduction or control of emissions and discharges to the environment and to the monitoring and reporting of them.

Where other statutory instruments impose obligations on the Premises/Licensee the intention is not to replicate them in the licence conditions. You should therefore ensure that you are aware of all your statutory obligations under the Act and any other statutory instrument. Legislation can be accessed through the State Law Publisher website using the following link: http://www.slp.wa.gov.au/legislation/statutes.nsf/default.html

For your Premises relevant statutory instruments include but are not limited to obligations under the:

- *Environmental Protection (Unauthorised Discharges) Regulations 2004* – these Regulations make it an offence to discharge certain materials such as contaminated stormwater into the environment other than in the circumstances set out in the Regulations.
- *Environmental Protection (Controlled Waste) Regulations 2004* - these Regulations place obligations on you if you produce, accept, transport or dispose of controlled waste.
- *Environmental Protection (Noise) Regulations 1997* – these Regulations require noise emissions from the Premises to comply with the assigned noise levels set out in the Regulations.

You must comply with your licence. Non-compliance with your licence is an offence and strict penalties exist for those who do not comply.

Licence holders are also reminded of the requirements of section 53 of the Act which places restrictions on making certain changes to prescribed premises unless the changes are in accordance with a works approval, licence, closure notice or environmental protection notice.

Licence fees
If you have a licence that is issued for more than one year, you are required to pay an annual licence fee prior to the anniversary date of issue of your licence. Non payment of annual licence fees will result in your licence ceasing to have effect meaning that it will no longer be valid and you will need to apply for a new licence for your Premises.

Ministerial conditions
If your Premises has been assessed under Part IV of the Act you may have had conditions imposed by the Minister for Environment. You are required to comply with any conditions imposed by the Minister.

Premises description and Licence summary

Talison Lithium Australia Pty Ltd operates a lithium mine (a series of open cut and underground operations) and processing plants at Greenbushes, WA. Lithium has been mined since 1983, however historical mining operations at the Premises date back to tin mining in 1888 and tantalum mining in the 1940s. Spodumene ore is mined and processed in one of two processing plants (the Technical Grade Processing Plant (TG) and the Chemical Grade (CG) Processing Plant) to recover lithium concentrate. Processing involves separation techniques analogous to those used in the mineral sands. The CG Processing Plant underwent an expansion in 2012/2013, under Works Approval W4927/2011/1. The total processing capacity is currently 1,750,000 tonnes. Planned debottlenecking in the two plants will allow processing capacity to increase to 2,300,000 tonnes per annum with no change to the tailings deposition rate.

Tailings are generated from processing and currently discharged to Tailings Storage Facility 2 (TSF 2). TSF2 was commissioned in 2006 and the height of the embankments are currently at RL 1260 m. There is an existing Tailings Storage Facility 1 (TSF1) which is on care and maintenance.

Tantalum concentrates and tin metal are also recovered from the ore deposits at Greenbushes, through a Primary Tantalum Processing Plant and a Secondary Tantalum Processing Plant. Prior to 2010 these plants and related infrastructure were once part of the Talison operations; however these assets are now owned and operated by a separate company Global Advanced Metals Greenbushes Pty Ltd and are subject to a separate Premises Licence L8501/2010/2. This Licence L4247/1991/13 has excised areas subject to the Licence L8501/2010/2 (refer to Figure 1: Premises Map for further detail).

Tailings are also generated from the tantalum process and are discharged to the Talison Lithium's TSF 1 via a contractual arrangement between the two companies. Currently the Tantalum Primary Processing Plant is on care and maintenance and hence no tailings are being generated.

July 2016 Amendment

This Licence is the result of an amendment sought by the Licensee to construct, commission and operate a series of embankment raises to a total height of 1280 m AHD (20 m in excess of the current embankment height of RL 1260m AHD) and to construct a buttress and other supporting infrastructure such that the TSF2 facility can comply with the ANCOLD 2012 guidelines.

The footprint of the TSF2 will extend to the west and south and result in destruction of a number of existing groundwater monitoring bores surrounding the TSF. These bores are being replaced by a series of new bores.

The Licence has also been amended to impose controls on surface water discharges from the Premises. Refer to the Decision Document for more detail.

The licences and works approvals issued for the Premises prior to issue of this Licence are:

Instrument log		
Instrument	**Issued**	**Description**
L4247/1991/11	14/12/2007	Licence re-issue
L4247/1991/12	14/12/2010	Licence re-issue
W4927/2011/1	28/07/2011	Works approval to upgrade and increase the capacity of the Lithium processing facility. Surface water management plan developed by Licensee as a works approval condition.
L4247/1991/13	12/12/2013	Licence re-issue
L4247/1991/13	15/07/2016	Licence amendment to authorise embankment raise for TSF2 and supporting infrastructure to RL 1280 m AHD.

Severance
It is the intent of these Licence conditions that they shall operate so that, if a condition or a part of a condition is beyond the power of this Licence to impose, or is otherwise *ultra vires* or invalid, that condition or part of a condition shall be severed and the remainder of these conditions shall nevertheless be valid to the extent that they are within the power of this Licence to impose and are not otherwise *ultra vires* or invalid.

END OF INTRODUCTION

Licence conditions

1 General

1.1 Interpretation

1.1.1 In the Licence, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 For the purposes of this Licence, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'AHD' means the Australian height datum;

'annual period' means the inclusive period from 1 July until 30 June in the following year;

'AS 3580.1.1' means the Australian Standard AS 3580.1.1 *Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment;*

'AS 3580.9.6' means the Australian Standard AS 3580.9.6 *Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM_{10} high volume sampler with size - selective inlet – Gravimetric method;*

'AS/NZS 2031' means the Australian Standard AS/NZS 2031 *Selection of containers and preservation of water samples for microbiological analysis;*

'AS/NZS 5667.1' means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples;*

'AS/NZS 5667.4' means the Australian Standard AS/NZS 5667.4 *Water Quality – Sampling – Guidance on sampling from lakes, natural and man-made;*

'AS/NZS 5667.6' means the Australian Standard AS/NZS 5667.6 *Water Quality – Sampling – Guidance on sampling of rivers and streams;*

'AS/NZS 5667.10' means the Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on sampling of waste waters;*

'AS/NZS 5667.11' means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters;*

'AS/NZS 5667.12' means the Australian Standard AS/NZS 5667.12 *Water Quality – Sampling – Guidance on sampling of bottom sediments;*

'averaging period' means the time over which a limit is measured or a monitoring result is obtained;

'CEMS' means continuous emissions monitoring system;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Chief Executive Officer
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850

Telephone:	(08) 9333 7510
Facsimile:	(08) 9333 7550
Email:	info@der.wa.gov.au

'freeboard' means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point;

'Inert Waste Type 1' has the meaning defined in Landfill Definitions;

'Inert Waste Type 2' has the meaning defined in Landfill Definitions;

'Landfill Definitions' means the document titled "Landfill Waste Classification and Waste Definition 1996" published by the Chief Executive Officer of the Department of Environment as amended from time to time;

'Licence' means this Licence numbered L4247/1991/13 and issued under the Act;

'Licensee' means the person or organisation named as Licensee on page 1 of the Licence;

'mbgl' means metres below ground level;

'NATA' means the National Association of Testing Authorities, Australia;

'NATA accredited' means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

'PM_{10}' means particles with an aerodynamic diameter of less or equal to 10 μm;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Licence;

'quarterly' means the 4 inclusive periods from, 1 July to 30 September, 1 October to 31 December and in the following year, 1 January to 31 March, 1 April to 30 June;

'Schedule 1' means Schedule 1 of this Licence unless otherwise stated;

'Schedule 2' means Schedule 2 of this Licence unless otherwise stated;

'six monthly' means the 2 inclusive periods from 1 July to 31 December and 1 January to 30 June in the following year;

'spot sample' means a discrete sample representative at the time and place at which the sample is taken; and

'µS/cm' means microsiemens per centimetre.

1.1.3 Any reference to an Australian or other standard in the Licence means the relevant parts of the the standard in force from time to time during the term of this Licence.

1.1.4 Any reference to a guideline or code of practice in the Licence means the version of that guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guideline or code of practice made during the term of this Licence.

1.2 General conditions

1.2.1 The Licensee shall immediately recover, or remove and dispose of spills of process liquors including tailings and saline wastewaters which occur outside an engineered containment system.

1.3 Premises operation

1.3.1 The Licensee shall ensure that the materials listed in Table 1.3.1 are only discharged into containment cells and/or dams or ponds with the relevant infrastructure requirements and at the locations specified in Table 1.3.1.

Table 1.3.1: Containment infrastructure

Containment cell or dam number(s)	Material	Infrastructure requirements
TSF1	Emergency tailings deposition of up to a depth of 300mm for a period not exceeding 6 months	• Embankment height at RL 1282m • Working decant system
TSF2	Tailings	• Buttress • Two seepage collection trenches and pipelines • Seepage collection sump pumps at sump 01, 02
Clear Water Pond	Tailings decant, seepage, mine dewater, contaminated stormwater	Arsenic remediation units to treat water within the circuit
Austins Dam	Process water (seepage return and decant), site runoff, overflows from Lithium Processing Plant siltation trap and stormwater	None specified
Southampton Dam	Process water from Austins Dam	None specified
Cowan Brook Dam	Contaminated and clean stormwater; emergency overflows from Austins Dam; current overflows from southern seepage recovery sump and forecast emergency overflows from the seepage trench sump	None specified

	02 post completion of the embankment raise to RL 1265 m.	
Cornwall North Pit	Mine dewater, stormwater	None specified
Cornwall Pit	Mine dewater, stormwater, process water	None specified
Vultans Pit	Mine dewater, stormwater	None specified

1.3.2 The Licensee shall operate TSF2 such that the freeboard allows for capacity for 1 in 100 year 72 hour rainfall event, additional 0.5m contingency and 0.1 m for wave run-up. At RL 1265 m the maximum operating pond level during the wet season should not exceed RL 1264.02m.

1.3.3 The Licensee must ensure inspections of surface water infrastructure are managed in accordance with the part of the document, and any updates to the management plan specified in Table 1.3.3:

Table 1.3.3 Management Plan		
Management Plan Reference	**Parts**	**Date of Document**
Surface Water Management Plan	Section 10.1	Version 5 23 September 2015

1.3.4 The arsenic remediation units shall treat process water and be sited within the primary water circuit. At least one unit (8 vessels) needs to operate with a 90% availability within a calendar month and at least 95% availability within a year (i.e. one unit in operation for at least 95% of the time).

1.3.5 The Licensee shall direct runoff from the heavy vehicle refuelling area and bunded area, heavy vehicle workshop wash down area and light vehicle wash down area through fuel/oil interceptor traps.

1.3.6 The Licensee shall construct the works to install the TSF 2 embankment raise and associated infrastructure in accordance with the documentation detailed in Table 1.3.4:

1.3.4: Construction Requirements[1]		
Document	**Parts**	**Date of Document**
Talison Lithium Australia – Tailings Storage Raise 2015 Licence Amendment Application and Supporting Documentation	All	23 October 2015
Talison Lithium Australia, letter response to DER letter dated 16 November 2015	All	30 November 2015

Note 1: Where the details and commitments of the documents listed in condition 1.3.6 are inconsistent with any other condition of this Licence, the conditions of this Licence shall prevail.

1.3.7 Following completion of works as listed in condition 1.3.6, no overflows from the TSF 2 sump 02 and 03 (denoted as S2 and S3 in Figure 2) to Cowan Brook Dam are permitted.

1.3.8 The Licensee shall ensure that where wastes produced on the Prescribed Premises are not taken to third party Premises for lawful use or disposal, they are managed in accordance with the requirements in Table 1.3.5.

Table 1.3.5: Management of waste		
Waste type	**Management strategy**	**Requirements**

Inert Waste Type 1 Inert Waste Type 2 Clean Fill	Receipt, handling and disposal of waste by landfilling	All waste types • No more than 200 tonnes per year of all waste types cumulatively shall be disposed of by landfilling. • Disposal of waste by landfilling shall only take place within the waste rock dump area; • Waste shall be placed in a defined trench or within an area defined by earthen bunds; and • The active tipping area shall be restricted to a maximum linear length of 30 metres. • Construction, operation and decommissioning of landfill cells can occur within the defined landfill area providing there is no waste within: o 100 m of any surface water body; and o 3 m of the highest level of the water table aquifer.
Used Tyres[1]	Burial	• Used tyres shall only be buried in the waste rock dump. • Tyres shall be buried in batches separated from each other by at least 100mm of soil/waste rock and each consisting of not more than 1000 whole tyres.

Note 1: Requirements for landfilling tyres are set out in Part 6 of the Environmental Protection Regulations1987.

1.3.9 The Licensee shall ensure that cover is applied and maintained on landfilled wastes in accordance with Table 1.3.6 and that sufficient stockpiles of cover are maintained on site at all times.

Table 1.3.6: Cover requirements[1]

Waste Type	Material	Depth	Timescales
All waste	Inert and incombustible material	500mm	Within three months of the final waste load in each defined bay.

Note 1: Additional requirements for final cover of tyres are set out in Part 6 of the *Environmental Protection Regulations 1987*.

1.3.10 The Licensee shall implement security measures at the landfill area to prevent as far as is practical, unauthorised access to the site.

2 Emissions

2.1 General

2.1.1 The Licensee shall record and investigate the exceedance of any descriptive or numerical limit specified in any part of section 2 of this Licence.

2.2 Point source emissions to surface water

2.2.1 The Licensee shall ensure that where waste is emitted to surface water from the emission points in Table 2.2.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.2.1: Emission points to surface water

Emission point reference on Map of emission points	Source
Cowan Brook Dam	Contaminated surface water (stormwater, TSF2 seepage and process water)
Carters Farm	Contaminated stormwater from disturbed mine work areas including mine waste dumps
Floyds North	
Floyds South	
Cemetery	Contaminated stormwater from disturbed mine work areas including mine waste dumps Seepage from TSF1

2.2.2 The Licensee is not permitted to discharge off the Premises from Southampton Dam.

3 Monitoring

3.1 General monitoring

3.1.1 The licensee shall ensure that:
- (a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;
- (b) all wastewater sampling is conducted in accordance with AS/NZS 5667.10;
- (c) all surface water sampling is conducted in accordance with AS/NZS 5667.4, AS/NZS 5667.6 or AS/NZS 5667.9 as relevant;
- (d) all groundwater sampling is conducted in accordance with AS/NZS 5667.11;
- (e) all sediment sampling is conducted in accordance with AS/NZS 5667.12;
- (f) all microbiological samples are collected and preserved in accordance with AS/NZS 2031; and
- (g) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured.

3.1.2 The Licensee shall ensure that :
- (a) quarterly monitoring is undertaken at least 45 days apart;
- (b) six monthly monitoring is undertaken at least 5 months apart; and
- (c) annual monitoring is undertaken at least 9 months apart.

3.1.3 The Licensee shall record production or throughput data and any other process parameters relevant to any non-continuous or CEMS monitoring undertaken.

3.1.4 The Licensee shall ensure that all monitoring equipment used on the Premises to comply with the conditions of this Licence is calibrated in accordance with the manufacturer's specifications and the requirements of the Licence.

3.1.5 The Licensee shall, where the requirements for calibration cannot be practicably met, or a discrepancy exists in the interpretation of the requirements, bring these issues to the attention of the CEO accompanied with a report comprising details of any modifications to the methods.

3.2 Monitoring of point source emissions to surface water

3.2.1 The Licensee shall undertake the monitoring in Table 3.2.1 according to the specifications in that table.

Table 3.2.1: Monitoring of point source emissions to surface water

Monitoring point reference (as per Figure 2)	Process description	Parameter[1]	Units	Frequency	Averaging Period	Method
Cowan Brook Dam	Discharge from Cowan Brook Dam to Norilup Dam (off Premises)	Flow	m^3	Each event	-	None specified
		pH	-	Each event [2]	Spot sample	As per L3.1.1
		EC	µS/cm			
		Lithium	mg/L			
		Arsenic				
		Cadmium				
		Chromium				
		Copper				
		Manganese				
		Nickel				
		Uranium				
Floyds North	Surface water discharge off Premises	Flow	m^3	Each event	-	None specified
		pH	-	One event per quarter[2]	Spot sample	As per L3.1.1
		EC	µS/cm			
		Lithium	mg/L			
		Arsenic				
		Cadmium				
		Chromium				
		Copper				
		Manganese				
		Nickel				
		Uranium				
Floyds South	Surface water discharge off Premises	Flow	m^3	Each event	-	None specified
		pH	-	One event per quarter[2]	Spot sample	As per L3.1.1
		EC	µS/cm			
		Lithium	mg/L			
		Arsenic				
		Cadmium				
		Chromium				
		Copper				
		Manganese				
		Nickel				
		Uranium				
Carters Farm	Surface water	pH	-	One	Spot	As per

	discharge off Premises	EC	µS/cm	event per quarter[2]	sample	L3.1.1
		Lithium	mg/L			
		Arsenic				
		Cadmium				
		Chromium				
		Copper				
		Manganese				
		Nickel				
		Uranium				
Cemetery	Surface water discharge off Premises	pH	-	One event per quarter[2]	Spot sample	As per L3.1.1
		EC	µS/cm			
		Lithium	mg/L			
		Arsenic				
		Cadmium				
		Chromium				
		Copper				
		Manganese				
		Nickel				
		Uranium				

Note 1: pH and EC in-field non-NATA accredited analysis permitted.
Note 2: 'Event' refers to a rainfall event of 24 hours duration or more.

3.3 Process monitoring

3.3.1 The Licensee shall undertake the monitoring in Table 3.3.1 according to the specifications in that table.

Table 3.3.1: Process monitoring

Monitoring point reference	Process description	Parameter	Units	Frequency	Method
Clear Water Pond	Overflow from the Clear Water Pond to Austins Dam	Flow	m^3	Continuous	None specified
Austins Dam	Overflow from Austins Dam to Cowan Brook Dam	Flow	m^3	Total m^3 per event	None specified
Lithium TG Raw Water Tank	Overflows to ground	Frequency	-	Number of events	None specified
Secondary seepage recovery sump	Overflow to Cowan Brook Dam	Flow	m^3	Total m^3 per event	None specified
Lithium CG Processing Plant Siltation Trap	Overflow from siltation trap to Austins Dam	Frequency and duration	Hrs	Number of events	Visual observation

3.4 Ambient environmental quality monitoring

3.4.1 The Licensee shall undertake the monitoring in Tables 3.4.1, 3.4.2 and 3.4.3 according to the specifications in those tables and record and investigate results that do not meet any limit or target specified.

Table 3.4.1: Monitoring of ambient air quality

Monitoring point reference and location	Parameter	Limit	Units[1]	Averaging period	Frequency	Method
Dust monitoring site	Particulates as PM10	90	$\mu g/m^3$	24 hours	Continuous from 1 November – 31 May	Talison Lithium Environmental Procedure ENV 2010: Air Quality Monitoring – High Volume Sampler

Note 1: All units are referenced to STP dry

Table 3.4.2: Monitoring of ambient surface water quality

Monitoring point reference and location	Parameter	Limit	Units	Averaging period	Frequency	Applicable Timeframe
Southampton Dam Austins Dam Cowan Brook Dam	pH	6 – 9	-	Spot sample	Quarterly	All
	Redox Potential (Eh)	-	mV			
	TDS	-	mg/L			
	Dissolved Oxygen	-				
	Chloride Nitrate Magnesium Sodium Sulfate Arsenic Cadmium Chromium Cobalt Copper Iron Lithium Manganese Nickel Uranium Thorium	-				
	Radium 226 Radium 228	-	Bq/L	Spot sample	Six monthly	All
Norilup (Dam)	pH	6 – 9	-	Spot sample	Quarterly	All
	Redox Potential (Eh)	-	mV			
	TDS	-	mg/L			
	Dissolved Oxygen	-				
	Lithium	7				2015/2016 & 2016/2017 reporting periods

		5				2017/2018 - 2019/2020 reporting periods
		3				2020/2021 - 2021/2022 reporting periods
		2				2022/2023 - 2025/2026 reporting period
	Arsenic	0.01				All
	Cadmium	0.002				
	Chromium, Cr (VI)	0.05				
	Copper	2				
	Manganese	0.5				
	Nickel	0.02				
	Uranium	0.017				
	Chloride Nitrate Magnesium Sodium Sulfate Cobalt Iron Thorium	-				
	Radium 226 Radium 228	-	Bq/L	Spot sample	Six monthly	All

Note 1: pH, redox potential and dissolved oxygen in-field non-NATA accredited analysis permitted.

Table 3.4.3: Monitoring of ambient groundwater quality[1]

Monitoring point reference	Parameter	Units	Averaging period	Frequency
Shallow bores				
MB16/01S MB16/02S MB97/04 MB16/03S MB16/04S MB16/04S MB16/05S MB16/06S MB16/07S MB16/08S	Standing water level	m(AHD) & mbgl	Spot sample	Quarterly
	pH	-		
	Total dissolved salts	mg/L		
	Chloride Nitrate Magnesium Sodium Sulfate Arsenic Cobalt Copper Iron Lithium Manganese	mg/L		

	Nickel Uranium Thorium			
	Radium 226 Radium 228	Bq/L		Six monthly
Intermediate bores				
MB16/01I MB16/02I MB16/03I MB16/04I MB16/05I MB16/06I	Standing water level	m(AHD) & mbgl	Spot sample	Quarterly
	pH	-		
	Total dissolved salts	mg/L		
	Chloride Nitrate Magnesium Sodium Sulfate Arsenic Cobalt Copper Iron Lithium Manganese Nickel Uranium Thorium	mg/L		
	Radium 226 Radium 228	Bq/L		Six monthly
Deep bores[2]				
MB16/01D MB16/02D MB16/03D MB16/04D MB3 MB16/05D MB16/06D MB16/07D MB01/09 MB01/01	Standing water level	m(AHD) & mbgl	Spot sample	Quarterly
	pH	-		
	Total dissolved salts	mg/L		
	Chloride Nitrate Magnesium Sodium Sulfate Arsenic Cobalt Copper Iron Lithium Manganese Nickel Uranium Thorium	mg/L		
	Radium 226 Radium 228	Bq/L		Six monthly
MB97/1 MB97/2 MB01/11	Standing water level	m(AHD) & mbgl	Spot sample	Quarterly
	pH	-		
	Total dissolved salts	mg/L		
	Sulfate Sodium Arsenic Lithium			

Note 1: Monitoring of new bores (MB16/xx series) only required following construction.

Note 2: Analysis of samples from bores MB97/1, MB97/2 and MB01/11 is exempt from the requirement listed in condition 3.1.1 (g).

3.4.2 In the event of the pH limit being exceeded for ambient surface water quality at Norilup Dam, the exceedance shall only be valid if the pH at Cowan Brook Dam is also above the limit for the same reporting period.

4 Improvements

4.1 Improvement program

4.1.1 The Licensee shall complete the improvements in Table 4.1.1 by the date of completion in Table 4.1.1.

Table 4.1.1: Improvement program

Improvement reference	Improvement	Date of completion
IR1	Develop, submit to the CEO and implement an emergency response plan that addresses overflows from TSF2 seepage sump 02. The plan shall include a timeframe to complete works so as to provide either emergency containment, and/ or additional redundancy in the form of a back up pumping system or equivalent to reduce the impact of overflows from pump failure at sump 02.	Plan by 1/11/16
IR2	Develop an annual ecological assessment program for the receiving environment downstream of the Premises, including Norilup Brook. The program must include assessment of sites upstream and downstream of Norilup Dam where the following parameters are assessed: water quality, flows (discharges from Cowan Brook Dam and flows within the watercourse itself), metal concentrations in sediments, macroinvertebrate diversity and abundance and assessment of aquatic fauna diversity and abundance. An assessment of bioaccumulation of contaminants must be completed annually as a minimum. The program must provide an assessment of impact due to the discharge. The Licensee shall consult with the Department of Water and the Department of Parks and Wildlife to develop the scope for the ecological assessment prior to implementation. The scope shall then be submitted to the CEO.	1/11/16
IR3	The Licensee shall install a flowmeter or equivalent to measure discharges from Norilup Dam downstream to Norilup Brook.	Plan by 30/09/16 Flowmeter to be installed in accord with plan

IR4	Develop and submit a plan to capture and/or reduce overflows from the Lithium TG Raw Water Tank such that the overflow is not released to the siltation trap. The plan must be implemented in accord with a timeframe agreed to by the Licensee and CEO.	Plan by 01/09/16 Remedial works to be completed in accord with plan
IR5	Provide a scope and schedule to the CEO for implementation of works to improve the water quality of discharge to Norilup Dam and/or isolate the contaminated process water flows (including tailings seepage) from clean stormwater so as to meet the ambient surface water quality limits (as specified in Table 3.4.2 of condition 3.4.1). The works must also replace the current system of conveying tailings seepage overflows from TSF2 and the Clear Water Pond and process water overflows from the Lithium Processing Plant in open channels or drains across the Premises with bunded pipelines or equivalent. The need for provision of additional storage capacity within the Premises for emergency overflows must be evaluated and included in the scope.	Plan by 1/12/2016 Works completed by 2021
IR6	Sample water quality for pH, TDS, Lithium, arsenic, cadmium, copper, manganese, nickel, uranium and thorium in receiving north west wetland for seepage from Southampton Dam, monthly over a consecutive three month period from December – February. Provide results to the CEO. In the event of adverse results, preliminary contingency management plans must also be submitted. Provide an estimate of the size of the wetland in hectares, contribution of seepage flows from Southhampton Dam in average m^3/day and as a total percentage of inflows to the wetland. Provide a map showing the wetland's location with regard to the Premises boundary.	1/04/2017
IR7	The Licensee shall monitor ambient surface water quality at Swenkies and Mt Jones Reservoir surrounding the Premises monthly for a consecutive six month period from date of licence amendment. The initial month's results shall be immediately forwarded to the CEO on receipt with the following results to be submitted on a monthly basis until conclusion of the six monthly period.	Monthly from date of amendment

5 Information

5.1 Records

5.1.1 All information and records required by the Licence shall:
- (a) be legible;
- (b) if amended, be amended in such a way that the original and subsequent amendments remain legible or are capable of retrieval;
- (c) except for records listed in 5.1.1(d) be retained for at least 6 years from the date the records were made or until the expiry of the Licence or any subsequent licence; and
- (d) for those following records, be retained until the expiry of the Licence and any subsequent licence:
  - (i) off-site environmental effects; or
  - (ii) matters which affect the condition of the land or waters.

5.1.2 The Licensee shall complete an Annual Audit Compliance Report indicating the extent to which the Licensee has complied with the conditions of the Licence, and any previous licence issued under Part V of the Act for the Premises for the previous annual period.

5.1.3 The Licensee shall implement a complaints management system that, as a minimum, records the number and details of complaints received concerning the environmental impact of the activities undertaken at the Premises and any action taken in response to the complaint.

5.2 Reporting

5.2.1 The Licensee shall submit to the CEO an Annual Environmental Report by 30 September of each year. The report shall contain the information listed in Table 5.2.1 in the format or form specified in that table.

Table 5.2.1: Annual Environmental Report

Condition or table (if relevant)	Parameter	Format or form[1]
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
-	Actual production throughputs for premises categories	None specified
2.2.3	Water quality of surface water discharges	None specified
3.4.1	Monitoring of ambient air quality, surface water quality, and groundwater quality.	None specified
5.1.2	Compliance	Annual Audit Compliance Report (AACR)
5.1.3	Complaints summary	None specified

Note 1: Forms are in Schedule 2

5.2.2 The Licensee shall ensure that the Annual Environmental Report also contains:
(a) any relevant process, production or operational data recorded under Condition 3.1.3; and
(b) an assessment of the information contained within the report against previous monitoring results and Licence limits.

5.2.3 The Licensee shall submit the information in Table 5.2.2 to the CEO according to the specifications in that table.

Table 5.2.2: Non-annual reporting requirements

Condition or table (if relevant)	Parameter	Reporting period	Reporting date (after end of the reporting period)	Format or form[1]
-	Copies of original monitoring reports submitted to the Licensee by third parties	Not Applicable	Within 14 days of the CEO's request	As received by the Licensee from third parties
3.2.1 and 3.3.1	Surface water discharges and process monitoring	Quarterly	Within 30 days	None specified

Note 1: Forms are in Schedule 2

5.2.4 The Licensee shall submit a compliance document to the CEO, following construction of the TSF2 embankment works to RL 1265 m and prior to commissioning of the same.

Further compliance documents shall be submitted to the CEO following each 5m lift and prior to commissioning, to a total height of RL 1280 m.

5.2.5 The compliance document shall:
- (a) certify that the works were constructed in accordance with the conditions of the Licence;
- (b) be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.

5.3 Notification

5.3.1 The Licensee shall ensure that the parameters listed in Table 5.3.1 are notified to the CEO in accordance with the notification requirements of the table.

Table 5.3.1: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement[1]	Format or form[2]
1.3.3	Issue of new versions of the Surface Water Management Plan	Within 30 days of issue of the new version of the Surface Water Management Plan	None specified
2.1.1	Breach of any limit specified in the Licence	Part A: As soon as practicable but no later than 5pm of the next usual working day. Part B: As soon as practicable	N1
3.1.5	Calibration report	As soon as practicable.	None specified

Note 1: Notification requirements in the Licence shall not negate the requirement to comply with s72 of the Act

Note 2: Forms are in Schedule 2

Schedule 1: Maps

Premises map

The Premises is shown in the map below. The red line depicts the Premises boundary, with two areas in yellow excised from the Premises boundary.

Figure 1: Premises Map

Map of storage areas, surface water emission and monitoring points

The locations of the surface water storages, emission and monitoring points defined in Tables 2.2.3, 2.3.1, and 3.4.2 are shown below.

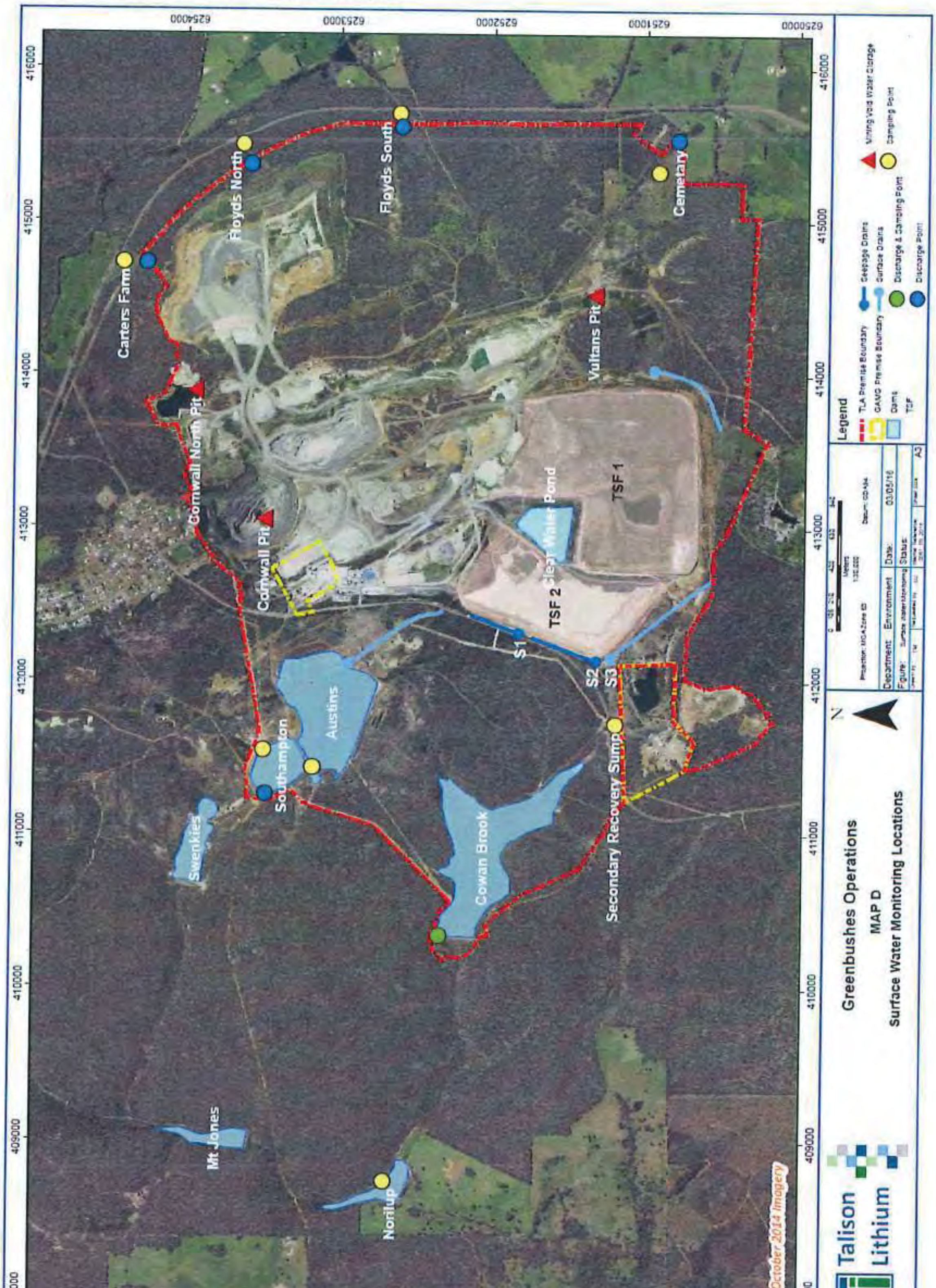

Figure 2: Map of surface water storages, emissions and monitoring points

Map of groundwater monitoring points

The location of groundwater monitoring points defined in Table 3.4.3 is shown below.

Figure 3: Map of groundwater monitoring locations

Map of ambient air quality monitoring location

The location of the monitoring point defined in Table 3.4.1 is shown below. Also shown are the locations of the noise and blast monitors required by the approval under Regulation 17 of the *Environmental Protection (Noise) Regulations 1997*.

Figure 4: Map of ambient air and noise quality monitoring points

Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:	L8501/2010/1
Our ref:	2010/0008673
Enquiries:	Danielle Eyre
Phone:	9725 4300
Fax:	9725 4351
Email:	danielle.eyre@dec.wa.gov.au

The Manager
Global Advanced Metals Pty Ltd
PO Box 31
GREENBUSHES WA 6254

Dear Sir/Madam

***ENVIRONMENTAL PROTECTION ACT 1986 – LICENCE* L8501/2010/1**

Global Advanced Metals
Maranup Ford Rd
GREENBUSHES WA 6254

Your application for a licence under Part V of the *Environmental Protection Act 1986* for the above premises works has been issued subject to the attached conditions. Enclosed is your licence number **L8501/2010/1.**

If you are concerned about, or object to any of the conditions you may lodge an appeal with the Minister for the Environment within 21 days from the date on which this licence is received. The Office of the Appeals Convenor can be contacted on 6467 5190 to find out the procedure and fee.

Members of the public may also appeal the licence. The Appeals Registrar at the Office of the Appeals Convenor can be contacted after the closing date of appeals to check whether any appeals were received.
Under Section 58 of the *Environmental Protection Act 1986*, it is an offence to contravene a licence condition. This offence carries a penalty of up to $125,000, with a daily penalty of up to $25,000.

If you have any questions relating to the licence or licence conditions, please contact Danielle Eyre on 9725 4300.

Yours sincerely

Peter Skitmore
Manager, Licensing & Permitting Branch

Monday, 13 December 2010
enc: Licence L8501/2010/1
copy to: Local Government Authority: Shire of Bridgetown-Greenbushes

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Environmental Protection Act 1986

LICENCE

LICENCE NUMBER: L8501/2010/1 **FILE NUMBER: 2010/008673**

NAME OF OCCUPIER:
Global Advanced Metals Pty Ltd
A.C.N. 139 987 465

ADDRESS OF OCCUPIER:
PO Box 31
GREENBUSHES WA 6254

NAME AND LOCATION OF PREMISES:
Global Advanced Metals
Maranup Ford Rd
GREENBUSHES WA 6254

Environmental Protection Regulations 1987
CLASSIFICATION(S) OF PREMISES:

Category 5: Processing or beneficiation of metallic or non-metallic ore
Category 44: Metal smelting or refining

COMMENCEMENT DATE OF LICENCE: Tuesday, 14 December 2010

EXPIRY DATE OF LICENCE: Friday, 13 December 2013

CONDITIONS OF LICENCE:
As described and attached:

DEFINITIONS
GENERAL CONDITION(S) 3
AIR POLLUTION CONTROL CONDITION(S) 8
WATER POLLUTION CONTROL CONDITION(S) 6
NOISE POLLUTION CONTROL CONDITION(S) 1
SOLID WASTE CONTROL CONDITION(S) 1
ATTACHMENT(S) 3

....

Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Monday, 13 December 2010

PPMS_ TL0422 v1.0

WESTERN AUSTRALIA

DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Environmental Protection Act 1986

LICENCE NUMBER: L8501/2010/1 **FILE NUMBER: 2010/008673**

Applicability

This licence relates to the Greenbushes mining project operated by Global Advanced Metals Pty Ltd, which processes pegmatite ore to produce tin metal and tantalum concentrate. Crushing, milling, screening, primary separation, flotation, roasting and smelting are undertaken at the premises to produce tantalum ore concentrate, tantalum glass concentrate and tin ingots. Any tailings generated are disposed of in a tailings storage dam located at an adjacent premises. All potentially contaminated water is retained at either the licensed premises or an adjacent licensed premises for re-use.

Potential environmental impacts relate to dust, noise, stack emissions and surface water quality. Conditions in this licence principally relate to air, water and noise monitoring, and their reporting. An ambient dust limit has been set for the operation.

This licence covers activities previously undertaken at the premises by other companies and complements L4247/2010/12 issued to Talison Lithium Australia Pty Ltd for the adjacent and contiguous premises.

The licence conditions will be subject to a major review during the period of the licence as part of the Department's commitment to upgrading the quality of its licences under the *Environmental Protection Act 1986*.

This facility is prescribed within Schedule 1 of the *Environmental Protection Regulations 1987* as outlined in Table 1;

Table 1: Categories under which the Greenbushes Mine is prescribed.

Category number	*Category name*	*Description*
5	Processing or beneficiation of metallic or non metallic ore	Premises on which – (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.
44	Metal smelting or refining	Premises on which metal ore, metal ore concentrate or metal waste is smelted, fused, roasted, refined or processed.

Nominal Rated Throughput

The nominal rated throughputs covered by this licence are:

- Quantity processed or beneficiated: 4 000 000 tonnes per annum;
- Quantity smelted or refined: 7 000 tonnes per annum of product roasted;

CONDITIONS OF LICENCE

DEFINITIONS

In these conditions of licence, unless inconsistent with the text or subject matter:

"advise" means advise by telephone, facsimile or e-mail;

"AS" means Australian Standard;

"Australian Standard 1657" means the current version and relevant part/s of Australian Standard AS1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation;

"Australian Standard 1940" means the current version and relevant part/s of Australian Standard AS1940 The storage and handling of flammable and combustible liquids;

"AS3580" means the current version and relevant part/s of Australian Standard AS3580 Methods for sampling and analysis of ambient air;

"AS3780" means the current version and relevant part/s of Australian Standard AS3780 Storage and handling of corrosive substances;

"AS4323" means the current version and relevant part/s of Australian Standard AS4323 Stationary source emissions, Method 1: Selection of sampling positions;

"AS5667.1:1998" means the current version and relevant part/s of Australian Standard AS5667 Water Quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples;

"bq/L" means becquerels per litre;

"calendar quarter" means a period of three calendar months beginning on 1 January, 1 April, 1 July and 1 October each calendar year and not including December 2010

"Director" means Director, Environmental Regulation Division of the Department of Environment and Conservation for and on behalf of the Chief Executive Officer as delegated under Section 20 of the *Environmental Protection Act 1986*;

"Director" and "Department of Environment and Conservation" for the purpose of correspondence means:

Department of Environment and Conservation *Telephone:* 9725 4300
South West Regional Office *Facsimile:* 9725 4351
PO Box 1693
BUNBURY WA 6231
Email: SouthWestRegion.IndustryRegulation@dec.wa.gov.au

"licensee" means Global Advanced Metals Pty Ltd;

"mg/L" means milligrams per litre;

"mg/m^3" and "$\mu g/m^3$" means milligrams and micrograms per cubic metre, respectively;

"NATA" means National Association of Testing Authorities;

"premises" means those parts of mining leases M01/3, M01/6 and G01/01 as depicted by purple boundary as indicated in Attachment 1; and

"PM_{10} " means particulate matter smaller than 10 micrometres in diameter.

GENERAL CONDITIONS

REPORTING REQUIREMENTS

G1 The licensee shall provide to the Director by **30 September each year**, two copies of an annual monitoring report containing data collected over the period **1 July to 30 June**. The report shall contain:

(i) monitoring data or other collected data required by any condition of this licence;

(ii) an explanation of the monitoring results with respect to the environmental impacts of the project (including comparison with historical data);

(iii) the monitoring methods used to collect and analyse data required by any condition of this licence to demonstrate they comply with the methods specified in this licence;

(iv) the number and type of complaints received including complainant's details, nature of complaint (where appropriate cross referenced with prevailing wind directions) and action taken;

(v) any issues raised from inspections or incident responses during the reporting period together with details as to how these have been addressed/rectified or, if the required work has yet to be completed, how and when they will be rectified/completed; and

(vi) any changes to site boundaries, location of groundwater monitoring bores, surface drainage channels and on-site or off-site impacts or pollution.

LICENCE LIMIT AND TARGET EXCEEDANCE REPORTING

G2(a) The licensee shall advise the Director within 48 hours of becoming aware of an exceedance of any measurement which indicates that any discharge limit or target specified in these conditions of licence has been exceeded.

G2(b) The written advice required by Condition G2(a) shall include:

(i) the date, time and probable reason for the exceedance;

(ii) an estimate of the period over which the limit or target was or is likely to be exceeded; and

(iii) an estimate of the extent of the discharge over that period and indication of known or potential environmental impacts.

G2(c) The licensee shall provide a full report on its investigations into any exceedance reported under condition G2(a) within seven days of that exceedance, and it shall include, but not be limited to:

(i) the date, time and reason for the exceedance;

(ii) the period over which the exceedance occurred;

(iii) the extent of the discharge over that period and potential or known environmental consequences;

(iv) corrective action taken or planned to mitigate adverse environmental consequences; and

(vi) corrective action taken or planned to prevent a recurrence of the exceedance.

G3 The licensee shall by **30 September** in each year, provide to the Director an Annual Audit Compliance Report in the form in Attachment 2 to this licence, signed and certified in the manner required by Section C of the form, indicating the extent to which the licensee has complied with the conditions of this licence, and any previous licence issued under Part V of the Act for the premises, during the 12 month period beginning 1 July the previous year.

AIR POLLUTION CONTROL CONDITIONS

DUST - GENERAL REQUIREMENT

A1 The licensee shall not allow visible dust generated from mining and processing operations to cross the boundary of the adjacent Talison Lithium Australia Pty Ltd premises as described in licence L4247/2010/12.

DUST (PARTICULATES) MONITORING TARGET AND LIMIT

A2(a) The licensee shall operate and maintain, from **1 November to 31 May** each year, high volume dust monitoring equipment capable of measuring PM_{10} in accordance with AS3580 at the location depicted as 'Hi-vol dust monitor' in Attachment 3

A2(b) The licensee shall provide the recorded results of the sampling and analysis referred to in condition A2(a) in the annual monitoring report.

A3 The Licensee shall, upon becoming aware as a result of the monitoring required in Condition A2(a) that an emission listed in Column 2 of Table 2 from an emission point in Column 1 of Table 2 has exceeded the emission target for that emission, in Column 3 of Table 2, undertake the target exceedance response required by conditions G2(a), G2(b) and G2(c).

Table 2: Air Emission Targets

Column 1	Column 2	Column 3
Emission Point	**Air Emissions**	**Emission Target**
Hi-vol dust monitor (at the location depicted in Attachment 3)	PM_{10}	50 μg/m^3 when averaged over a 24 hour period

A4 The licensee shall manage on-site activities such that the level of PM_{10} collected in the high volume dust monitoring equipment at the location depicted as 'Hi-vol dust monitor' in Attachment 3 and attributed to mining activities does not exceed 90 μg/m^3 when averaged over a 24 hour period.

SAMPLING PORTS AND PLATFORMS

A5 The licensee shall maintain emissions sampling ports, platforms and access ways on the chimney stacks for the Tantalum Secondary Processing plant- Roaster and the Tantalum Secondary Processing plant- Furnaces in accordance with Australian Standard 1657-1974, and Australian Standard 4323.1 - 1995.

STACK PARTICULATE MANAGEMENT - BAGHOUSE

A6(a) The licensee shall direct emissions from the Secondary Processing Plant–Roaster and the Secondary Processing Plant – Smelter furnaces through baghouse filters capable of reducing total particulate emissions to less than 50 mg/m^3.

A6(b) The licensee shall visually inspect the discharge of the Roaster baghouse filter at least once per day (when in operation).

A6(c) If a visible particulate emission is observed, the licensee shall immediately identify the source of the leak (which baghouse section) and isolate that section.

A6(d) The licensee shall not use the baghouse section (where the leak is detected) until the leak is repaired.

A6(e) The licensee shall monitor the pressure drop across the Roaster baghouse filter system on a daily basis.

A6(f) Where a pressure drop is detected, consistent with the failure of a filter bag, the licensee shall close-off the section where the leak is detected and not used that filter bag until the leak is repaired.

A6(g) The licensee shall keep in stock a set of bag filters capable of completely changing out one section of the baghouse filter.

A6(h) The licensee shall maintain a system that records:
- (i) when the baghouse filter discharge was inspected (condition A6(b));
- (ii) when the baghouse filter pressure drop was monitored (condition A6(e));
- (iii) the location / source of any leak (condition A6(c));
- (iv) when the filter was brought back on-line (condition A6(d) and A6(f));

STACK MONITORING

A7(a) The licensee shall perform, during each three month calendar quarter, stack emission source monitoring from the Smelter and Roaster stacks (as depicted in Attachment 3) in accordance with USEPA Method 29 for the purpose of measuring the total particulate and arsenic emissions.

A7(b) The stack emission source monitoring referred to in part (a) of this condition is not required to be undertaken within any three month calendar quarter when the Smelter and Roaster is operated for less than two hundred hours within that three month calendar quarter.

A8 The results of the source monitoring detailed in condition A7 shall be provided in the next annual monitoring report.

WATER POLLUTION CONTROL CONDITIONS

TAILINGS STORAGE FACILITY

W1 The licensee shall direct tailings, slurry and liquid generated from mineral processing activities to the tailings storage facility operated by Talison Lithium Australia Pty Ltd in accordance with the conditions of L4247/1991/12 and located on mining tenements M01/6 and M01/7.

STORMWATER MANAGEMENT

W2 The licensee shall divert stormwater run-off from the processing plants via drains, settling basins or wetland filters to the plant water storage dams.

WATER MANAGEMENT FROM ANCILLARY OPERATIONS

W3 The licensee shall install and maintain bunding, drains and sealed collection sumps around the process plant, mechanical workshops and laboratory areas to enable recovery of any spillages. Collected matter shall either be treated on-site, or disposed of off-site for recycling or to a licensed landfill site or liquid waste facility.

BUNDING AND CONTAINMENT

W4(a) The licensee shall store flammable and combustible liquids and corrosive substances, (where the total volume of each substance stored on the premises exceeds 250 litres) within bunded areas in accordance with AS1940 and AS3780.

W4(b) The licensee shall remove and dispose of any liquid resulting from spills or leaks of chemicals including fuel, oil or other hydrocarbons, whether inside or outside the low permeability compound(s) by recycling or to a licensed landfill or liquid waste facility.

WATER MONITORING PROGRAMME AND REPORTING

W5(a) The licensee shall, at the frequencies stated in Table 3, take and have analysed representative water samples from the monitoring sites depicted in Attachment 3:

Table 3 Water Monitoring Programme

Monitoring sites	Sampling Frequency	Parameters to be measured
Monitoring Bores: MB1, MB3, MB97/03, MB97/4, MB01/01, MB01/09, MB05/01, and MB05/02.	**3-monthly** (January, April, July and October)	pH, Total Dissolved Solids calculated from Electrical Conductivity, Chloride, Sulphate, Nitrate-Nitrogen, Arsenic, Cobalt, Copper, Iron, Lithium, Magnesium, Manganese, Nickel, Uranium and Thorium.
	6-monthly (January and July)	$Radium^{226}$ $Radium^{228}$
Cowan Brook, and Southampton/ Austins Pump Station *Parameters measured at these locations will be the total unfiltered analysis*	**3-monthly** (January, April, July and October)	pH, Total Dissolved Solids calculated from Electrical Conductivity, Chloride, Sulphate, Nitrate-Nitrogen, Arsenic, Cobalt, Copper, Iron, Lithium, Magnesium, Manganese, Nickel, Uranium and Thorium.
	6-monthly (January and July)	$Radium^{226}$ $Radium^{228}$

With the exception of pH and Radium, all measurements shall be presented in mg/L. Radium shall be presented in bq/L.

W5(b) The licensee shall measure the Standing Water Level {in metres AHD (Australian Height Datum)} in monitoring bores MB1, MB3, MB97/4, MB01/09 and MB01/01, **quarterly** (as outlined in condition W6(a)), and provide the results in the annual monitoring report.

SAMPLING AND ANALYSIS

W6(a) The licensee shall collect all water samples in accordance with Australian Standard 5667.

W6(b) With the exception of pH, the licensee shall submit all water samples to a laboratory with current NATA accreditation for the analyses specified, to be analysed in accordance with the current "Standard Methods for Examination of Water and Wastewater-APHA-AWWA-WEF".

NOISE POLLUTION CONTROL CONDITIONS

NOISE MONITORING AND REPORTING

N1(a) The licensee shall measure the general plant noise emissions on a continuous basis at the location outlined in Attachment 3.

The noise monitoring instrumentation shall comply with the requirements of the Environmental Protection (Noise) Regulations 1997 and any exemption order granted to the licensee.

N1(b) The licensee shall provide the recorded results of noise monitoring referred to in condition N1(a) and from blasting operations in the next annual monitoring report.

SOLID WASTE POLLUTION CONTROL CONDITION

SOLID WASTE MANAGEMENT

S1(a) The licensee shall provide areas to store recyclable and re-usable solid waste products generated at the premises.

S1(b) The licensee shall ensure all putrescible waste is disposed to a licensed landfill facility.

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Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Thursday, 9 December 2010

ATTACHMENT 1 – PLAN OF PREMISES

APPENDIX 2

Minesite Contaminant Sources & Pathways

Minesite Sources	Types of Analytes or Contaminants	Possible Pathways
Mining (drilling, blasting, loading and hauling)	• Li & PO_4 from the ore body (weathering of lithium phosphate minerals). • Arsenic (As) from weathering of arsenic sulphide minerals and native arsenic). • Sulfate (SO_4) from weathering of sulphidic rock in pits. • Other heavy metals mobilised by a change in pH of soil/ rock water (e.g. Fe, Mn, Ni, Zn, Cu, Ni). • Residual Nitrate (NO_3) from blast reagents. • Hydrocarbons from plant and equipment.	• Pit dewatering. • Runoff from pit faces and ingress of groundwater. • Runoff from haul roads. • Residues carried by vehicles. • Dust carried by prevailing winds and deposited in adjacent drainage areas and catchments.
Crushing and stockpiling of fine ore	• Li & PO_4 from the crushing of lithium phosphate minerals. • Sulfate (SO_4) from weathering of sulphidic rock material. • Heavy metals mobilised by a change in pH of drainage water (e.g. As, Fe, Mn, Ni, Zn, Cu, Ni). • Residual Nitrate (NO_3) from blast reagents. • Oil and grease from lubrication of equipment.	• Dust carried by prevailing winds. • Runoff from crusher site. • Runoff and seepage from ore stockpiles.
Processing of ore (Lithium and Tantalum plants) **Note:** Tantalum Plant currently closed	• Li & PO_4 from the crushing of lithium phosphate minerals. • SO_4 from weathering of sulphidic rock material in the stockpiles. • Heavy metals mobilised by a change in pH of drainage water (e.g. As, Fe, Mn, Ni, Zn, Cu, Ni). • Residual NO_3 from blast reagents. • Li from wet grinding of lithium phosphate minerals. • Impurities in spodumene ore (e.g. heavy metals As, Fe, Mn, Ni, Co, Cu and Ni, and nutrients P and NO_3). • Sodium (Na) from additions of soda ash (Na_2CO_3) for pH control. • SO4, Li and heavy metals from attritioning with sulphuric acid. • Processing chemical additives (Oleic Acid, Frothing Agent, and Acid Filtration Aid - NALCO81605). • Oil and grease from lubrication of equipment.	• Runoff and seepage from Processing Plant sites and chemical storage facilities. • Overflows or discharges from the Mine Water Circuit. • Scrubber process water.
Tailing storage facilities (TSFs) **Note:** TSF1 closed but can receive water from pit dewatering if required. TSF2 active since 2006. TSF3 closed and rehabilitated.	• Lithium (Li) in tailings. • Residues from minerals processing (see above). • Na from soda ash (Na_2CO_3) for neutralisation of process water prior to discharge to TSF. • Herbicides for weed control – Roundup (Glyphosate) and Brushoff (Metsulphuron).	• Seepage from TSF1, TSF2 and TSF3 to groundwater. • Seepage from south embankment of TSF1 to drain to Westralia Gully. • Runoff from downstream face of east and south embankment of TSF1 toe drain to Westralia Gully. • Seepage from west embankement of TSF1 to TSF2. • Runoff from downstream face of west embankment of TSF1 to TSF2.

Minesite Sources	Types of Analytes or Contaminants	Possible Pathways
		• Dust from TSF1. • Seepage from west embankment of TSF2 to drain along Maranup Ford Road. • Runoff from downstream face of west embankment of TSF2 to drain. • Seepage and runoff from south-west embankment of TSF2 to Tin Shed Dam. • Decant of tails water and rainfall runoff from TSF1 and TSF2 to Clear Water Pond (CWP). • Seepage from CWP to groundwater. • Seepage/overflows from CWP overflow drain to Austins Dam. • Seepage and runoff from TSF3 to Tin Shed Dam.
Waste rock dumps **Note:** IP Landform is a historical facility and Floyds Landform is the current facility.	• Li due to weathering of lithium minerals in the waste rock. • Sulfate (SO_4) from weathering of sulphidic rock in dumps. • Heavy metals mobilised by a change in pH of soil/rock water (e.g. As, Fe, Mn, Ni, Zn, Cu, Ni). • Residual Nitrate (NO_3) from blast reagents.	• Dust carried by prevailing winds. • Seepage to groundwater. • Runoff from landforms.
Dewatering	• Li & PO_4 from the ore body (weathering of lithium phosphate minerals). • Arsenic (As) from weathering of arsenic sulphide minerals and native arsenic). • Sulfate (SO_4) from acidic drainage water. • Heavy metals mobilised by a change in pH of soil/rock water. • Residual Nitrate (NO_3) from blast reagents. • Hydrocarbons from plant and equipment.	• Overflows or discharges from the Dewatering System.
Wastewater	• Nutrients (N and P). • Faecal coliforms. • Other organic matter.	• Leach drains.

APPENDIX 3

SWMP Water Management Interventions

No.	Water Management Intervention 2015	Timeline	Current Status
1	Instigate a site pilot test plant to trial the removal of Lithium and other elements of interest from the Mine Water Circuit and manage the sustainable disposal thereof.	Jan 2015	This referenced the first of a series of pilot. The third and final pilot study is currently underway to obtain a process guarantee ahead of construction.
2	Investigate the existing bioremediation function of Austins wetland and , if necessary , to consider requirements for the rehabilitation of the wetland and/or construction of a new wetland.	Closed	
3	For the purpose of mine closure, conduct an investigation into the Austins Wetland to determine the fate of the sediments under varied climatic conditions ie: if drying occurs	2017	Complete
4	When and if Lithium concentrations in Cowan Brook discharge reach 10mg/L repeat surveys of aquatic flora and fauna along the Norilup Brook to determine the presence and health thereof and any evidence of bioaccumulation.	As required	Aquatic surveys are now are requirement under L4247/1991/13 to be conducted annually. Last survey was completed in Spring 2016.
5	Install additional water meters and flow loggers as outlined in Sections 3.6 and 6.4.	2016	Installation of water meters and flow loggers is ongoing and targeted at those that are required under L4247/1991/13
6	Increase the percentage of water returned direct to the process plants from the Clear Water Pond to improve water use efficiency and reduce seepage (and therefore contamination via the Austin Drain pathway).	Ongoing	Ongoing
7	Continue to upgrade monitoring program based on the findings of the reports to ensure improved understanding and if required apply remediation.	Ongoing	Ongoing. Additional monitoring bores to be expected to be installed in May.
8	Include a subsurface seepage recovery system in the construction of the next TSF 2 lift	2016	Currently under construction
9	Implement measures to remove Lithium from key components of the Mine Water Circuit this must include a viable and non-polluting option for the disposal of Reverse Osmosis brine	2017	Final pilot study in progress. The RO system is expected to be running when the current CG Plant #2 expansion is completed.
10	Install solar pump on Austins dam seepage collection point to return water to circuit	2016	Complete
11	Increase the amount of water pipe vs open drain transfer	ongoing	Ongoing
12	Install real time level monitoring in major storage dams	2016	Complete
13	Determine most effective solution for the disposal of RO brine	2016	Ongoing
14	Update ground water monitoring bores based on GHD review	2016	15 monitoring bores to be expected to be installed in late May, 6 more to follow.

APPENDIX 4

Mapping of Shallow Aquifer & Additional Monitoring Bores

LEGEND

Flow Direction Groundwater

Flow Direction Surface Water

Inferred Shallow Aquifer

? Possible Shallow Aquifer

1: 112,030,904 (at A4)

0 112.5225 450 675 900 1,125

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Talison Lithium Limited
Stage 3, Integrated Geophysics
& Hydrogeology Assessment.

Inferred distribution of sands and water flow direction

Job Number	61-31371
Revision	A
Date	16 Sep 2014

Figure 1

G:\61\31371\GIS\Maps\Working\6130220_G003_RevA_Fig1.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

Data source: Talison Lithium Limited: Overall Greenbushes Mine MGA50 - -2013; GHD: Monitoring Bore Location - 20140116, Extent of Inferred Sand - 20140116, Section Line - 20140110. Created by: jrutherford

LEGEND

- Proposed Monitoring Bore Location
- Existing Monitoring Bore Location
- Inferred Shallow Aquifer
- ? Possible Shallow Aquifer

1: 28,604 (at A4)

0 112.5225 450 675 900 1,125

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

GHD

SLIP ENABLER

Talison Lithium Limited
Stage 3, Integrated Geophysics
& Hydrogeology Assessment.

Job Number	61-31371
Revision	A
Date	17 Sep 2014

Inferred distribution of sands and groundwater wells

Figure 2

G:\61\31371\GIS\Maps\Working\6130220_G003_RevA_Fig2.mxd

239 Adelaide Terrace Perth WA 6004 Australia **T** 61 8 6222 8222 **F** 61 8 6222 8555 **E** permail@ghd.com.au **W** www.ghd.com.au

Data source: Talison Lithium Limited: Overall Greenbushes Mine MGA50 - -2013; GHD: Monitoring Bore Location - 20140116, Extent of Inferred Sand - 20140116, Section Line - 20140110. Created by: jrutherford

APPENDIX 5

Historical Water Quality Monitoring Data

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	Oct-97	7.58	1102	596	0.011	188	3	15.8	27.4	319	0	40	42.7	<0.01	<0.02	0.015	<0.005	<0.01	0.009	<0.005	<0.06	0.27	0.029	<0.05		
D2	Dec-97	7.68	1104	660	0.014	181	2.9	15.3	26.5	345	0	40	40.9	1.4	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.27	<0.005	<0.05		
D2	Jan-98	7.95	1205	615	0.055	185	3	15.5	26.9	352	0	43	41	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	0.08	0.27	<0.005	<0.05		
D2	Feb-98	7.99	1315	694	0.016	196	3.2	16.3	28.3	355	0	45	42.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	0.29	<0.005	<0.05		
D2	Apr-98	7.77	1299	688	0.033	197	3.2	16.1	27.8	335	0	48	42	<0.2	<0.02	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	0.28	0.008	<0.05		
D2	May-98	7.88	1355	689	0.015	203	3.2	16.4	29.3	383	0	45	39.4	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.28	0.01	<0.05		
D2	Jun-98	7.83	1405	719	0.019	191	3	16.2	27.7	384	0	50	38	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.25	0.009	<0.05		
D2	Jul-98	7.79	1366	772	0.032	187	3	15.5	27.1	393	0	47	39	0.2	0.03	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.27	<0.005	<0.05		
D2	Aug-98	7.74	1352	631	0.005	213	3.5	17.5	31.7	359	0	46	40.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	0.24	<0.005	<0.05		
D2	Sep-98	7.77	1316	648	0.021	198	3.1	16	28.9	368	0	45	40.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.006	<0.005	0.09	0.25	0.006	<0.05		
D2	Oct-98	7.67	1314	735	0.038	199	3.3	16.4	29.3	360	0	45	40.8	<0.2	0.03	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	0.26	<0.005	<0.05		
D2	Dec-98	7.92	1267	640	0.078	206	3	16.3	30.2	373	0	46	43.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.025	<0.005	<0.06	0.29	0.005	<0.05		
D2	Jan-99	7.93	1346	691	0.08	206	3	16.2	30.4	396	0	48	42.1	<0.2	<0.02	<0.005	0.009	<0.01	0.008	<0.005	0.07	0.27	<0.005	<0.05		
D2	Feb-99	8.01	1367	693	0.221	218	3.6	18.5	33	391	0	50	44.5	<0.2	<0.02	<0.005	<0.005	<0.01	0.016	<0.005	0.07	0.31	0.032	<0.05		
D2	Mar-99	7.93	1416	741	0.028	217	3.4	18	32.6	416	0	51	43	<0.2	<0.02	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.3	0.008	<0.05		
D2	Apr-99	7.72	1399	730	0.036	223	3.3	17.9	33.9	422	0	54	44.4	<0.2	<0.02	<0.005	<0.005	<0.01	0.013	<0.005	0.06	0.27	0.019	<0.05		
D2	May-99	7.75	1445	756	0.034	223	3.5	17.9	33.2	393	0	56	45.2	<0.2	0.03	<0.005	<0.005	<0.01	0.009	<0.005	0.08	0.29	0.019	<0.05		
D2	Jun-99	7.65	1426	701	0.035	209	3.4	17.4	30.8	387	0	53	40.9	<0.2	<0.02	<0.005	0.006	<0.01	0.006	<0.005	<0.06	0.3	0.023	<0.05		
D2	Jul-99	7.64	1374	677	0.029	206	3.3	16.7	30.3	377	0	53	43.2	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	0.14	0.34	0.021	<0.05		
D2	Aug-99	7.64	1274	739	0.047	192	3.7	16.9	28.3	346	0	52	56.4	0.5	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	0.06	0.79	<0.005	<0.05		
D2	Sep-99	7.75	1209	727	<0.005	189	4.2	17.7	28.3	308	0	51	58.1	0.4	<0.02	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	1.1	0.008	<0.05		
D2	Oct-99	7.8	1185	646	0.057	180	4.4	17.7	26.5	317	0	53	63.4	0.7	0.02	<0.005	<0.005	<0.01	0.015	<0.005	0.08	1.4	<0.005	<0.05		
D2	Nov-99	8.02	1112	582	0.13	166	4.5	17	24.1	282	0	55	67.6	0.6	<0.02	<0.005	<0.005	<0.01	<0.005	0.007	<0.06	1.7	<0.005	<0.05		
D2	Dec-99	8.06	1156	647	0.074	181	5	18.8	26.4	298	0	57	71.8	0.5	<0.02	<0.005	<0.005	<0.01	0.009	0.008	0.07	2	0.012	<0.05		
D2	Jan-00	7.94	1226	781	0.07	184	5.1	19.2	27.4	305	0	58	73.8	0.2	<0.02	<0.005	<0.005	<0.01	0.01	<0.005	0.08	2	0.016	<0.05		
D2	Feb-00	8.12	1183	655	0.039	185	5	18.5	27.1	289	0	62	77.2	<0.2	0.06	<0.005	<0.005	<0.01	<0.005	<0.005	0.09	1.9	<0.005	<0.05		
D2	Mar-00	8.11	1247	650	0.021	188	4.9	18.6	27.5	307	0	65	75.9	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	0.14	1.9	<0.005	<0.05		
D2	Apr-00	8.05	1259	706	0.016	195	5.1	19.1	28.9	319	2.9	58	76.5	<0.2	0.02	<0.005	<0.005	<0.01	0.01	<0.005	0.12	1.9	<0.005	<0.05		
D2	May-00	7.91	1258	698	0.019	193	4.6	18.5	28.1	347	0	65	74.2	<0.2	0.04	<0.005	<0.005	<0.01	0.011	<0.005	0.11	1.8	<0.005	<0.05		
D2	Jun-00	7.9	1280	678	0.023	193	4.9	18.7	28.6	295	0	66	73.7	<0.2	0.03	<0.005	<0.005	<0.01	<0.005	<0.005	0.1	1.8	<0.005	<0.05		
D2	Jul-00	7.92	1218	683	0.026	183	4.5	17.7	27.6	331	0	71	67.8	<0.2	0.03	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.6	0.006	<0.05		
D2	Aug-00	8	1220	627	0.045	150	4.6	17.9	26.5	307	0	68	67.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.006	<0.005	<0.06	1.6	0.005	<0.05		
D2	Sep-00	7.82	1143	638	0.055	173	4.9	18	25.3	275	0	64	70.5	<0.2	<0.02	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	1.7	0.007	<0.05		
D2	Oct-00	7.89	1050	608	0.07	174	5.8	19.6	26.2	250	0	65	72.7	<0.2	0.04	<0.005	<0.005	<0.01	0.017	<0.005	0.07	1.9	<0.005	<0.05		
D2	Nov-00	8.08	1103	572	0.063	155	5.3	17.1	23.3	283	0	66	72.3	<0.2	<0.02	0.007	<0.005	<0.01	0.014	<0.005	<0.06	1.8	0.03	<0.05		
D2	Dec-00	8.18	1148	677	0.054	157	5.5	19	23.6	292	0	66	69.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.007	<0.005	0.08	1.8	0.012	<0.05		
D2	Jan-01	8.2	1174	648	0.054	188	5.8	20.1	27.9	317	0	68	74.9	<0.2	0.02	<0.005	<0.005	<0.01	0.009	<0.005	0.11	2	0.007	<0.05		
D2	Feb-01	8.19	1220	640	0.032	187	5.7	19.8	28	320	0	69	75.6	<0.2	<0.02	<0.005	<0.005	<0.01	0.009	<0.005	0.12	1.9	<0.005	<0.05		
D2	Mar-01	7.63	1249	708	0.039	194	5.8	20.4	29.4	304	0	67	78	<0.2	<0.02	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	2	0.024	<0.05		
D2	Apr-01	7.92	1274	688	0.026	195	5.8	20.7	29.9	327	0	74	76.4	<0.2	<0.02	<0.005	<0.005	<0.01	0.013	<0.005	<0.06	1.8	<0.005	<0.05		
D2	May-01	7.99	1250	740	0.046	194	5.9	21.1	30	330	0	74	75.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	2	0.024	<0.05		
D2	Jun-01	7.97	1269	674	0.065	192	5.9	21.1	29.9	327	0	75	70.4	<0.2	0.02	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	1.9	0.019	<0.05		
D2	Jul-01	8	1250	689	0.055	202	5.9	21.4	31	322	0	76	75.2	<0.2	0.03	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.9	<0.005	<0.05		
D2	Aug-01	8.05	1258	788	0.103	199	5.3	20.3	27.6	310	0	76	73.5	<0.2	0.02	<0.005	<0.005	<0.01	0.008	<0.005	0.1	1.9	<0.005	<0.05		
D2	Sep-01	7.95	1164	711	<0.005	191	5.4	20.2	28.9	323	0	74	71.2	<0.2	<0.02	<0.005	0.007	<0.01	0.007	<0.005	<0.06	1.7	0.012	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	Oct-01	8.14	1143	678	0.055	189	5.1	19.6	27.8	318	0	72	68.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	1.7	0.043	<0.05		
D2	Nov-01	8.89	1225	683	0.072	197	5.1	20	28.6	321	6.73	35	68.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	1.7	0.006	<0.05		
D2	Dec-01	8.19	1181	691	0.058	197	5	20	29	333	0	74	64.5	<0.2	<0.02	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	1.7	0.02	<0.05		
D2	Jan-02	8.28	1351	632	0.08	203	5.2	20.4	29.4	311	0	76	69.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.019	<0.005	0.09	1.7	0.01	<0.05		
D2	Feb-02	8.23	1258	758	0.048	212	5.2	21.4	31	338	0	78	68.6	<0.2	<0.02	<0.005	<0.005	<0.01	0.032	<0.005	0.08	1.7	0.008	<0.05		
D2	Mar-02	8.03	1356	750	0.103	208	5.4	20.8	31.1	384	0	81	67.1	<0.2	0.03	<0.005	<0.005	<0.01	0.062	<0.005	0.06	1.7	<0.005	<0.05		
D2	Apr-02	8.05	1398	800	0.072	217	5.7	22.1	33.3	363	0	84	71.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.043	<0.005	<0.06	1.7	<0.005	<0.05		
D2	May-02	8.01	1450	754	0.073	208	5.6	21.2	33.6	373	0	83	68.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.007	<0.005	0.1	1.7	<0.005	<0.05		
D2	Jun-02	7.98	1376	742	0.091	198	5.5	21	33.7	365	0	82	66.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.012	<0.005	0.08	1.6	0.008	<0.05		
D2	Jul-02	7.89	1385	749	0.099	204	5.5	21.2	33.6	385	0	93	65	1.7	<0.02	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	1.5	0.02	<0.05		
D2	Aug-02	7.85	1225	700	0.078	186	5.5	21.1	30.6	324	0	74	67.2	0.9	<0.02	<0.005	<0.005	<0.01	0.017	<0.005	<0.06	1.6	0.007	<0.05		
D2	Sep-02	7.9	1121	643	0.05	183	5.5	21.1	29.9	308	0	71	67.4	0.9	<0.02	<0.005	<0.005	<0.01	0.006	<0.005	0.06	1.5	0.008	<0.05		
D2	Oct-02	7.59	1222	685	0.097	181	5.2	20.7	29.5	333	0	68	68.9	0.7	<0.02	<0.005	<0.005	<0.01	0.009	<0.005	0.07	1.5	<0.005	<0.05		
D2	Nov-02	8.22	1238	669	0.048	180	5.1	19.8	28.8	322	0	73	68.8	0.5	<0.001	<0.005	<0.005	<0.01	0.005	<0.005	0.85	1.5	<0.005	<0.05		
D2	Dec-02	8.17	1333	689	0.046	183	5.1	20	29.5	343	0	73	69.3	0.3	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	0.13	1.5	<0.005	<0.05		
D2	Jan-03	8.26	1398	734	0.04	186	5.3	20.3	29.7	341	0	74	69.7	0.3	<0.001	<0.005	<0.005	<0.01	0.014	<0.005	0.1	1.6	0.013	<0.05		
D2	Feb-03	8.32	1426	739	<0.005	191	5.5	20.9	31.4	353	0.56	83	74	<0.2	0.001	<0.005	<0.005	<0.01	0.013	<0.005	0.1	1.6	<0.005	<0.05		
D2	Mar-03	7.99	1407	730	0.057	209	5.5	22.4	31.9	357	0	86	72.5	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	0.08	1.8	0.011	<0.05		
D2	Apr-03	8.05	1418	751	0.114	223	6.1	24.2	36.7	356	0	88	76.5	<0.2	0.001	<0.005	<0.005	<0.01	0.019	<0.005	0.23	1.8	<0.005	<0.05		
D2	May-03	8.05	1433	775	0.045	207	6.1	23.2	32.7	339	0	89	73.9	<0.2	0.001	<0.005	0.007	0.01	0.013	<0.005	0.24	1.7	0.035	0.06		
D2	Jun-03	7.94	1376	723	0.038	214	5.5	22.6	32.8	350	0	88	71.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.12	1.7	<0.005	<0.05		
D2	Jul-03	7.96	1357	853	0.048	214	5.5	22.5	34.4	342	0	83	69.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.018	<0.005	0.11	1.6	<0.005	<0.05		
D2	Aug-03	8.01	1282	700	0.078	201	5.4	22	32.6	346	0	76	68.8	<0.2	0.002	<0.005	<0.005	<0.01	0.021	<0.005	0.09	1.7	<0.005	<0.05		
D2	Sep-03	7.92	1193	742	0.037	192	5.5	21.7	30.1	317	0	72	77.4	0.5	0.002	<0.005	<0.005	<0.01	0.017	<0.005	0.08	2	<0.005	<0.05		
D2	Oct-03	7.78	1201	653	0.07	177	5.6	21.1	28.1	299	0	68	77.2	0.4	<0.001	<0.005	<0.005	<0.01	0.007	<0.005	0.08	2.1	<0.005	<0.05		
D2	Nov-03	7.93	1175	614	0.067	174	5.4	20.9	28.2	298	0	69	76.3	0.2	0.004	<0.005	<0.005	<0.01	0.007	<0.005	0.13	2.1	<0.005	<0.05		
D2	Jan-04	8.21	1226	758	<0.005	175	5.3	20.9	28.5	319	0	75	75.8	<0.2	0.002	<0.005	<0.005	<0.01	<0.005	<0.005	0.13	2	<0.005	<0.05		
D2	Feb-04	8.25	1341	775	0.005	187	5.6	22.2	29.8	364	0	76	79.1	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	0.29	2.2	<0.005	<0.05		
D2	Mar-04	8.31	1312	766	<0.005	185	5.6	21.7	29.4	329	0.8	75	77.9	<0.2	0.005	<0.005	<0.005	<0.01	<0.005	<0.005	0.08	2.1	<0.005	<0.05		
D2	Apr-04	8.14	1392	764	0.026	187	5.7	21.9	29.6	370	0	80	78.4	<0.2	0.002	<0.005	0.005	<0.01	0.009	<0.005	0.16	2.1	<0.005	<0.05		
D2	May-04	7.99	1356	769	0.019	186	6.2	23.4	30.6	322	0	94	78.7	0.2	0.003	<0.005	<0.005	<0.01	0.009	<0.005	0.09	2.1	0.006	<0.05		
D2	Jun-04	7.72	1385	842	0.034	201	5.8	24.4	32.8	334	0	81	81.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.009	0.007	<0.06	2.1	<0.005	<0.05		
D2	Jul-04	7.88	1295	808	0.008	194	5.7	23.4	31.9	340	0	79	77.3	<0.2	<0.001	<0.005	0.005	<0.01	0.013	<0.005	<0.06	2	<0.005	<0.05		
D2	Aug-04	7.87	1294	752	0.1	189	5.2	20.9	29.8	344	0	75	73.9	<0.2	0.01	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	1.9	<0.005	<0.05		
D2	Sep-04	7.98	1231	688	0.067	182	5	21	29.7	303	0	75	74	<0.2	0.009	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.8	<0.005	<0.05		
D2	Oct-04	7.98	1254	759	0.028	179	4.9	20.3	28.8	303	0	44	73.4	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.8	<0.005	<0.05		
D2	Nov-04	8.1	1344	710	0.035	203	5.8	22.7	32.9	331	0	75	74.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.006	<0.005	0.17	2	<0.005	<0.05		
D2	Dec-04	8.19	1348	773	0.068	203	5.8	23.5	32.5	332	0	76	74.3	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.9	0.006	<0.05		
D2	Jan-05	7.51	1434	746	0.036	211	5.9	24.1	33.8	347	0	67	77.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.017	<0.005	<0.06	2	<0.005	<0.05		
D2	Feb-05	8.2	1505	729	0.036	212	6	24.3	34.7	373	0	89	76	<0.2	<0.001	<0.005	<0.005	<0.01	0.018	0.005	0.12	2	0.006	<0.05		
D2	Mar-05	8.11	1550	820	0.035	221	6.1	24.5	35.4	364	0	66	73.7	<0.2	0.001	<0.005	<0.005	<0.01	0.028	0.006	<0.06	2.1	<0.005	<0.05		
D2	Apr-05	8.01	1551	918	0.131	228	6.3	26.9	37.8	362	0	92	81.6	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2	<0.005	<0.05		
D2	May-05	7.8	1455	773	0.131	207	6.3	25.2	37	366	0	76	77.8	0.2	<0.001	<0.005	<0.005	<0.01	0.028	<0.005	<0.06	2	<0.005	<0.05		
D2	Jun-05	7.55	1481	834	0.111	226	6.3	26.1	37.5	370	0	78	88.4	0.5	0.001	<0.005	<0.005	<0.01	0.254	<0.005	<0.06	2	<0.005	<0.05		
D2	Jul-05	7.75	1310	787	0.177	209	6.5	25.4	34.5	283	0	70	92.8	1.2	0.001	<0.005	<0.005	<0.01	0.207	<0.005	<0.06	2.3	0.009	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	Aug-05	7.51	1309	736	0.135	206	6.4	25.5	34	334	0	63	96.2	1.2	0.002	<0.005	<0.005	<0.01	0.112	<0.005	<0.06	2.4	<0.005	<0.05		
D2	Sep-05	7.63	1252	786	0.091	190	6.2	23.8	31	311	-	63	90.6	1.3	0.002	<0.005	<0.005	<0.01	0.059	<0.005	0.19	2.5	<0.005	<0.05		
D2	Oct-05	7.63	1165	649	0.057	179	6.1	22.2	29	296	0	61	87.2	1.2	0.001	<0.005	<0.005	<0.01	<0.005	0.009	0.32	2.6	<0.005	<0.05		
D2	Nov-05	7.63	1140	612	0.052	180	6.1	22.5	28.2	287	0	83	90.6	1.5	0.003	<0.005	<0.005	<0.01	<0.005	<0.005	0.07	2.6	<0.005	<0.05		
D2	Dec-05	8.09	1143	704	0.06	178	6.1	23	29	294	0	68	90.2	1.3	0.002	<0.005	0.01	<0.01	<0.005	<0.005	<0.06	2.7	<0.005	<0.05		
D2	Jan-06	8.21	1217	732	0.117	176	6	22.9	28.6	282	0	64	89.1	0.6	0.003	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2.6	<0.005	<0.05		
D2	Feb-06	8.43	1274	671	0.069	182	6.2	23.6	30.1	302	4.54	59	91.2	0.3	0.002	<0.005	<0.005	<0.01	0.007	<0.005	0.09	2.7	0.013	<0.05		
D2	Mar-06	8.56	1286	667	0.061	189	6.3	23.8	30.2	314	6.45	54	90.8	<0.2	0.001	<0.005	<0.005	<0.01	0.005	<0.005	0.07	2.7	<0.005	<0.05		
D2	Apr-06	8.09	1199	733	0.062	190	6.4	24.1	30.6	325	0	69	93.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.011	<0.005	<0.06	2.7	<0.005	<0.05		
D2	May-06	8.06	1213	690	0.049	193	6.3	24.6	31	326	0	71	93.5	<0.2	0.002	<0.005	<0.005	<0.01	0.007	0.005	<0.06	2.7	<0.005	<0.05		
D2	Jun-06	8.01	1254	675	0.045	187	6.2	23.4	30.3	319	0	70	90	<0.2	0.004	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2.7	<0.005	<0.05		
D2	Jul-06	7.94	1283	788	0.063	187	6.1	23	30.2	317	0	70	92.3	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	0.005	<0.06	2.6	0.006	<0.05		
D2	Aug-06	7.95	1283	679	0.058	192	6	23.1	32.2	316	0	69	87.7	<0.2	0.007	<0.005	<0.005	<0.01	<0.005	<0.005	0.07	2.6	<0.005	<0.05		
D2	Sep-06	7.86	1262	733	0.091	187	6	23.4	33.1	323	0	67	82.2	<0.2	0.007	<0.005	<0.005	<0.01	<0.005	<0.005	0.16	2.5	<0.005	<0.05		
D2	Oct-06	8.29	1268	721	0.04	186	6.3	23.5	33	305	0	70	87.3	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2.8	<0.005	0.05		
D2	Nov-06	8.26	1290	733	0.03	187	6.3	23.3	33.4	320	0	70	89.1	<0.2	0.01	<0.005	0.01	<0.01	<0.005	<0.005	<0.06	2.9	<0.005	<0.05		
D2	Dec-06	8.13	1273	681	0.03	175	6	22.1	31.6	331	0	73	83.2	<0.2	0.005	<0.005	<0.005	<0.01	<0.005	<0.005	0.07	2.8	<0.005	<0.05		
D2	Jan-07	8.04	1266	750	0.03	189	6.6	24.2	33.4	332	0	117	86.4	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	<0.005	0.07	2.9	<0.005	<0.05		
D2	Feb-07	8.43	1355	779	0.08	190	6.4	25.8	34.6	345	1.88	74	89.5	<0.2	<0.001	<0.005	0.01	<0.01	<0.005	<0.005	0.16	3	<0.005	<0.05		
D2	Mar-07	8.44	1248	698	0.03	203	6.8	26	35.9	341	1.05	73	90.5	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	0.07	3	<0.005	<0.05		
D2	Apr-07	8.03	1326	690	0.09	204	6.7	25.6	35.3	353	0	84	90.9	0.4	0.006	<0.005	0.01	<0.01	0.03	<0.005	<0.06	3	<0.005	<0.05		
D2	May-07	8.16	1493	755	0.02	199	6.7	25.3	34.7	321	0	87	88.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.1	3	<0.005	<0.05		
D2	Jun-07	7.46	1366	837	0.03	206	6.9	26.6	37.1	367	0	118	91.9	<0.2	0.003	<0.005	<0.005	<0.01	0.01	<0.005	0.07	3.1	<0.005	<0.05		
D2	Jul-07	7.83	1310	801	0.03	203	6.9	25.5	37.1	358	0	87	88.8	<0.2	0.002	<0.005	0.01	<0.01	<0.005	<0.005	<0.06	3.1	<0.005	<0.05		
D2	Aug-07	7.65	1313	675	0.05	199	7.3	27.3	36.9	316	0	80	103	<0.2	0.007	<0.005	0.01	<0.01	0.01	<0.005	<0.06	3.7	<0.005	<0.05		
D2	Sep-07	7.81	1266	635	0.05	171	6.9	25.7	31.8	319	0	86	101	<0.2	0.007	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	3.7	<0.005	<0.05		
D2	Oct-07	7.91	1357	797	0.04	186	7.9	29.4	36.2	294	0	71	113	0.45	0.017	<0.005	0.01	<0.01	0.02	<0.005	<0.06	4.5	<0.005	<0.05		
D2	Nov-07	7.69	1264	710	0.1	179	7.2	27.1	31.9	314	0	68	107	0.24	0.006	<0.005	0.01	<0.01	0.04	<0.005	0.08	4	<0.005	<0.05		
D2	Dec-07	8.02	1249	720	0.04	190	7.5	27.5	32.8	309	0	78	106	<0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	0.06	4.3	<0.005	<0.05		
D2	Jan-08	8.27	1335	782	0.05	196	8	29.5	35.2	320	0	74	111	<0.2	0.003	<0.005	<0.005	<0.01	0.02	0.01	<0.06	4.4	0.01	<0.05		
D2	Feb-08	8.25	1366	727	0.03	200	7.9	30	36.2	329	0	196	112	<0.2	0.001	<0.005	0.01	<0.01	0.01	<0.005	0.06	4.3	0.01	<0.05		
D2	Mar-08	8.19	1410	788	0.02	202	8	30.6	37.2	339	0	86	111	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	4.1	<0.005	<0.05		
D2	Apr-08	7.82	1415	727	0.03	198	7.8	29.6	36.5	332	0	87	111	<0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	0.33	4.4	<0.005	<0.05		
D2	May-08	7.9	1350	724	0.02	194	8.7	28.7	33.8	317	0	89	105	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	4.3	<0.005	<0.05		
D2	Jun-08	7.9	1330	708	0.03	197	8.8	29.7	34.5	326	0	87	110	<0.2	0.002	<0.005	0.01	<0.01	0.02	<0.005	<0.06	4.4	0.01	<0.05		
D2	Jul-08	7.89	1293	763	0.03	196	8.5	28.8	33.9	328	0	85	110	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	4.3	<0.005	<0.05		
D2	Aug-08	7.88	1280	619	0.1	183	7.9	27.8	30.8	319	0	75	112	0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	4.2	<0.005	<0.05		
D2	Sep-08	8.02	1313	735	0.04	194	8.2	29.3	32	305	0	78	116	<0.2	0.003	<0.005	<0.005	<0.01	0.01	<0.005	0.07	4.3	<0.005	<0.05		
D2	Oct-08	7.9	1325	698	0.04	184	8.3	29.3	32.5	313	0	75	124	<0.2	<0.001	<0.005	0.01	<0.01	0.01	0.01	0.06	4.6	<0.005	<0.05		
D2	Nov-08	8.16	1351	693	0.02	180	7.6	28.1	31.1	308	0	76	123	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	0.01	<0.06	4.4	0.01	<0.05		
D2	Dec-08	8.33	1342	753	0.02	188	8.5	29.5	33.2	317	0.45	79	133	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	0.01	0.11	4.6	0.01	<0.05		
D2	Jan-09	8.19	1330	785	0.04	189	8.8	30.1	34.1	322	0	82	129	<0.2	0.002	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	5	<0.005	<0.05		
D2	Feb-09	8.4	1380	761	0.03	202	8.9	31.1	33.8	330	5.08	73	137	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.1	5.2	<0.005	<0.05		
D2	Mar-09	7.86	1382	808	0.06	198	8.9	32	35.9	335	0	85	130	0.21	0.003	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	4.8	<0.005	<0.05		
D2	Apr-09	7.94	1423	816	0.02	211	9.2	34.4	36.8	334	0	88	136	<0.2	<0.001	<0.005	0.01	<0.01	0.06	<0.005	<0.06	5.1	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	May-09	8	1426	809	0.03	214	9.4	33.5	36.1	351	0	91	138	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.2	<0.005	<0.05		
D2	Jun-09	7.91	1427	899	0.04	200	8.9	32.8	35	337	0	90	132	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	4.8	<0.005	<0.05		
D2	Jul-09	7.95	1493	796	0.02	191	9	30.8	34.1	315	0	89	125	0.22	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	4.7	<0.005	<0.05		
D2	Aug-09	8.08	1366	836	0.03	192	8.6	32.4	36	310	0	124	139	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5	<0.005	<0.05		
D2	Sep-09	7.87	1450	752	0.04	180	8.3	32.1	34.8	311	0	77	140	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	4.9	0.01	<0.05		
D2	Oct-09	7.99	1349	791	0.06	180	8.4	33.1	33.8	302	0	74	150	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	5	<0.005	<0.05		
D2	Nov-09	8.19	1335	752	0.03	179	8.4	32.6	35.2	287	0	75	144	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.08	4.9	<0.005	<0.05		
D2	Dec-09	8.26	1320	729	0.03	180	8.2	32.9	34.9	286	0	80	147	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.06	4.9	0.01	<0.05		
D2	Jan-10	8.34	1387	796	0.03	187	8.7	33.8	36.3	312	3.28	75	152	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.1	<0.005	<0.05		
D2	Feb-10	8.52	1349	819	0.02	197	8.7	35.5	38.7	332	9.68	67	156	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.3	0.02	<0.05		
D2	Mar-10	8.41	1426	843	0.02	194	9	35.4	38.1	321	6.63	79	168	<0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	0.07	5.5	<0.005	<0.05		
D2	Apr-10	8.2	1317	875	0.07	196	9.2	36.4	39.4	316	0	91	157	<0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	5.4	<0.005	<0.05		
D2	May-10	8.02	1387	896	0.09	202	9.4	37	40.2	322	0	95	159	<0.2	<0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	5.5	<0.005	<0.05		
D2	Jun-10	8.04	1449	859	0.02	199	9	35.5	38.2	327	0	96	150	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.2	<0.005	<0.05		
D2	Jul-10	7.99	1448	784	0.02	198	9.3	35.9	39.4	314	0	94	152	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.4	<0.005	<0.05		
D2	Aug-10	8.06	1436	824	0.01	192	8.7	35	37.8	331	0	95	149	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.1	<0.005	<0.05		
D2	Sep-10	8.13	1457	844	0.01	192	8.8	34.8	38.5	333	0	94	149	<0.2	0.001	<0.005	0.01	<0.01	0.01	<0.005	0.06	5.1	<0.005	<0.05		
D2	Oct-10	8.29	1460	812	<0.005	194	8.7	35.1	37.7	329	0	98	147	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	5.2	<0.005	<0.05		
D2	Nov-10	8.54	1366	824	<0.005	196	8.7	34	38.2	326	7.3	80	146	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.2	<0.005	<0.05		
D2	Dec-10	7.87	1509	817	0.01	205	9.2	35.9	40.2	346	0	99	146	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.5	<0.005	<0.05		
D2	Jan-11	8.49	1582	848	<0.005	205	8.7	36.4	40.3	332	6.84	86	148	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.5	<0.005	<0.05		
D2	Feb-11	8.38	1592	842	0.05	208	8.6	35.8	39.4	357	4.46	94	141	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.4	<0.005	<0.05		
D2	Mar-11	8.55	1648	943	0.09	219	8.8	36.8	41.6	370	6.56	91	148	<0.2	0.002	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	5.7	<0.005	<0.05		
D2	Apr-11	8.33	1627	945	0.01	218	9.1	36.4	41.7	389	2.35	102	163	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	5.9	<0.005	<0.05		
D2	May-11	8.28	1616	935	0.01	238	9.2	38.8	47.8	390	0	105	167	<0.2	0.001	<0.005	<0.005	<0.01	0.01	0.01	<0.06	6.2	<0.005	<0.05		
D2	Jun-11	8.27	1554	903	0.05	229	8.8	38.8	45.7	367	0	109	162	<0.2	0.003	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.1	<0.005	<0.05		
D2	Jul-11	8.13	1575	937	0.04	220	8.4	36.3	43.8	362	0	107	155	<0.2	0.001	<0.005	<0.005	<0.01	0.01	0.01	0.13	6	0.01	<0.05		
D2	Aug-11	7.97	1546	875	0.01	218	8.1	36.1	42.3	351	0	105	148	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.8	0.01	<0.05		
D2	Sep-11	8.2	1442	833	0.04	189	7	34	36.6	310	0	143	122	<0.2	0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	6.6	0.02	<0.05		
D2	Oct-11	7.98	1546	897	0.07	204	7.2	32.6	39.9	330	0	113	137	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.3	0.01	<0.05		
D2	Nov-11	8.16	1497	928	0.05	205	7.4	33.8	39	342	0	120	134	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.3	<0.005	<0.05		
D2	Dec-11	8.13	1513	876	0.06	207	7.4	34.7	39.6	340	0	170	136	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.3	<0.005	<0.05		
D2	Jan-12	8.01	1614	925	0.04	222	7.8	36.2	36.2	355	0	128	138	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	5.7	0.01	<0.05		
D2	Feb-12	7.85	1646	913	0.03	226	7.9	37	37.7	357	0	108	148	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.8	0.02	<0.05		
D2	Mar-12	8.15	1600	1040	0.02	244	7.8	35.4	38.2	392	0	104	145	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.7	0.02	<0.05		
D2	Apr-12	7.96	1607	868	0.02	228	8.1	35.7	38.6	368	0	110	146	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.8	0.01	<0.05		
D2	May-12	8.14	1725	918	0.02	229	8	34.6	38	383	0	116	142	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.9	0.01	<0.05		
D2	Jun-12	7.9	1645	942	0.02	208	8	33.9	39	371	0	114	143	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6	0.01	<0.05		
D2	Jul-12	8.11	1696	992	0.01	235	9.3	37.7	38.6	359	0	116	141	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.9	0.01	<0.05		
D2	Aug-12	8.26	1532	889	0.02	223	8.5	35.2	36.7	369	0	115	142	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.9	0.02	<0.05		
D2	Sep-12	8.23	1596	911	0.02	226	7.7	36	35.2	366	0	114	135	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.7	0.02	<0.05		
D2	Oct-12	8.28	1542	893	0.02	223	7.4	34.8	35.4	370	0	113	141	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.6	0.01	<0.05		
D2	Nov-12	8.33	1587	843	0.02	219	7.6	34.7	35.1	366	2.37	110	136	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.5	0.02	<0.05		
D2	Dec-12	8.14	1587	949	0.03	227	7.4	34	36.6	375	0	116	137	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.8	0.02	<0.05		
D2	Jan-13	8.3	1637	889	0.03	236	7.8	35	36.1	378	0.39	121	131	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.2	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	Feb-13	8.33	1714	933	0.01	247	8.3	36.1	40	385	2.52	118	148	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.5	0.01	<0.05		
D2	Mar-13	8.26	1765	951	0.02	249	8	35.8	38.5	399	0	124	142	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.3	<0.005	<0.05		
D2	Apr-13	8.36	1710	929	0.01	247	8.2	34.7	37.6	387	3.2	118	136	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.06	6.4	<0.005	<0.05		
D2	May-13	8.38	1717	1000	0.01	243	8	34.4	38.4	405	4.43	117	137	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.3	0.02	<0.05		
D2	Jun-13	8.24	1750	954	0.01	212	6.9	29.5	34.4	391	0	126	124	<0.2	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	5.7	0.01	<0.05		
D2	Jul-13	8.26	1667	969	0.01	240	8.3	31.7	39.2	385	0	124	133	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	6.6	0.01	<0.05		
D2	Aug-13	8.4	1687	900	0.01	236	7.8	32	37.5	387	2.51	115	143	<0.2	0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	6.2	0.02	<0.05		
D2	Sep-13	8.33	1616	872	0.03	221	7.5	30.7	34.7	360	1.35	118	142	<0.2	0.007	<0.005	0.01	<0.01	0.01	<0.005	0.08	6.1	0.02	<0.05		
D2	Oct-13	8.19	1511	836	0.04	222	7.4	34.2	31.2	329	0	120	141	<0.2	0.005	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.2	0.01	<0.05		
D2	Nov-13	7.83	1574	846	0.04	214	7.3	31.6	32.6	333	0	143	140	<0.2	0.008	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.4	0.02	<0.05		
D2	Dec-13	8.52	1576	846	0.05	214	7.3	31.3	32.1	339	3.08	124	135	<0.2	0.006	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	6.5	<0.005	<0.05		
D2	Jan-14	8.63	1606	870	0.02	220	7.3	30.1	33	346	5.31	128	137	<0.2	0.007	<0.005	<0.005	<0.01	0.01	0.01	<0.06	6.7	<0.005	<0.05		
D2	Feb-14	8.46	1651	993	0.013	232	7.4	30.1	33	354	2.37	130	147	<0.2	0.003	<0.005	0.008	<0.01	0.011	<0.005	<0.06	7	<0.005	<0.05		
D2	Mar-14	8.47	1692	924	0.016	237	7.8	31	34	369	3.43	132	149	<0.2	0.004	<0.005	<0.005	<0.01	0.014	<0.005	0.12	7.2	<0.005	<0.05		
D2	Apr-14	8.41	1676	961	0.014	236	8.1	29.1	35.2	273	5.53	307	146	<0.2	0.006	<0.005	<0.005	<0.01	0.014	<0.005	<0.06	7.1	<0.005	<0.05		
D2	May-14	8.18	1687	1040	0.015	246	8	30.8	35.4	370	0	187	149	<0.2	<0.001	<0.005	<0.005	<0.01	0.016	0.008	0.12	7.1	<0.005	<0.05		
D2	Jun-14	8.37	1684	1000	0.022	240	8.4	30.4	35	362	2.67	173	144	<0.2	0.006	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	7	<0.005	<0.05		
D2	Jul-14	8.14	1623	944	0.017	245	7.8	31.4	35.1	362	0	188	142	<0.2	0.004	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	6.8	<0.005	<0.05		
D2	Aug-14	8.36	1611	1020	0.029	242	7.6	31.2	34	354	2.42	201	141	<0.2	0.007	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	6.7	<0.005	<0.05		
D2	Sep-14	8.07	1553	994	0.036	231	7.6	30.5	32.2	326	0	179	133	<0.2	0.006	<0.005	<0.005	<0.01	0.011	<0.005	<0.06	6.7	<0.005	<0.05		
D2	Oct-14	8.36	1559	914	0.033	227	7.4	30.3	30.6	315	2.82	192	131	<0.2	0.018	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	6.8	0.011	<0.05		
D2	Nov-14	8.42	1508	839	0.026	229	7.4	31.6	31.3	318	2.67	168	126	<0.2	0.014	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	6.6	0.009	<0.05		
D2	Dec-14	8.47	1575	856	0.036	231	7.5	31	31.5	333	2.65	135	130	<0.2	0.01	<0.005	<0.005	<0.01	0.011	<0.005	<0.06	6.7	<0.005	<0.05		
D2	Jan-15	8.69	1614	880	0.023	242	7.9	32.3	33.3	346	5.57	128	137	<0.2	0.011	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	6.9	<0.005	<0.05		
D2	Feb-15	8.62	1698	919	0.018	246	8.1	30.9	34.3	351	4.74	133	145	<0.2	0.01	<0.005	<0.005	<0.01	0.008	<0.005	0.08	7.2	0.011	<0.05		
D2	Mar-15	8.7	1711	923	0.023	255	8.4	31.1	35.3	364	6.11	130	149	<0.2	0.01	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	7.3	<0.005	<0.05		
D2	Apr-15	8.44	1697	1000	0.011	260	8.3	30.7	35.4	393	2	142	131	<0.2	0.008	<0.005	<0.005	<0.01	0.007	<0.005	<0.06	7.2	<0.005	<0.05		
D2	May-15	8.55	1661	972	0.011	255	8.3	30.1	35	369	4.26	139	149	<0.2	0.008	<0.005	<0.005	<0.01	<0.005	<0.005	0.12	7.3	<0.005	<0.05		
D2	Jun-15	8.5	1663	922	0.011	252	8.2	29.8	34.7	375	2.83	143	147	<0.2	0.006	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	7.1	<0.005	<0.05		
D2	Jul-15	8.52	1652	909	0.012	255	8	29.9	35.3	364	3.03	143	147	<0.2	0.007	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	7.2	<0.005	<0.05		
D2	Aug-15	8.5	1658	903	0.02	251	8	29	34.7	360	3.65	146	138	<0.2	0.006	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	7.1	<0.005	<0.05		
D2	Sep-15	8.53	1642	958	0.024	249	7.8	29.1	34.6	351	4.34	141	134	<0.2	0.003	<0.005	<0.005	<0.01	0.005	<0.005	0.07	6.8	<0.005	<0.05		
D2	Oct-15	8.53	1606	928	0.035	250	7.9	28.8	35	360	4.01	145	134	<0.2	0.004	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.9	<0.005	<0.05		
D2	Nov-15	8.81	1647	912	0.02	251	7.9	28.6	34.7	360	8.94	131	133	<0.2	0.005	<0.005	<0.005	<0.01	0.013	<0.005	<0.06	7	<0.005	<0.05		
D2	Dec-15	8.22	1709	940	0.024	258	8.2	28.6	35.5	378	7.55	137	136	<0.2	0.005	<0.005	<0.005	<0.01	0.013	<0.005	0.17	7	0.02	<0.05		
D2	Jan-16	8.61	1756	1020	0.019	262	7.5	26.8	35.3	387	6.3	133	134	<0.2	0.005	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	7.1	<0.005	<0.05		
D2	Feb-16	8.8	1730	926	0.03	265	8.5	27.4	36.2	394	8.41	125	136	<0.2	0.006	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	7.1	0.009	<0.05		
D2	Mar-16	8.82	1755	1020	0.019	268	8.4	26.4	36.6	385	9.2	124	139	<0.2	0.005	<0.005	<0.005	<0.01	0.011	<0.005	0.07	7.3	<0.005	<0.05		
D2	Apr-16	8.72	1782	951	0.012	274	8.4	26.8	37.4	383	7.35	130	139	<0.2	0.004	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	7.3	<0.005	<0.05	8.81	
D2	May-16	8.53	1787	956	0.016	273	9.1	28.5	40.2	395	3.95	137	146	<0.2	0.005	<0.005	<0.005	<0.01	0.007	<0.005	0.1	7.7	<0.005	<0.05	8.06	
D2	Jun-16	8.14	1806	977	0.011	275	8.2	26.6	37.2	396	0	146	129	<0.2	0.006	<0.005	<0.005	<0.01	0.005	<0.005	0.1	7.3	<0.005	<0.05	7.85	
D2	Jul-16	8.51	1708	945	0.019	266	7.9	24.8	36	386	4.21	143	129	<0.2	0.003	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	7.3	<0.005	<0.05	7.99	
D2	Aug-16	8.53	1591	873	0.043	250	7.2	23.7	33.4	386	4.7	134	118	0.31	0.001	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	6.7	<0.005	<0.05	7.79	
D2	Sep-16	8.62	1689	889	0.037	251	7.4	24.4	33.8	383	6.37	130	119	<0.2	0.002	<0.005	<0.005	<0.01	0.006	<0.005	<0.06	6.6	<0.005	<0.05	7.47	
D2	Oct-16	8.58	1624	859	0.037	244	7	24.1	33	349	4.74	133	118	<0.2	0.003	<0.005	<0.005	<0.01	0.006	<0.005	<0.06	6.4	<0.005	<0.05	8.11	

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D2	Nov-16	8.79	1632	883	0.043	252	7.3	25.2	33.9	364	8.58	132	120	<0.2	0.003	<0.005	<0.005	<0.01	0.014	<0.005	<0.06	6.6	<0.005	<0.05	8.17	
D2	Dec-16	9.02	1609	886	0.022	249	7.4	24.6	34.1	375	14.1	118	121	<0.2	0.004	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	6.5	0.009	<0.05	8.75	
D2	Jan-17	8.75	1698	921	<0.005	258	7.6	24.8	35.5	380	8.42	138	125	0.22	0.004	<0.005	<0.005	<0.01	0.016	0.006	<0.06	6.8	0.006	<0.05	7.78	
D2	Feb-17	8.76	1771	1040	<0.005	260	7.6	23.9	35.3	406	8.17	142	123	<0.2	0.005	<0.005	<0.005	<0.01	0.012	<0.005	<0.06	6.7	0.012	<0.05	8.38	
D2	Mar-17	8.72	1773	972	0.019	268	7.8	24.8	37.1	394	7.48	146	127	<0.2	0.005	<0.005	<0.005	<0.01	0.008	<0.005	0.1	7.1	<0.005	<0.05	7.86	
D2	Apr-17	8.27	1794	1000	0.033	269	8	24.8	37	413	0	167	127	<0.2	0.004	<0.005	<0.005	<0.01	0.015	<0.005	<0.06	7.1	<0.005	<0.05	7.66	
D2	May-17	N.A.	1770	954	0.022	269	8	24.3	36.9	411	0	167	128	<0.2	0.005	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	6.8	<0.005	<0.05	7.71	
D2	Jun-17	8.49	1775	942	0.017	276	8.2	25.4	37.7	446	4.28	161	128	<0.2	0.003	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	7.3	<0.005	<0.05	8.34	
D2	Jul-17	7.92	1811	913	0.011	270	7.8	25.3	37	410	0	166	129	<0.2	0.003	<0.005	<0.005	<0.01	0.009	<0.005	0.11	7.1	<0.005	<0.05	8.53	
Mean		**8.09**	**1425.4**	**796.51**	**0.041**	**209**	**6.7**	**26.3**	**33.4**	**343**	**1.2**	**94**	**104.3**	**0.1**	**0.004**	**0.000**	**0.001**	**0.00**	**0.013**	**0.001**	**0.04**	**3.89**	**0.005**	**0.000**		
Min		**0.00**	**1050**	**572**	**0.000**	**150**	**2.9**	**15.3**	**23.3**	**250**	**0.0**	**35**	**38.0**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**0.24**	**0.000**	**0.000**		
Max		**9.02**	**1811**	**1040**	**0.221**	**276**	**9.4**	**38.8**	**47.8**	**446**	**14.1**	**307**	**168**	**1.7**	**0.060**	**0.015**	**0.010**	**0.010**	**0.254**	**0.010**	**0.85**	**7.70**	**0.043**	**0.060**		
D3	Oct-97	8.07	1055	588	0.171	170	5.4	22	20.2	227	0	72	142.1	0.1	<0.02	0.009	<0.005	<0.01	0.072	<0.005	0.06	5.6	0.011	<0.05		
D3	Dec-97	8.45	1191	755	0.153	192	7.1	24.2	21.5	267	1.44	90	166.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.118	<0.005	<0.06	7.8	0.008	<0.05		
D3	Jan-98	8.38	1320	735	0.118	203	7.6	24.4	22.3	288	0	80	166	<0.2	<0.02	<0.005	<0.005	<0.01	0.075	<0.005	0.08	7.9	0.01	<0.05		
D3	Feb-98	8.14	1481	799	0.078	215	8.2	25.7	23.9	315	0	108	163.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.101	<0.005	<0.06	8	<0.005	<0.05		
D3	Apr-98	7.99	1480	899	0.063	224	8.6	27	24.5	300	0	113	162.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.139	<0.005	0.07	7.7	0.009	<0.05		
D3	May-98	8.04	1498	828	0.117	222	8.1	26.2	25.6	346	0	84	136.8	<0.2	<0.02	0.006	<0.005	<0.01	0.092	<0.005	0.21	6.7	0.006	<0.05		
D3	Jun-98	7.86	1562	803	0.157	209	8.4	25.3	23.4	350	0	91	144.4	0.2	<0.02	<0.005	<0.005	<0.01	0.139	<0.005	<0.06	6.7	0.009	<0.05		
D3	Jul-98	7.83	1471	878	0.202	196	8.6	24.2	21	313	0	81	160	0.3	<0.02	<0.005	<0.005	<0.01	0.127	<0.005	<0.06	6.9	<0.005	<0.05		
D3	Aug-98	7.17	647	300	0.151	97	3.5	11.8	12.6	134	0	34	55.7	2.8	<0.02	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	1.7	<0.005	<0.05		
D3	Sep-98	7.53	830	416	0.202	118	4.8	14.6	14.2	174	0	45	85.2	5.3	<0.02	<0.005	<0.005	<0.01	0.126	<0.005	0.11	2.9	0.006	<0.05		
D3	Oct-98	7.47	645	304	0.254	92	3.6	11.5	12.2	133	0	36	60.2	3.3	0.03	<0.005	<0.005	<0.01	0.087	<0.005	<0.06	1.6	<0.005	<0.05		
D3	Dec-98	7.91	1190	672	0.283	186	8.4	26.2	21.6	252	0	67	159.3	0.8	0.03	<0.005	<0.005	<0.01	0.231	<0.005	0.09	5.9	<0.005	<0.05		
D3	Jan-99	8.08	1320	755	0.283	189	8.7	27.6	22.3	270	0	75	162.4	0.5	<0.02	<0.005	0.011	0.03	0.179	<0.005	<0.06	5.6	0.006	<0.05		
D3	Feb-99	7.89	1392	759	0.261	215	9.1	30.1	27.1	319	0	73	148.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.263	<0.005	0.11	4.9	0.017	<0.05		
D3	Mar-99	8.08	1481	862	0.176	218	11.7	33.2	26.5	352	0	83	175.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.143	0.007	0.07	5.7	0.008	<0.05		
D3	Apr-99	8.07	1545	903	0.314	243	11.8	34.9	28.9	353	0	87	215.4	<0.2	0.05	<0.005	<0.005	<0.01	0.316	<0.005	0.12	6.2	0.022	<0.05		
D3	May-99	7.95	1547	893	0.32	234	12.3	36	27.9	337	0	87	184.9	<0.2	0.04	<0.005	0.008	<0.01	0.29	<0.005	0.07	6.4	0.013	<0.05		
D3	Jun-99	7.53	1245	641	0.276	174	8.2	25.3	21.6	271	0	63	114.5	1	<0.02	<0.005	0.006	<0.01	0.129	<0.005	0.06	3.9	0.017	<0.05		
D3	Jul-99	6.91	372	193	0.215	50	1.8	6.2	8	74	0	23	23.5	7.1	<0.02	<0.005	<0.005	<0.01	0.008	<0.005	0.1	0.16	0.016	<0.05		
D3	Aug-99	7.51	983	607	0.316	136	6.9	21.6	17.2	209	0	61	109	2.7	<0.02	<0.005	0.009	<0.01	0.045	<0.005	0.07	3	<0.005	<0.05		
D3	Sep-99	7.48	672	417	0.133	97	4.9	15.3	13.4	138	0	46	67.5	5	<0.02	<0.005	<0.005	<0.01	0.026	<0.005	<0.06	2.1	0.033	<0.05		
D3	Oct-99	7.93	855	477	0.25	122	6.4	19.7	15.9	176	0	61	90.5	2.3	<0.02	<0.005	<0.005	<0.01	0.04	<0.005	0.08	3.2	<0.005	<0.05		
D3	Nov-99	8.34	926	470	0.211	128	6.8	20.5	16.3	185	1.18	71	102.6	1.3	0.03	<0.005	<0.005	<0.01	0.039	<0.005	0.13	3.9	<0.005	<0.05		
D3	Dec-99	8.31	1011	598	0.179	147	8.4	24.3	18.6	209	1.01	79	116.3	0.9	<0.02	0.006	<0.005	<0.01	0.076	<0.005	0.07	5	0.013	<0.05		
D3	Jan-00	8.04	1103	719	0.145	159	9.4	26.4	20	193	0	89	122.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.083	<0.005	0.06	5.5	0.015	<0.05		
D3	Feb-00	8.38	1066	587	0.123	159	9.4	26.4	20.4	209	1.9	94	132.7	<0.2	0.06	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	5.4	<0.005	<0.05		
D3	Mar-00	8.4	1161	612	0.081	166	9.7	27.1	21.1	217	3.03	99	131.2	<0.2	<0.02	<0.005	<0.005	<0.01	<0.005	<0.005	0.14	5.5	<0.005	<0.05		
D3	Apr-00	8.3	1185	674	0.085	169	10.5	29.7	22.1	231	0.54	102	135.1	<0.2	<0.02	<0.005	0.009	<0.01	0.029	<0.005	0.11	5.8	0.012	<0.05		
D3	May-00	8.12	1180	673	0.174	170	10.1	29.6	21.5	246	0	103	134.4	<0.2	<0.02	<0.005	<0.005	<0.01	0.034	<0.005	0.12	5.6	0.005	<0.05		
D3	Jun-00	7.34	1211	676	0.15	168	11	31	21.8	231	0	88	135	<0.2	0.05	<0.005	<0.005	<0.01	0.025	<0.005	0.07	5.5	<0.005	<0.05		
D3	Jul-00	7.69	807	453	0.212	112	6.6	19.8	15.3	185	0	69	80.3	1.2	0.03	<0.005	<0.005	<0.01	0.045	<0.005	<0.06	2.8	0.017	<0.05		
D3	Aug-00	7.63	720	359	0.314	91	5.4	16.1	12.8	143	0	58	66.7	2	<0.02	0.006	<0.005	<0.01	0.024	<0.005	<0.06	2.1	0.011	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3	Sep-00	8.03	830	477	0.351	116	7	20.5	15.4	173	0	67	89.1	0.9	<0.02	<0.005	<0.005	<0.01	0.041	<0.005	<0.06	3	<0.005	<0.05		
D3	Oct-00	8.79	860	526	0.234	128	9.1	24.9	18	176	8.85	54	101.8	0.6	0.05	<0.005	0.009	<0.01	0.058	<0.005	0.09	3.5	<0.005	<0.05		
D3	Nov-00	8.76	955	506	0.167	122	9.9	24.6	17	193	8.91	60	114.4	0.6	0.05	0.019	<0.005	<0.01	0.071	<0.005	<0.06	4	0.015	<0.05		
D3	Dec-00	8.7	1067	627	0.112	127	10.5	27.7	17.9	196	5.32	71	113.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.047	0.01	0.09	4.2	0.013	<0.05		
D3	Jan-01	7.91	1058	619	0.095	153	11.4	32	21.7	216	0	91	123.6	<0.2	0.04	<0.005	<0.005	<0.01	0.028	<0.005	0.13	4.6	0.01	<0.05		
D3	Feb-01	8.44	1128	736	0.137	157	11.8	33.5	22.6	234	3.33	92	130.7	<0.2	0.02	<0.005	<0.005	<0.01	0.02	<0.005	0.15	4.7	0.029	<0.05		
D3	Mar-01	8.11	1210	721	0.277	174	12.7	38.4	25.4	258	0	109	147	<0.2	0.08	<0.005	<0.005	<0.01	0.33	<0.005	0.16	5.2	0.022	<0.05		
D3	Apr-01	8.11	1258	719	0.113	186	9.3	29	27.8	295	0	95	108.3	<0.2	0.04	<0.005	<0.005	<0.01	0.014	<0.005	<0.06	3.2	0.029	<0.05		
D3	May-01	8.21	1260	751	0.107	187	9.4	30.1	28.2	279	0	93	110.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.014	<0.005	0.08	3.5	0.018	<0.05		
D3	Jun-01	8.19	1244	672	0.166	181	8.8	28.8	27.3	291	0	89	96.2	<0.2	<0.02	<0.005	0.006	<0.01	0.016	<0.005	<0.06	3.2	0.026	<0.05		
D3	Jul-01	8.17	1215	688	0.135	183	10.2	32.5	27	276	0	92	119.1	0.2	0.03	<0.005	<0.005	<0.01	0.012	<0.005	<0.06	3.8	<0.005	<0.05		
D3	Aug-01	8.56	1227	780	0.145	178	10.6	35.5	23.2	243	3.47	84	136.3	1.6	<0.02	<0.005	<0.005	<0.01	0.012	<0.005	0.13	4.4	<0.005	<0.05		
D3	Sep-01	8.43	1093	723	0.107	162	10.7	35.3	23.4	241	3.82	75	136.6	0.6	<0.02	<0.005	0.009	<0.01	0.02	<0.005	0.14	4.1	0.009	<0.05		
D3	Oct-01	9.03	1001	611	0.138	151	9	30	21.2	215	7.59	55	123.5	3	0.03	<0.005	<0.005	<0.01	0.029	<0.005	0.18	3.6	0.021	<0.05		
D3	Nov-01	9.06	1106	657	0.112	161	9.4	30.5	22.5	241	10.9	50	129.4	1.6	0.02	<0.005	<0.005	<0.01	0.078	<0.005	0.13	3.8	0.015	<0.05		
D3	Dec-01	8.47	606	335	0.708	93	4.3	17.6	13.8	131	2.04	45	51.4	0.7	<0.02	<0.005	<0.005	<0.01	0.028	0.012	<0.06	1.2	0.036	<0.05		
D3	Jan-02	9.02	1262	641	0.079	179	8.9	30.2	25.1	245	10	61	119.6	<0.2	0.03	<0.005	<0.005	<0.01	0.056	<0.005	<0.06	3.4	0.024	<0.05		
D3	Feb-02	8.67	1181	699	0.116	192	8.8	30	27.5	282	6.25	72	113.2	<0.2	0.04	<0.005	<0.005	<0.01	0.025	<0.005	0.1	3.3	<0.005	<0.05		
D3	Mar-02	8.36	1331	833	0.14	202	8.5	28.6	30.3	322	1.26	85	104.9	<0.2	0.02	<0.005	<0.005	<0.01	0.026	<0.005	<0.06	3.2	0.018	<0.05		
D3	Apr-02	8.44	1382	763	0.104	206	8.9	29.2	31.5	332	2.74	86	108.1	0.2	0.04	<0.005	<0.005	<0.01	0.025	<0.005	<0.06	3.2	<0.005	<0.05		
D3	May-02	8.03	1396	764	0.126	193	10	31.7	30.9	321	0	90	114.5	1.9	0.02	<0.005	<0.005	<0.01	0.028	<0.005	1.2	3.8	0.011	<0.05		
D3	Jun-02	7.93	1280	699	0.227	172	9.1	31.5	29.2	303	0	93	101.5	2.2	0.04	<0.005	<0.005	<0.01	0.04	<0.005	0.11	3.4	<0.005	<0.05		
D3	Jul-02	7.88	1187	668	0.221	160	8.9	32.1	25	264	0	102	101.3	3	<0.02	<0.005	<0.005	<0.01	0.027	<0.005	0.08	3.4	0.006	<0.05		
D3	Aug-02	7.83	988	548	0.295	132	7.6	27.3	20.7	212	0	76	86.2	5.3	<0.02	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	2.7	0.005	<0.05		
D3	Sep-02	7.95	874	502	0.226	131	7.9	28.4	20.1	209	0	74	91.9	4.2	<0.02	<0.005	0.005	<0.01	0.041	<0.005	<0.06	3	<0.005	<0.05		
D3	Oct-02	7.73	1033	602	0.256	139	8.5	30.6	21	223	0	79	102	2.9	0.03	<0.005	<0.005	<0.01	0.032	<0.005	0.09	3.6	<0.005	<0.05		
D3	Nov-02	8.42	1056	590	0.087	141	8.8	29.4	20.8	224	2.45	79	108	0.6	0.011	<0.005	<0.005	<0.01	0.042	<0.005	0.15	3.9	<0.005	<0.05		
D3	Dec-02	8.09	1156	614	0.174	146	9.1	30.2	22	256	0	89	108	1.1	0.003	<0.005	<0.005	<0.01	0.103	<0.005	0.13	4	0.006	<0.05		
D3	Jan-03	8.15	1240	665	0.154	152	10	32.4	23.1	258	0	99	114	0.6	0.017	<0.005	<0.005	<0.01	0.063	0.008	0.08	4.3	0.029	<0.05		
D3	Feb-03	8.11	1357	701	<0.005	169	9.2	32.1	27.4	283	0	111	117	<0.2	0.02	<0.005	<0.005	<0.01	0.093	<0.005	0.15	3.9	<0.005	<0.05		
D3	Mar-03	8.01	1399	773	0.065	197	8.8	34.4	29.4	315	0	114	114	0.2	0.017	<0.005	<0.005	<0.01	0.086	<0.005	0.15	4.1	<0.005	<0.05		
D3	Apr-03	7.96	1418	774	0.058	211	9.1	35	34.1	326	0	112	114	0.2	0.013	<0.005	<0.005	<0.01	0.049	<0.005	0.11	3.7	<0.005	<0.05		
D3	May-03	8.01	1431	777	0.112	195	7.8	31.6	30.8	314	0	106	107	0.2	0.009	<0.005	0.006	<0.01	0.159	<0.005	0.17	3.4	0.005	<0.05		
D3	Jun-03	7.9	1340	808	0.158	199	7.4	28.7	30	311	0	97	95	0.2	0.008	<0.005	<0.005	<0.01	0.033	<0.005	0.09	3.1	<0.005	<0.05		
D3	Jul-03	7.86	1106	729	0.185	163	7.4	27	25.9	262	0	78	93.1	0.5	0.008	<0.005	<0.005	<0.01	0.034	<0.005	0.11	3.2	<0.005	<0.05		
D3	Aug-03	7.91	1056	586	0.303	153	8.1	28.3	23.6	239	0	75	102	0.8	0.02	<0.005	<0.005	<0.01	0.058	<0.005	0.07	3.9	<0.005	<0.05		
D3	Sep-03	7.89	1086	686	0.166	156	8.7	29.7	23.4	247	0	74	120	1.4	0.019	<0.005	<0.005	<0.01	0.046	<0.005	0.09	4.6	<0.005	<0.05		
D3	Oct-03	7.99	1023	566	0.097	142	8.7	27.8	21.6	220	0	68	119	1.5	0.03	<0.005	<0.005	<0.01	0.016	<0.005	0.09	4.7	<0.005	<0.05		
D3	Nov-03	8.32	994	564	0.08	138	8.5	27.2	21.6	218	0	68	122	0.9	0.034	<0.005	<0.005	<0.01	0.016	<0.005	0.1	5	<0.005	<0.05		
D3	Jan-04	8.06	1188	732	0.043	160	7.7	26.2	25.4	269	0	81	108	<0.2	0.017	<0.005	<0.005	<0.01	0.037	<0.005	0.19	4.1	<0.005	<0.05		
D3	Feb-04	7.96	1337	775	0.043	181	7.2	25.4	28.4	363	0	80	97.3	<0.2	0.013	<0.005	<0.005	<0.01	0.061	<0.005	0.12	3.4	<0.005	<0.05		
D3	Mar-04	8.06	1316	784	0.034	184	6.7	24.5	28.8	319	0	82	92.8	<0.2	0.012	<0.005	<0.005	<0.01	0.064	<0.005	0.08	3.1	<0.005	<0.05		
D3	Apr-04	7.84	1404	766	0.132	186	6.5	24	29.4	350	0	83	89.4	0.2	0.007	<0.005	0.007	<0.01	0.062	0.006	0.15	2.8	<0.005	<0.05		
D3	May-04	7.97	1327	784	0.091	180	8.2	30.9	30	307	0	105	114	0.5	0.019	<0.005	<0.005	<0.01	0.076	<0.005	0.08	4	<0.005	<0.05		
D3	Jun-04	7.71	1396	857	0.083	188	8.8	34.2	30.8	291	0	92	128	0.3	0.019	<0.005	<0.005	<0.01	0.062	<0.005	<0.06	4.8	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3	Jul-04	7.81	1260	798	0.11	174	9.4	35	28.8	279	0	85	136	0.3	0.041	<0.005	0.005	<0.01	0.118	<0.005	0.13	5.3	<0.005	<0.05		
D3	Aug-04	7.98	1224	718	0.205	161	9.1	31.3	25.2	258	0	78	133	0.3	0.015	<0.005	<0.005	<0.01	0.086	<0.005	<0.06	5.6	<0.005	<0.05		
D3	Sep-04	7.96	1138	680	0.245	151	9	31.4	24.1	244	0	73	134	0.2	0.019	<0.005	<0.005	<0.01	0.067	<0.005	<0.06	5.7	0.005	<0.05		
D3	Oct-04	7.62	1144	729	0.148	148	9.4	30.4	23	252	0	67	139	<0.2	0.026	<0.005	<0.005	<0.01	0.064	<0.005	0.07	6.3	<0.005	<0.05		
D3	Nov-04	8.01	1272	657	0.109	180	8.8	28.6	28.5	287	0	73	111	<0.2	0.015	<0.005	<0.005	<0.01	0.019	<0.005	<0.06	4.9	<0.005	<0.05		
D3	Dec-04	8.28	1292	735	0.103	190	7.2	26.2	30	261	0	83	88.2	0.3	0.009	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	3.4	<0.005	<0.05		
D3	Jan-05	8.18	1397	723	0.056	204	7.2	27.2	32.5	328	0	86	87.4	<0.2	0.007	<0.005	<0.005	<0.01	0.062	<0.005	0.09	3.1	0.006	<0.05		
D3	Feb-05	8	1507	727	0.065	208	6.9	26.5	33.9	391	0	88	85.5	<0.2	0.007	<0.005	<0.005	<0.01	0.051	<0.005	0.13	2.8	0.044	<0.05		
D3	Mar-05	8.12	1612	840	0.069	222	6.9	25.9	35.3	366	0	89	81.4	<0.2	0.006	<0.005	<0.005	<0.01	0.034	<0.005	<0.06	2.7	<0.005	<0.05		
D3	Apr-05	8.08	1539	915	0.081	225	7	27.9	37.3	377	0	93	87	0.3	0.004	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2.5	<0.005	<0.05		
D3	May-05	8.02	1443	774	0.22	196	9.4	31.6	33.9	340	0	94	112	0.3	0.022	<0.005	<0.005	<0.01	0.023	<0.005	<0.06	4.8	<0.005	<0.05		
D3	Jun-05	7.76	1398	773	0.277	199	11.1	35.4	30.7	298	0	87	135	1.4	0.03	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	6.5	<0.005	<0.05		
D3	Jul-05	7.99	1216	765	0.374	183	10.7	34.2	27.8	344	0	82	133	2.7	0.035	<0.005	<0.005	<0.01	0.013	<0.005	<0.06	6.3	<0.005	<0.05		
D3	Aug-05	8.03	1271	714	0.429	180	11.2	35.4	27.5	269	0	75	140	4.2	0.037	<0.005	<0.005	<0.01	<0.005	0.005	<0.06	6.8	<0.005	<0.05		
D3	Sep-05	8.02	1182	754	0.308	161	10.3	32.2	24.4	244	-	79	128	3.9	0.036	<0.005	<0.005	<0.01	<0.005	<0.005	0.19	6.4	<0.005	<0.05		
D3	Oct-05	8	1079	590	0.307	151	9.9	29.9	23.1	234	0	69	126	2.5	0.022	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	6.2	<0.005	<0.05		
D3	Nov-05	8.08	1045	554	0.212	154	9.6	28.4	22.1	234	0	98	125	2.6	0.035	<0.005	<0.005	<0.01	0.02	<0.005	0.13	5.9	<0.005	<0.05		
D3	Dec-05	8.72	1078	637	0.082	159	9.5	28.7	24	270	8.71	57	120	1	0.049	<0.005	0.006	<0.01	0.024	<0.005	<0.06	5.6	<0.005	<0.05		
D3	Jan-06	8.09	1178	693	0.123	162	9.4	29.5	24.8	247	0	82	115	0.4	0.042	<0.005	<0.005	<0.01	0.032	0.007	<0.06	5.4	<0.005	<0.05		
D3	Feb-06	7.94	1220	680	0.955	176	9.4	31	27.5	256	0	88	114	0.2	0.053	<0.005	<0.005	<0.01	0.06	<0.005	0.06	5.1	<0.005	<0.05		
D3	Mar-06	7.83	1302	694	0.224	183	9.6	32.3	27.9	290	0	93	116	0.2	0.032	<0.005	<0.005	<0.01	0.109	<0.005	<0.06	5.4	<0.005	<0.05		
D3	Apr-06	7.95	1238	814	0.129	186	11.1	36.2	27.7	297	0	106	140	<0.2	0.051	<0.005	<0.005	<0.01	0.062	<0.005	0.09	6.8	<0.005	<0.05		
D3	May-06	7.95	1279	749	0.14	193	9.7	33.5	29.5	313	0	94	126	<0.2	0.03	<0.005	<0.005	<0.01	0.069	<0.005	<0.06	5.5	<0.005	<0.05		
D3	Jun-06	7.89	1331	773	0.144	188	10.9	35.4	28.5	300	0	107	134	<0.2	0.04	<0.005	<0.005	<0.01	0.038	<0.005	0.09	6.8	<0.005	<0.05		
D3	Jul-06	8.06	1266	839	0.121	185	11	35.6	28.2	294	0	105	142	<0.2	0.034	<0.005	<0.005	<0.01	0.042	0.005	0.08	7	<0.005	<0.05		
D3	Aug-06	7.97	1295	708	0.206	181	10.3	33.7	29	280	0	93	132	0.23	0.028	<0.005	<0.005	<0.01	0.085	<0.005	0.07	6.4	<0.005	<0.05		
D3	Sep-06	7.81	1234	744	0.338	170	10.2	34.5	28.5	265	0	86	128	0.81	0.022	<0.005	<0.005	<0.01	0.168	<0.005	0.17	6.3	<0.005	<0.05		
D3	Oct-06	8.04	1231	645	0.23	165	10	33.4	28.2	255	0	85	130	0.72	0.022	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	6.4	<0.005	<0.05		
D3	Nov-06	8.17	1253	729	0.19	165	10.2	34.2	28.9	273	0	89	135	0.23	0.032	<0.005	0.01	<0.01	0.16	<0.005	<0.06	6.9	<0.005	<0.05		
D3	Dec-06	7.79	1274	724	0.16	161	10.1	33.2	27.7	287	0	93	132	<0.2	0.035	<0.005	<0.005	<0.01	0.16	<0.005	0.12	7	<0.005	<0.05		
D3	Jan-07	7.84	1297	825	0.16	179	11.5	37.7	30	298	0	102	145	<0.2	0.019	<0.005	<0.005	<0.01	0.13	<0.005	0.09	8	<0.005	<0.05		
D3	Feb-07	8.07	1453	862	0.19	187	11.8	41.9	32.2	314	0	106	165	<0.2	0.015	<0.005	0.01	<0.01	0.3	<0.005	0.13	8.8	<0.005	<0.05		
D3	Mar-07	7.91	1447	831	0.11	205	12.8	44.8	34.2	320	0	105	180	<0.2	0.035	<0.005	<0.005	<0.01	0.21	<0.005	0.12	9.7	<0.005	<0.05		
D3	Apr-07	7.9	1457	871	0.29	208	13.1	45.9	34.5	341	0	111	184	<0.2	0.043	<0.005	0.01	<0.01	0.25	<0.005	<0.06	10	0.01	<0.05		
D3	May-07	7.88	1594	824	0.15	201	11.9	42.7	33.6	309	0	99	172	0.21	0.035	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	8.7	<0.005	<0.05		
D3	Jun-07	7.58	1514	966	0.24	199	12.6	45.9	34.6	351	0	95	192	0.2	0.035	<0.005	<0.005	<0.01	0.1	<0.005	0.07	9.7	<0.005	<0.05		
D3	Jul-07	7.64	1340	845	0.38	182	11.8	41.7	32.3	311	0	85	174	0.23	0.023	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	9	<0.005	<0.05		
D3	Aug-07	7.67	1302	735	0.55	179	11.3	41.6	32.4	260	0	74	180	0.4	0.038	<0.005	0.01	<0.01	0.11	0.01	<0.06	8.7	<0.005	<0.05		
D3	Sep-07	7.33	1214	635	0.57	144	9.1	33.7	25.6	258	0	77	155	0.55	0.032	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	6.7	<0.005	<0.05		
D3	Oct-07	7.64	1241	770	0.39	155	9.9	38	29.9	239	0	63	168	0.33	0.066	<0.005	0.01	<0.01	0.15	0.01	0.08	7.7	<0.005	<0.05		
D3	Nov-07	7.66	1201	705	0.22	153	9.3	37.1	27.6	242	0	59	165	0.6	0.017	<0.005	0.01	<0.01	0.13	<0.005	<0.06	7	0.02	<0.05		
D3	Dec-07	7.28	1178	704	0.17	165	9.8	39.3	29.1	247	0	63	174	<0.2	0.011	<0.005	<0.005	<0.01	0.31	<0.005	<0.06	7.7	<0.005	<0.05		
D3	Jan-08	7.45	1266	782	0.17	172	10.7	43.8	31.9	253	0	51	195	<0.2	0.013	<0.005	<0.005	<0.01	0.29	0.01	0.07	8.2	0.01	<0.05		
D3	Feb-08	7.85	1387	775	0.12	180	10.6	46.2	33.3	276	0	62	211	<0.2	0.013	<0.005	<0.005	<0.01	0.15	<0.005	0.07	8.4	<0.005	<0.05		
D3	Mar-08	7.75	1455	870	0.08	188	11	49.7	35.4	292	0	65	226	<0.2	0.038	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	8.5	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3	Apr-08	7.35	1545	927	0.14	194	10.5	46.6	36	313	0	62	227	<0.2	0.02	<0.005	<0.005	<0.01	0.05	<0.005	0.41	8.6	0.01	<0.05		
D3	May-08	7.71	1410	725	0.22	184	11.7	46.3	31.7	254	0	61	221	<0.2	0.014	<0.005	<0.005	<0.01	0.08	<0.005	0.09	8.8	0.01	<0.05		
D3	Jun-08	7.56	1420	784	0.31	183	12.1	48.1	32.1	293	0	51	235	<0.2	0.01	<0.005	<0.005	<0.01	0.08	<0.005	0.07	9.1	0.01	<0.05		
D3	Jul-08	7.41	1378	849	0.49	176	11.7	47.7	31.1	260	0	47	240	<0.2	0.018	<0.005	<0.005	<0.01	0.15	<0.005	<0.06	8.7	<0.005	<0.05		
D3	Aug-08	7.34	1252	662	0.38	162	10.5	42.1	27.7	245	0	38	220	0.24	0.003	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	7.8	<0.005	<0.05		
D3	Sep-08	7.36	1279	764	0.33	168	10.3	43.7	27.5	236	0	31	227	0.22	0.004	<0.005	0.01	<0.01	0.27	<0.005	<0.06	7.6	0.01	<0.05		
D3	Oct-08	7.24	1244	732	0.22	159	10.5	43.5	28.7	238	0	36	234	<0.2	<0.001	<0.005	<0.005	<0.01	0.23	<0.005	<0.06	8.1	<0.005	<0.05		
D3	Nov-08	7.22	1297	689	0.2	145	9.6	44.7	27.9	239	0	23	232	0.21	0.002	<0.005	<0.005	<0.01	0.53	0.01	<0.06	7.9	0.01	<0.05		
D3	Dec-08	7.51	1316	751	0.12	163	10.3	44.6	29.4	251	0	38	242	<0.2	0.003	<0.005	<0.005	<0.01	0.33	0.01	0.09	7.7	<0.005	<0.05		
D3	Jan-09	7.52	1325	800	0.09	170	10.8	45.7	31.4	268	0	36	241	<0.2	0.004	<0.005	<0.005	<0.01	0.15	0.01	0.06	8.3	0.01	0.05		
D3	Feb-09	7.52	1425	843	0.07	189	11.5	51.6	33.1	281	0	43	280	<0.2	0.006	<0.005	<0.005	<0.01	0.13	<0.005	0.1	9.3	<0.005	<0.05		
D3	Mar-09	7.79	1457	947	0.14	186	11.9	56	35.6	291	0	33	284	0.81	0.008	<0.005	<0.005	<0.01	0.15	<0.005	<0.06	9.1	<0.005	<0.05		
D3	Apr-09	7.5	1562	1020	0.12	205	13	64.9	38.3	280	0	31	318	<0.2	0.005	<0.005	<0.005	<0.01	0.21	<0.005	<0.06	10.5	<0.005	<0.05		
D3	May-09	7.46	1597	999	0.13	214	13.2	64.1	37.9	315	0	29	345	<0.2	0.006	<0.005	<0.005	<0.01	0.09	<0.005	0.08	10.8	0.01	<0.05		
D3	Jun-09	7.31	1548	1000	0.12	196	12.4	62.2	36.7	297	0	30	322	<0.2	0.004	<0.005	<0.005	<0.01	0.12	<0.005	<0.06	9.9	<0.005	<0.05		
D3	Jul-09	7.37	1568	878	0.19	179	11.4	53.8	33.5	263	0	27	285	<0.2	0.003	<0.005	<0.005	<0.01	0.16	0.01	<0.06	8.9	0.01	<0.05		
D3	Aug-09	7.35	1376	888	0.5	169	10.7	49.6	34	250	0	33	262	<0.2	0.005	<0.005	<0.005	<0.01	0.19	0.01	0.1	8.4	0.01	<0.05		
D3	Sep-09	7.43	1371	757	0.37	156	9.7	45.2	31.6	240	0	31	240	<0.2	0.005	<0.005	<0.005	<0.01	0.16	0.01	<0.06	7.4	<0.005	<0.05		
D3	Oct-09	7.52	1310	790	0.46	154	9.6	43.6	30.4	239	0	39	233	<0.2	0.004	<0.005	0.01	<0.01	0.12	<0.005	<0.06	7.2	<0.005	<0.05		
D3	Nov-09	7.61	1236	739	0.26	152	9.4	42.8	31.6	224	0	41	224	<0.2	0.009	<0.005	<0.005	<0.01	0.12	<0.005	0.1	6.8	<0.005	<0.05		
D3	Dec-09	7.53	1252	726	0.07	157	9.3	43.4	31.3	223	0	48	229	<0.2	0.005	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	7	<0.005	<0.05		
D3	Jan-10	7.67	1365	806	0.15	166	10	45.9	33.9	247	0	54	247	<0.2	0.009	<0.005	<0.005	<0.01	0.18	0.01	<0.06	7.6	<0.005	<0.05		
D3	Feb-10	7.7	1317	848	0.09	184	10.5	49.1	37.2	264	0	63	267	<0.2	0.013	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	8.2	<0.005	<0.05		
D3	Mar-10	7.96	1497	944	0.1	179	11	48.6	36.7	271	0	69	286	<0.2	0.019	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	8.7	<0.005	<0.05		
D3	Apr-10	8.11	1412	975	0.1	196	11.8	52.9	40.3	278	0	70	283	<0.2	0.021	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	9.4	<0.005	<0.05		
D3	May-10	7.89	1487	1000	0.11	204	12.2	53.4	41.1	283	0	82	290	<0.2	0.016	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	9.7	<0.005	<0.05		
D3	Jun-10	7.95	1541	982	0.13	198	11.6	50.8	39	282	0	82	270	<0.2	0.023	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	9.2	<0.005	<0.05		
D3	Jul-10	8.03	1567	880	0.16	196	11.5	49.7	38.8	267	0	87	270	<0.2	0.022	<0.005	<0.005	<0.01	0.06	0.01	<0.06	9.3	<0.005	<0.05		
D3	Aug-10	8.39	1477	857	0.15	186	10.9	48.3	36.4	277	4.8	75	256	<0.2	0.021	<0.005	0.01	<0.01	0.07	<0.005	<0.06	8.8	<0.005	<0.05		
D3	Sep-10	8.29	1477	893	0.17	184	10.7	47.2	35.8	258	0	87	248	<0.2	0.022	<0.005	<0.005	<0.01	0.15	<0.005	<0.06	8.7	<0.005	<0.05		
D3	Oct-10	8.27	1498	892	0.05	187	10.6	47.4	35	287	0	94	244	<0.2	0.036	<0.005	<0.005	<0.01	0.16	0.01	<0.06	8.8	<0.005	<0.05		
D3	Nov-10	8.03	1412	914	0.07	191	10.8	47.3	35.8	295	0	100	245	<0.2	0.055	<0.005	<0.005	<0.01	0.35	<0.005	0.09	9.1	<0.005	<0.05		
D3	Dec-10	7.83	1586	934	0.06	210	12	52.5	38.7	299	0	110	257	<0.2	0.08	<0.005	0.01	<0.01	0.42	<0.005	<0.06	10	<0.005	<0.05		
D3	Jan-11	7.86	1736	994	<0.005	214	11.2	53.6	39.7	306	0	114	258	<0.2	0.051	<0.005	<0.005	<0.01	0.69	<0.005	<0.06	9.9	<0.005	<0.05		
D3	Feb-11	7.95	1792	997	0.07	225	11.5	53.6	40	344	0	115	249	<0.2	0.044	<0.005	<0.005	<0.01	0.14	<0.005	<0.06	9.8	<0.005	<0.05		
D3	Mar-11	8.02	1868	1120	0.04	237	11.8	56.3	42.6	361	0	119	262	<0.2	0.044	<0.005	<0.005	<0.01	0.3	<0.005	<0.06	10.6	<0.005	<0.05		
D3	Apr-11	8.01	1781	1020	0.06	243	11.4	52.9	43.4	376	0	100	277	<0.2	0.035	<0.005	0.01	<0.01	0.09	<0.005	<0.06	10.1	0.01	<0.05		
D3	May-11	7.95	1846	1120	0.07	263	12.3	58.1	47.8	393	0	120	309	<0.2	0.062	<0.005	<0.005	<0.01	0.11	0.01	<0.06	12	<0.005	<0.05		
D3	Jun-11	7.96	1756	1080	0.1	255	11.4	57.1	45	344	0	119	296	<0.2	0.078	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	11.8	<0.005	<0.05		
D3	Jul-11	7.92	1699	1060	0.16	229	10.7	50.5	41.1	333	0	114	283	<0.2	0.048	<0.005	<0.005	<0.01	0.1	0.01	<0.06	11.4	0.01	<0.05		
D3	Aug-11	7.73	1459	890	0.19	199	9.1	42.6	35	295	0	97	221	<0.2	0.018	<0.005	<0.005	<0.01	0.04	<0.005	0.18	9.3	0.01	<0.05		
D3	Sep-11	7.95	1474	880	0.44	191	8.9	42.4	35.1	282	0	95	218	<0.2	0.019	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	9.3	0.01	<0.05		
D3	Oct-11	8.01	1503	897	0.11	184	8.3	37.8	33.9	263	0	107	206	<0.2	0.018	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	8.6	0.01	<0.05		
D3	Nov-11	7.95	1442	901	0.12	192	8.4	39	33.3	266	0	115	201	<0.2	0.02	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	8.7	0.01	<0.05		
D3	Dec-11	7.68	1419	919	0.1	198	8.7	40.3	34.5	277	0	123	208	<0.2	0.026	<0.005	<0.005	<0.01	0.13	<0.005	0.08	8.8	0.01	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3	Jan-12	7.57	1617	949	0.09	215	9.2	43.3	32.2	296	0	131	216	<0.2	0.03	<0.005	0.01	<0.01	0.09	0.01	<0.06	9.7	0.03	<0.05		
D3	Feb-12	8.04	1761	959	0.05	227	9.6	45.3	34.4	313	0	111	244	<0.2	0.04	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	10.1	0.01	<0.05		
D3	Mar-12	8	1705	1100	0.06	234	9.9	45.8	35.8	333	0	119	250	<0.2	0.055	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	10.7	0.02	<0.05		
D3	Apr-12	8.22	1745	983	0.05	247	10.1	45.7	37.4	345	0	126	245	<0.2	0.066	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	10.6	0.01	<0.05		
D3	May-12	8.09	1802	1000	0.08	243	9.6	41.4	37.2	364	0	129	215	<0.2	0.057	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	9.4	0.01	<0.05		
D3	Jun-12	8.18	1762	1040	0.12	223	9.9	41.5	37.3	345	0	130	235	<0.2	0.082	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	10.7	0.02	<0.05		
D3	Jul-12	8.11	1745	1000	0.15	246	11.1	45.1	35.7	373	0	129	247	<0.2	0.079	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	10.8	0.01	<0.05		
D3	Aug-12	8.31	1606	967	0.13	231	10.3	41.4	33.3	323	1.38	122	238	<0.2	0.068	<0.005	<0.005	<0.01	0.04	0.01	<0.06	10.5	0.01	<0.05		
D3	Sep-12	8.35	1606	916	0.14	227	9.2	41.3	30.4	308	2.64	112	223	<0.2	0.055	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	10.2	0.03	<0.05		
D3	Oct-12	8.63	1551	940	0.13	222	8.8	39.1	29.5	304	8.82	98	235	<0.2	0.067	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	9.9	0.01	<0.05		
D3	Nov-12	8	1587	890	0.08	221	9.1	39.6	29.6	301	0	121	228	<0.2	0.051	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	9.8	0.02	<0.05		
D3	Dec-12	8.02	1658	1020	0.09	235	9.3	40.3	31.3	321	0	127	238	<0.2	0.057	<0.005	<0.005	<0.01	0.12	<0.005	<0.06	10.4	0.03	<0.05		
D3	Jan-13	8.1	1697	1000	0.06	243	9.9	42.5	31	324	0	133	230	<0.2	0.055	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	11.2	<0.005	<0.05		
D3	Feb-13	8.26	1818	1040	0.05	263	10.2	43.7	36.7	355	0	140	244	<0.2	0.064	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	10.8	<0.005	<0.05		
D3	Mar-13	8.12	1954	1100	0.07	279	10.6	46.8	35.9	377	0	150	248	<0.2	0.08	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	11.3	<0.005	<0.05		
D3	Apr-13	8.23	1921	1100	0.06	278	11.1	46.6	35.2	369	0	155	248	<0.2	0.094	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	12	<0.005	<0.05		
D3	May-13	8.22	1903	1160	0.05	270	10.6	45.3	35.5	384	0	154	250	<0.2	0.08	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	11.7	0.03	<0.05		
D3	Jun-13	8.13	1908	1080	0.11	233	9.1	38.6	31.2	355	0	153	226	<0.2	0.061	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	10.4	0.01	<0.05		
D3	Jul-13	8.16	1770	1060	0.2	258	10.9	40.7	34.5	347	0	150	236	<0.2	0.045	<0.005	<0.005	<0.01	0.02	0.01	<0.06	12.1	0.02	<0.05		
D3	Aug-13	8.14	1652	916	0.33	230	9.4	38.1	29.9	309	0	137	236	<0.2	0.026	<0.005	0.01	<0.01	0.05	<0.005	<0.06	10.5	0.02	<0.05		
D3	Sep-13	8.15	1528	860	0.33	208	8.5	33.6	27.3	276	0	125	210	<0.2	0.015	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	9.3	0.02	<0.05		
D3	Oct-13	8.27	1425	803	0.22	208	8.2	35.8	25.1	259	0	120	195	<0.2	0.018	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	8.5	0.01	<0.05		
D3	Nov-13	8.16	1423	799	0.21	196	8	32.9	25.8	249	0	139	191	<0.2	0.029	<0.005	<0.005	<0.01	0.05	0.01	<0.06	8.6	0.03	<0.05		
D3	Dec-13	8.21	1465	806	0.1	197	8.1	33.4	25.3	257	0	140	189	<0.2	0.037	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	8.9	<0.005	<0.05		
D3	Jan-14	8.35	1521	837	0.13	204	8.3	33.3	26.3	264	1.19	155	193	<0.2	0.048	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	9.2	<0.005	<0.05		
D3	Feb-14	8.29	1602	1000	0.039	226	8.9	35.1	27.2	275	0	171	211	<0.2	0.087	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	9.9	<0.005	<0.05		
D3	Mar-14	8.44	1682	968	0.07	238	9.6	36.8	28.5	299	2.74	176	221	<0.2	0.118	<0.005	<0.005	<0.01	0.063	<0.005	<0.06	10.7	<0.005	<0.05		
D3	Apr-14	8.39	1674	972	0.056	240	9.8	33.2	30.3	325	2.6	189	209	<0.2	0.135	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	10.5	<0.005	<0.05		
D3	May-14	8.31	1691	1080	0.087	251	9.6	34	30.8	319	0.12	228	205	<0.2	0.115	<0.005	<0.005	<0.01	0.042	0.005	0.19	10.3	<0.005	<0.05		
D3	Jun-14	8.41	1655	1000	0.101	236	9.8	30.9	28.9	296	3.49	213	188	<0.2	0.146	<0.005	<0.005	<0.01	0.034	0.007	<0.06	10	<0.005	<0.05		
D3	Jul-14	8.13	1528	928	0.17	236	9.1	31.1	27.6	282	0	230	181	<0.2	0.128	<0.005	<0.005	<0.01	0.035	<0.005	<0.06	9.8	<0.005	<0.05		
D3	Aug-14	7.94	1482	967	0.283	230	8.8	30.7	25.7	261	0	220	179	<0.2	0.083	<0.005	<0.005	<0.01	0.052	<0.005	<0.06	9.4	<0.005	<0.05		
D3	Sep-14	7.82	1305	816	0.234	195	7.6	27.3	22.1	229	0	186	153	1.05	0.043	<0.005	<0.005	<0.01	0.034	<0.005	<0.06	7.9	<0.005	<0.05		
D3	Oct-14	8.14	1401	848	0.195	208	8	28.7	22.9	235	0	211	161	<0.2	0.054	<0.005	<0.005	<0.01	0.027	<0.005	0.07	8.6	<0.005	<0.05		
D3	Nov-14	8.31	1365	775	0.166	202	8.1	30.2	23.6	242	0.79	164	156	<0.2	0.063	<0.005	<0.005	<0.01	0.021	<0.005	<0.06	8.6	<0.005	<0.05		
D3	Dec-14	8.29	1424	811	0.121	215	8.3	30.3	23.7	249	0	168	163	<0.2	0.056	<0.005	<0.005	<0.01	0.026	<0.005	<0.06	8.8	<0.005	<0.05		
D3	Jan-15	8.45	1530	858	0.11	234	9.1	33.7	26.1	270	2.6	178	173	<0.2	0.075	<0.005	<0.005	<0.01	0.025	<0.005	<0.06	9.4	<0.005	<0.05		
D3	Feb-15	8.47	1660	905	0.071	240	9.5	33.8	28.4	290	3.41	195	180	<0.2	0.105	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	10.2	<0.005	<0.05		
D3	Mar-15	8.56	1716	958	0.053	262	9.6	33.3	31.5	323	4.69	191	175	<0.2	0.106	<0.005	<0.005	<0.01	0.033	<0.005	<0.06	10	<0.005	<0.05		
D3	Apr-15	8.43	1733	993	0.061	269	9.8	33.5	31.8	355	2.59	203	154	<0.2	0.109	<0.005	<0.005	<0.01	0.035	<0.005	<0.06	10.2	<0.005	<0.05		
D3	May-15	8.38	1666	1000	0.146	258	9.9	32.1	29.1	314	2.09	224	175	<0.2	0.117	<0.005	<0.005	<0.01	0.05	<0.005	0.11	10.7	<0.005	<0.05		
D3	Jun-15	8.4	1626	954	0.138	250	9.8	31.7	28	307	2.22	225	171	<0.2	0.11	<0.005	<0.005	<0.01	0.043	<0.005	<0.06	10.6	<0.005	<0.05		
D3	Jul-15	8.34	1626	909	0.17	253	9.6	32	28.1	295	1.16	226	169	<0.2	0.092	<0.005	<0.005	<0.01	0.045	<0.005	<0.06	10.7	<0.005	<0.05		
D3	Aug-15	8.31	1536	924	0.276	240	9.5	30.6	26.2	278	0.66	233	157	<0.2	0.073	<0.005	<0.005	<0.01	0.054	<0.005	<0.06	10.6	<0.005	<0.05		
D3	Sep-15	8.42	1506	876	0.269	232	9	30	25	265	2.8	214	154	<0.2	0.05	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	10.1	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3	Oct-15	8.54	1484	878	0.218	235	9.1	29.1	25.4	270	4.98	207	155	<0.2	0.046	<0.005	<0.005	<0.01	0.017	<0.005	<0.06	10.4	<0.005	<0.05		
D3	Nov-15	8.65	1530	919	0.106	239	9.3	28.6	25.2	272	7.7	202	154	<0.2	0.057	<0.005	<0.005	<0.01	0.029	<0.005	<0.06	10.5	<0.005	<0.05		
D3	Dec-15	8.69	1571	874	0.116	253	9.7	28	26.3	295	8.56	206	159	<0.2	0.082	<0.005	<0.005	<0.01	0.024	<0.005	<0.06	10.9	<0.005	<0.05		
D3	Jan-16	8.67	1698	1040	0.065	263	9.6	25.4	26.3	315	9.88	213	155	<0.2	0.134	<0.005	<0.005	<0.01	0.051	0.005	<0.06	12	<0.005	<0.05		
D3	Feb-16	8.14	1698	974	0.052	266	10.4	26.5	27.3	324	0	227	155	<0.2	0.155	<0.005	<0.005	<0.01	0.005	<0.005	<0.06	12	<0.005	<0.05		
D3	Mar-16	8.67	1720	1060	0.087	276	10.9	25.8	28.1	317	8.72	220	162	<0.2	0.181	<0.005	<0.005	<0.01	0.037	<0.005	0.07	12.5	<0.005	<0.05		
D3	Apr-16	8.62	1774	991	0.099	284	11	26.3	28.8	320	7.45	228	162	<0.2	0.185	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	12.5	<0.005	<0.05	8.73	
D3	May-16	8.54	1767	979	0.108	280	10.9	26.8	28.4	327	5.42	226	160	<0.2	0.181	<0.005	<0.005	<0.01	0.04	<0.005	0.08	12.3	<0.005	<0.05	8.67	
D3	Jun-16	8.41	1794	948	0.164	272	10.3	26.8	27.2	320	3.6	223	154	<0.2	0.164	<0.005	<0.005	<0.01	0.053	0.005	0.1	12	<0.005	<0.05	8.31	
D3	Jul-16	8.32	1624	923	0.273	259	10	26.1	25.6	302	0.92	238	152	<0.2	0.116	<0.005	<0.005	<0.01	0.056	<0.005	<0.06	11.9	<0.005	<0.05	8.51	
D3	Aug-16	8.26	1440	773	0.24	233	9	26	22.3	260	0	209	155	<0.2	0.085	<0.005	<0.005	<0.01	0.044	<0.005	0.06	10.7	<0.005	<0.05	8.08	
D3	Sep-16	8.33	1447	811	0.146	218	9	26.8	20.7	245	1.19	186	170	<0.2	0.077	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	10.6	<0.005	<0.05	7.88	
D3	Oct-16	8.4	1483	762	0.216	208	8.3	25.9	20	228	2.74	176	162	<0.2	0.052	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	9.8	<0.005	<0.05	7.89	
D3	Nov-16	8.52	1365	769	0.282	217	8.7	26.6	20.7	233	4.28	183	170	<0.2	0.046	<0.005	<0.005	<0.01	0.039	<0.005	0.07	10.2	<0.005	<0.05	8.43	
D3	Dec-16	8.54	1404	776	0.098	218	8.9	27	21.4	240	5.62	185	173	<0.2	0.057	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	10.3	0.068	<0.05	8.89	
D3	Jan-17	8.68	1471	834	0.084	229	9.2	26.5	22.5	243	8.11	183	180	<0.2	0.092	<0.005	<0.005	<0.01	0.032	0.005	<0.06	10.7	0.009	<0.05	8.67	
D3	Feb-17	8.29	1585	986	0.073	237	9.4	24.7	23.5	290	0	207	175	0.45	0.126	<0.005	<0.005	<0.01	0.051	<0.005	0.09	10.7	0.005	<0.05	8.53	
D3	Mar-17	8.65	1627	921	0.06	250	9.5	26.1	27.1	274	7.14	191	174	<0.2	0.13	<0.005	<0.005	<0.01	0.051	<0.005	0.18	10.6	<0.005	<0.05	8.7	
D3	Apr-17	8.35	1685	969	0.071	258	10	27.3	27.8	314	2.39	216	180	<0.2	0.15	<0.005	<0.005	<0.01	0.049	<0.005	0.13	10.9	<0.005	<0.05	8.6	
D3	May-17	N.A.	1718	960	0.094	253	9.6	26.4	27.6	383	0	108	174	0.28	0.141	<0.005	<0.005	<0.01	0.056	<0.005	<0.06	10.3	<0.005	<0.05	8.47	
D3	Jun-17	8.41	1660	916	0.099	263	9.9	28.4	28.5	315	3.02	219	178	<0.2	0.109	<0.005	<0.005	<0.01	0.057	0.005	0.11	11	<0.005	<0.05	8.26	
D3	Jul-17	7.64	1708	920	0.101	255	9.5	28.5	27.8	325	0	209	179	<0.2	0.106	<0.005	<0.005	<0.01	0.059	<0.005	<0.06	10.6	<0.005	<0.05	8.41	
Mean		**8.00**	**1379.2**	**801.29**	**0.170**	**194**	**9.5**	**34.7**	**28.2**	**278**	**1.0**	**106**	**169.6**	**0.4**	**0.039**	**0.000**	**0.001**	**0.00**	**0.084**	**0.001**	**0.05**	**7.35**	**0.006**	**0.000**		
Min		**0.00**	**372**	**193**	**0.000**	**50**	**1.8**	**6.2**	**8.0**	**74**	**0.0**	**23**	**23.5**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**0.16**	**0.000**	**0.000**		
Max		**9.06**	**1954**	**1160**	**0.955**	**284**	**13.2**	**64.9**	**47.8**	**393**	**10.9**	**238**	**345**	**7.1**	**0.185**	**0.019**	**0.011**	**0.030**	**0.690**	**0.012**	**1.20**	**12.50**	**0.068**	**0.050**		
D3A	Oct-97	7.75	1134	644	0.305	181	6.5	24.4	21.2	240	0	88	158.1	0.3	<0.02	0.012	<0.005	<0.01	0.489	<0.005	0.09	6.9	0.014	<0.05		
D3A	Nov-97	7.48	1287	802	0.25	191	8.2	25.8	19.9	253	0	93	187.1	0.5	0.03	<0.005	<0.005	<0.01	0.397	<0.005	0.18	9.7	<0.005	<0.05		
D3A	Dec-97	8.32	1234	785	0.104	191	8.2	26.1	20.6	267	0.4	103	176.7	0.8	<0.02	<0.005	<0.005	<0.01	0.301	<0.005	0.07	9.2	<0.005	<0.05		
D3A	Jan-98	8.43	1370	773	0.172	208	9	27.1	21.3	286	1.63	7.67	181.5	0.2	<0.02	<0.005	<0.005	<0.01	0.35	<0.005	0.06	9.6	0.009	<0.05		
D3A	Feb-98	8.11	1576	865	0.233	222	9.4	28.8	23.2	316	0	124	191.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.406	<0.005	0.06	10.1	0.005	<0.05		
D3A	Apr-98	7.93	1615	993	0.312	239	14.4	30.5	18.9	302	0	95	236.3	1.2	0.03	<0.005	0.007	<0.01	0.346	<0.005	0.09	12	0.005	<0.05		
D3A	May-98	8.15	1613	922	1.2	240	9.4	31.2	26.5	351	0	86	180.2	0.2	<0.02	<0.005	0.01	<0.01	0.909	<0.005	0.1	7.9	0.01	<0.05		
D3A	Jun-98	7.96	1579	839	0.176	211	10.2	28.2	21.3	335	0	88	184.1	0.3	<0.02	<0.005	<0.005	<0.01	0.135	<0.005	<0.06	8.5	0.018	<0.05		
D3A	Jul-98	7.7	1559	950	0.113	215	11.8	31.5	20.6	310	0	60	214.7	1.3	0.03	<0.005	<0.005	<0.01	0.128	<0.005	0.08	8.6	<0.005	<0.05		
D3A	Aug-98	7.39	1325	678	0.199	197	9.9	29.3	22.5	252	0	57	169.1	1.4	<0.02	<0.005	<0.005	<0.01	0.075	<0.005	0.08	6.3	<0.005	<0.05		
D3A	Sep-98	7.9	1270	671	0.104	176	8.5	26.2	19.7	240	0	58	160.6	1.6	<0.02	<0.005	<0.005	<0.01	0.064	<0.005	0.16	6	0.006	<0.05		
D3A	Oct-98	7.85	1235	639	0.091	175	9.1	27.7	20.4	242	0	56	162.9	2.9	0.02	<0.005	<0.005	<0.01	0.036	<0.005	0.09	5.9	0.017	<0.05		
D3A	Dec-98	8.13	1235	687	0.099	187	9.3	29.7	21.7	263	0	67	175.4	0.7	<0.02	<0.005	<0.005	<0.01	0.115	<0.005	0.08	6.5	<0.005	<0.05		
D3A	Jan-99	8.57	1352	752	0.179	187	10.4	31.4	22	267	2.4	69	173.7	0.8	0.11	<0.005	<0.005	<0.01	0.178	<0.005	<0.06	6.4	<0.005	<0.05		
D3A	Feb-99	8.32	1432	799	0.089	214	11.9	36.4	25.3	288	1.27	79	196.8	0.2	0.02	<0.005	<0.005	<0.01	0.075	<0.005	0.1	6.8	0.016	<0.05		
D3A	Mar-99	7.78	1558	926	0.372	228	15.7	38.6	23	346	0	73	214	<0.2	<0.02	<0.005	0.007	<0.01	0.188	<0.005	<0.06	7.4	0.022	<0.05		
D3A	Apr-99	7.49	1520	860	0.442	229	17	42.1	23.9	330	0	72	212.8	0.9	0.05	<0.005	<0.005	<0.01	0.405	<0.005	0.14	7.7	0.028	<0.05		
D3A	May-99	7.88	1564	900	0.562	227	15	39.3	24	321	0	82	214.5	1	0.05	<0.005	<0.005	<0.01	0.182	<0.005	0.16	7.9	0.019	<0.05		
D3A	Jun-99	7.64	1300	705	0.189	168	10.6	39.2	21.8	248	0	79	170.8	10.2	0.05	<0.005	0.005	<0.01	0.122	<0.005	0.09	5.6	0.012	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3A	Jul-99	7.93	1257	686	0.149	170	10.8	33.4	20	232	0	86	162.5	5.7	<0.02	<0.005	<0.005	<0.01	0.027	<0.005	0.24	6.2	0.019	<0.05		
D3A	Aug-99	8.13	1189	735	0.059	163	9.8	31.4	19.2	224	0	90	160.3	6.1	<0.02	<0.005	<0.005	<0.01	0.02	<0.005	0.06	5.5	<0.005	<0.05		
D3A	Sep-99	8.1	1079	655	0.041	154	9.9	30.4	18.8	202	0	89	138.7	7.2	<0.02	<0.005	<0.005	<0.01	0.035	<0.005	<0.06	6.1	0.01	<0.05		
D3A	Oct-99	8.35	1070	614	0.089	149	9.6	28.9	17.9	206	1.81	85	129.8	5.3	0.04	<0.005	<0.005	<0.01	0.034	<0.005	0.07	5.6	<0.005	<0.05		
D3A	Nov-99	8.52	1017	588	0.111	135	8.6	26.2	16.7	183	2.88	82	119.8	5.2	0.03	<0.005	<0.005	<0.01	0.024	<0.005	0.09	5.3	<0.005	<0.05		
D3A	Dec-99	8.73	1049	633	0.113	150	9.2	27.9	18.8	204	6.36	79	122.7	1.4	0.04	<0.005	<0.005	<0.01	0.057	0.015	0.12	5.8	0.006	<0.05		
D3A	Jan-00	8.42	1118	732	0.088	161	10.1	30.1	20.4	196	2.85	90	126.5	0.3	<0.02	<0.005	<0.005	<0.01	0.063	<0.005	0.08	5.9	0.02	<0.05		
D3A	Feb-00	7.86	1037	618	0.026	159	10	29.8	20.6	217	0	104	133.7	0.2	<0.02	<0.005	<0.005	<0.01	0.041	<0.005	<0.06	5.7	<0.005	<0.05		
D3A	Mar-00	8.58	1147	627	0.042	164	10.2	30.3	21.2	217	4.91	100	134.8	<0.2	0.04	<0.005	<0.005	<0.01	0.035	<0.005	0.1	5.7	<0.005	<0.05		
D3A	Apr-00	8.43	1152	682	0.015	171	11.2	32.8	22.2	233	3.62	98	138.6	<0.2	<0.02	<0.005	<0.005	<0.01	0.051	<0.005	<0.06	5.9	0.01	0.05		
D3A	May-00	7.85	1176	688	0.188	166	12	32.7	21	252	0	95	139.2	0.3	0.12	<0.005	0.009	<0.01	0.129	<0.005	0.19	5.5	0.008	<0.05		
D3A	Jun-00	8.11	1203	681	0.089	170	11.6	33.2	22.2	225	0	102	139.2	<0.2	0.06	<0.005	<0.005	<0.01	0.097	<0.005	0.07	5.6	0.007	<0.05		
D3A	Jul-00	7.68	1085	611	0.429	144	12.3	30.7	18.5	209	0	76	144.5	0.7	0.07	<0.005	0.009	<0.01	0.221	<0.005	0.11	4.9	0.009	<0.05		
D3A	Aug-00	8.07	1065	573	0.087	139	10.5	28.1	17.9	196	0	82	133.3	<0.2	<0.02	0.007	<0.005	<0.01	0.084	<0.005	<0.06	4.5	0.015	<0.05		
D3A	Sep-00	7.94	950	573	0.076	113	8.8	25.1	15.4	181	0	74	107.9	2	<0.02	<0.005	<0.005	<0.01	0.053	<0.005	<0.06	3.6	<0.005	<0.05		
D3A	Oct-00	8.24	890	553	0.066	132	10.9	32.7	19.1	182	0	78	120.5	2.9	0.05	<0.005	<0.005	<0.01	0.058	<0.005	<0.06	4	0.01	<0.05		
D3A	Nov-00	8.03	940	518	0.137	119	10.4	27.4	16.6	194	0	80	118.5	1.2	0.11	<0.005	<0.005	<0.01	0.121	<0.005	<0.06	4.2	0.009	<0.05		
D3A	Dec-00	8.77	992	628	0.058	125	10.8	32.4	18.1	200	6.3	75	118.6	0.7	0.04	<0.005	<0.005	<0.01	0.096	<0.005	<0.06	4.3	<0.005	<0.05		
D3A	Jan-01	8.04	1060	628	0.045	152	11.7	35.4	21.9	210	0	72	131.2	<0.2	0.05	<0.005	0.006	<0.01	0.115	<0.005	0.09	4.7	0.009	<0.05		
D3A	Feb-01	8.58	1163	688	0.027	159	12	35.5	22.7	238	5	86	139	3	0.07	<0.005	<0.005	<0.01	0.037	<0.005	0.15	4.9	0.007	<0.05		
D3A	Mar-01	8.15	1220	677	0.105	177	10.2	29.7	26	302	0	93	114.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.019	<0.005	<0.06	3.8	0.023	<0.05		
D3A	Apr-01	8.27	1217	750	0.126	178	13.5	39.7	26.1	254	0	111	153.3	<0.2	0.06	<0.005	<0.005	<0.01	0.096	<0.005	0.17	5	0.008	<0.05		
D3A	May-01	8.15	1290	773	0.045	184	13.9	41	26.3	248	0	107	152.7	<0.2	0.06	<0.005	0.008	<0.01	0.034	<0.005	0.07	5.4	0.015	<0.05		
D3A	Jun-01	8.38	1237	708	0.044	174	13.4	40.1	25.1	256	1.71	98	142.6	0.6	0.04	<0.005	<0.005	<0.01	0.017	<0.005	0.13	5.2	0.027	<0.05		
D3A	Jul-01	8.27	1239	728	0.061	181	13	44	26.7	268	0	97	160.3	3	0.07	<0.005	<0.005	<0.01	0.031	<0.005	0.1	5	0.009	<0.05		
D3A	Aug-01	7.97	1220	793	0.3	175	11.1	41.5	22.8	239	0	87	157	3.5	0.03	<0.005	<0.005	<0.01	0.144	<0.005	0.14	4.6	<0.005	<0.05		
D3A	Sep-01	8.31	1089	735	0.184	159	10.4	39.7	23.6	237	0.62	80	143.1	9.7	0.03	<0.005	<0.005	<0.01	0.089	<0.005	<0.06	3.9	0.013	<0.05		
D3A	Oct-01	8.6	1052	648	0.202	157	9.4	36.2	22	220	5.55	65	136	7.8	0.02	<0.005	<0.005	<0.01	0.058	<0.005	0.09	3.8	<0.005	<0.05		
D3A	Nov-01	9.13	1134	676	0.06	164	9.5	33.8	22.7	245	12.7	49	136.9	2.4	0.03	<0.005	<0.005	<0.01	0.059	<0.005	0.06	3.9	0.011	<0.05		
D3A	Dec-01	8.93	1104	660	0.076	167	9.5	31.6	23.2	244	7.81	53	130	7.1	<0.02	<0.005	<0.005	<0.01	0.021	<0.005	<0.06	4	0.006	<0.05		
D3A	Jan-02	8.82	1235	639	0.031	177	9.2	33.1	25	234	7.78	61	135.8	0.9	0.04	<0.005	<0.005	<0.01	0.032	<0.005	<0.06	3.8	0.005	<0.05		
D3A	Feb-02	9.36	1160	692	0.05	184	9.1	31.8	26.5	248	16.4	47	126.2	<0.2	0.06	<0.005	<0.005	<0.01	0.027	<0.005	0.1	3.8	<0.005	<0.05		
D3A	Mar-02	9.05	1285	784	0.055	187	9.6	29.9	27.6	288	8.55	67	123.5	1	0.1	<0.005	<0.005	<0.01	0.034	<0.005	0.08	4	<0.005	<0.05		
D3A	Apr-02	9.29	1334	711	0.018	198	10.3	31.3	30.3	307	15.2	56	131.2	1.1	0.09	<0.005	0.006	<0.01	0.026	<0.005	<0.06	4.2	<0.005	<0.05		
D3A	May-02	7.86	1285	700	0.356	172	9.6	33.8	28.4	286	0	87	110.7	9.5	0.05	<0.005	0.006	<0.01	0.207	0.008	0.1	3.7	<0.005	<0.05		
D3A	Jun-02	7.99	1268	685	0.137	161	10.5	36.2	27	260	0	92	119.2	7.1	0.09	<0.005	<0.005	<0.01	0.056	<0.005	0.1	4.4	0.028	<0.05		
D3A	Jul-02	7.81	1204	701	0.113	164	11.1	36.1	24	250	0	99	124	1.9	0.07	<0.005	<0.005	<0.01	0.119	<0.005	0.07	4.9	0.007	<0.05		
D3A	Aug-02	7.94	1064	637	0.027	145	9.7	34.9	22.4	221	0	82	113	8.1	<0.02	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	4.1	0.015	<0.05		
D3A	Sep-02	7.83	951	581	0.067	141	9.5	33.6	21	217	0	79	111	10.1	0.05	<0.005	<0.005	<0.01	0.064	<0.005	<0.06	4	0.005	<0.05		
D3A	Oct-02	8.24	1058	600	0.039	140	9.2	34.1	21.1	222	0	81	112	4.7	0.03	<0.005	<0.005	<0.01	0.029	<0.005	0.06	4.2	0.006	<0.05		
D3A	Nov-02	8.59	1062	593	0.094	139	8.8	31.3	20.9	217	4.27	78	112	0.5	0.037	<0.005	<0.005	<0.01	0.073	<0.005	0.08	4.1	<0.005	<0.05		
D3A	Dec-02	8.19	1160	652	0.06	145	8.6	32	22.6	239	0	90	114	2.1	0.02	<0.005	<0.005	<0.01	0.174	<0.005	0.08	4.1	0.013	<0.05		
D3A	Jan-03	8.57	1219	666	0.068	151	9	33.6	23.8	250	5.11	88	121	1.2	0.062	<0.005	0.008	<0.01	0.077	0.006	0.08	4.5	0.012	<0.05		
D3A	Feb-03	8.3	1365	759	<0.005	166	10.4	37	26.3	269	0	116	143	0.7	0.055	<0.005	<0.005	<0.01	0.163	<0.005	0.08	5.1	0.031	<0.05		
D3A	Mar-03	8.13	1399	755	0.372	188	10.6	41.3	27.7	287	0	126	141	0.6	0.039	<0.005	<0.005	<0.01	0.232	<0.005	0.09	5.6	0.006	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3A	Apr-03	8.37	1418	796	0.03	197	10.5	42.2	32.7	303	2.57	118	146	0.7	0.055	<0.005	<0.005	<0.01	0.058	<0.005	0.17	5.3	<0.005	<0.05		
D3A	May-03	8.29	1428	803	0.065	188	10.2	39.6	28.8	280	0	114	147	0.4	0.043	<0.005	<0.005	<0.01	0.087	<0.005	0.1	5.5	0.005	<0.05		
D3A	Jun-03	8.09	1292	693	0.078	184	10	37.2	27.1	261	0	103	133	0.6	0.034	<0.005	<0.005	<0.01	0.043	0.007	0.1	5.3	0.009	0.06		
D3A	Jul-03	7.58	1127	699	0.202	163	10.3	30.6	23.9	238	0	67	131	1.9	0.069	<0.005	0.005	<0.01	0.255	<0.005	0.11	5.5	0.008	<0.05		
D3A	Aug-03	8	1116	620	0.072	158	9.6	32.5	24	235	0	74	126	2.1	0.044	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	5.3	0.009	<0.05		
D3A	Sep-03	7.61	1076	677	0.048	151	9.3	31.1	22.9	232	0	65	136	2.6	0.071	<0.005	<0.005	<0.01	0.028	<0.005	<0.06	5.4	<0.005	<0.05		
D3A	Oct-03	7.98	1035	597	0.015	137	9.3	28.5	21.4	208	0	63	129	2.8	0.096	<0.005	<0.005	<0.01	0.025	0.005	0.07	5.3	<0.005	<0.05		
D3A	Nov-03	8.81	967	588	0.007	135	8.7	27.4	21.4	214	6.59	52	128	1	0.071	<0.005	0.006	<0.01	0.02	<0.005	0.06	5.3	<0.005	<0.05		
D3A	Jan-04	8.43	1150	714	<0.005	145	8.7	27.9	23	238	4.14	74	128	0.2	0.085	<0.005	<0.005	<0.01	0.058	<0.005	0.07	5.5	<0.005	<0.05		
D3A	Feb-04	8.11	1323	792	<0.005	167	10.1	31.8	26.1	346	0	91	138	<0.2	0.124	<0.005	<0.005	<0.01	0.162	<0.005	0.07	6.4	<0.005	<0.05		
D3A	Mar-04	8.55	1314	799	0.007	173	10.2	33.2	27.3	256	4	90	143	<0.2	0.094	<0.005	<0.005	<0.01	0.083	<0.005	<0.06	6.4	<0.005	<0.05		
D3A	Apr-04	8.17	1415	802	<0.005	174	9.7	34.5	28.4	317	0	101	143	0.5	0.047	<0.005	0.006	<0.01	0.097	<0.005	0.12	6.2	<0.005	<0.05		
D3A	May-04	7.8	1397	809	0.205	181	9.7	35.3	29.6	317	0	118	125	0.6	0.068	<0.005	<0.005	<0.01	0.377	<0.005	<0.06	5	<0.005	<0.05		
D3A	Jun-04	7.5	1427	901	0.209	184	9.8	37.1	29.9	280	0	85	152	0.8	0.035	<0.005	<0.005	<0.01	0.207	<0.005	<0.06	6	0.008	<0.05		
D3A	Jul-04	7.87	1257	827	<0.005	171	10.2	37.3	28.2	265	0	79	154	0.5	0.039	<0.005	<0.005	<0.01	0.173	<0.005	<0.06	6.1	0.011	<0.05		
D3A	Aug-04	7.99	1232	735	0.087	161	10	32.7	24.8	286	0	71	147	0.6	0.03	<0.005	<0.005	<0.01	0.116	<0.005	0.07	6.6	0.005	<0.05		
D3A	Sep-04	7.88	1146	691	0.083	150	9.8	32.6	23.4	227	0	65	153	0.9	0.044	<0.005	0.006	<0.01	0.111	<0.005	<0.06	6.7	0.008	<0.05		
D3A	Oct-04	7.64	1155	732	0.086	146	9.7	30.4	22.5	262	0	64	144	0.4	0.053	<0.005	<0.005	<0.01	0.102	<0.005	<0.06	6.8	0.007	<0.05		
D3A	Nov-04	7.99	1239	669	0.123	168	10.8	34.2	26.6	252	0	76	142	0.2	0.044	<0.005	<0.005	<0.01	0.092	<0.005	0.07	6.9	<0.005	<0.05		
D3A	Dec-04	8.14	1300	749	0.102	176	10.8	36.7	27.8	302	0	76	144	<0.2	0.049	<0.005	<0.005	<0.01	0.058	<0.005	<0.06	6.9	<0.005	<0.05		
D3A	Jan-05	8.1	1441	787	0.017	196	11.8	39.7	30.6	308	0	91	158	0.3	0.043	<0.005	<0.005	<0.01	0.074	<0.005	<0.06	7.7	<0.005	<0.05		
D3A	Feb-05	8.38	1536	777	0.033	194	11.5	39.5	31.1	322	3.26	93	151	<0.2	0.083	<0.005	<0.005	<0.01	0.103	<0.005	0.07	7.2	0.018	<0.05		
D3A	Mar-05	8.71	1618	910	0.007	213	12.5	39.6	32.6	333	11.4	87	150	<0.2	0.096	<0.005	<0.005	<0.01	0.045	0.006	<0.06	8.2	0.007	<0.05		
D3A	Apr-05	8.19	1627	999	0.048	215	12.6	43.7	34.7	349	0	100	167	1.4	0.105	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	7.7	<0.005	<0.05		
D3A	May-05	7.98	1480	846	0.037	190	12.8	39.8	31.8	315	0	92	162	3	0.096	<0.005	<0.005	<0.01	0.015	<0.005	<0.06	8	<0.005	<0.05		
D3A	Jun-05	8.01	1386	770	0.018	195	12.8	40.4	30.9	262	0	85	147	4.7	0.081	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	7.8	<0.005	<0.05		
D3A	Jul-05	8.01	1206	766	0.053	176	11.7	36.5	26.3	252	0	75	147	6	0.109	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	7.1	<0.005	<0.05		
D3A	Aug-05	7.94	1238	706	0.033	177	12.3	39.1	27	252	0	71	155	8.2	0.087	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	7.5	<0.005	<0.05		
D3A	Sep-05	7.71	1185	790	0.05	157	11.1	34.8	23.6	236	0	71	143	6.7	0.09	<0.005	<0.005	<0.01	0.008	<0.005	0.09	7	0.007	<0.05		
D3A	Oct-05	7.88	1076	592	0.045	140	10.5	31.7	21.5	221	0	70	132	4.8	0.067	<0.005	<0.005	<0.01	0.023	<0.005	<0.06	6.6	<0.005	<0.05		
D3A	Nov-05	7.84	1062	562	0.035	148	10.5	31.7	21.3	219	0	72	135	4.4	0.085	<0.005	<0.005	<0.01	0.075	<0.005	<0.06	6.4	<0.005	<0.05		
D3A	Dec-05	8.09	1072	650	0.094	150	10.4	32.9	22.3	222	0	79	133	2.8	0.158	<0.005	0.009	<0.01	0.227	<0.005	<0.06	6.6	<0.005	<0.05		
D3A	Jan-06	7.94	1169	715	0.077	159	10.5	34	23.2	228	0	86	137	1.7	0.109	<0.005	<0.005	<0.01	0.245	<0.005	<0.06	6.9	<0.005	<0.05		
D3A	Feb-06	8.19	1204	678	0.025	164	11	35.4	24.5	243	0	92	140	1.3	0.087	<0.005	<0.005	<0.01	0.101	<0.005	<0.06	7.2	<0.005	<0.05		
D3A	Mar-06	7.88	1315	726	0.029	178	11.4	36.8	26	271	0	96	142	0.6	0.084	<0.005	<0.005	<0.01	0.122	<0.005	<0.06	7.5	<0.005	<0.05		
D3A	Apr-06	8.45	1275	724	0.044	190	11.8	39.8	28.2	297	5.55	101	151	<0.2	0.093	<0.005	<0.005	<0.01	0.112	<0.005	<0.06	7.6	<0.005	<0.05		
D3A	May-06	8.17	1364	802	0.077	190	11.5	38.7	28.3	308	0	110	150	<0.2	0.078	<0.005	<0.005	<0.01	0.107	<0.005	<0.06	7.4	<0.005	<0.05		
D3A	Jun-06	8.25	1380	795	0.054	184	11.3	36.8	27.9	307	0	107	143	<0.2	0.069	<0.005	<0.005	<0.01	0.055	<0.005	<0.06	7.5	<0.005	<0.05		
D3A	Jul-06	8.05	1329	751	0.213	182	10.7	35.2	28	285	0	103	142	<0.2	0.04	<0.005	<0.005	<0.01	0.138	<0.005	<0.06	6.8	<0.005	<0.05		
D3A	Aug-06	7.74	1242	693	0.815	182	11.6	39.4	30.5	260	0	76	127	3.1	0.052	<0.005	<0.005	<0.01	0.625	<0.005	0.13	7.2	<0.005	<0.05		
D3A	Sep-06	8.47	1185	723	0.163	163	10.1	35.9	28.1	254	3.96	71	140	1.65	0.039	<0.005	<0.005	<0.01	0.195	<0.005	0.13	6.7	<0.005	<0.05		
D3A	Oct-06	8.02	1235	779	0.16	163	10	34.8	28.1	256	0	81	141	0.87	0.051	<0.005	0.01	<0.01	0.18	<0.005	0.07	7	<0.005	<0.05		
D3A	Nov-06	7.84	1280	720	0.14	164	10.4	34.8	28.5	265	0	90	144	0.53	0.063	<0.005	0.01	<0.01	0.35	0.01	<0.06	7.4	<0.005	<0.05		
D3A	Dec-06	7.92	1312	743	0.09	165	10.4	34.5	28.1	281	0	90	143	<0.2	0.057	<0.005	<0.005	<0.01	0.27	<0.005	<0.06	7.7	<0.005	<0.05		
D3A	Jan-07	8.06	1303	847	0.04	179	11.6	39.4	30.4	298	0	98	157	<0.2	0.028	<0.005	<0.005	<0.01	0.18	<0.005	0.07	8.8	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3A	Feb-07	8.2	1489	864	0.06	192	12.1	44.2	33	321	0	104	175	<0.2	0.044	<0.005	0.01	<0.01	0.17	<0.005	0.11	9.7	<0.005	<0.05		
D3A	Mar-07	8.03	1406	818	0.19	204	13.1	47.9	34.5	330	0	102	193	<0.2	0.102	<0.005	<0.005	<0.01	0.4	<0.005	0.08	10.5	<0.005	0.05		
D3A	Apr-07	8.46	1476	926	0.06	213	13.4	48.9	35.2	355	0.27	108	206	<0.2	0.093	<0.005	<0.005	<0.01	0.12	<0.005	<0.06	10.8	<0.005	<0.05		
D3A	May-07	7.6	1595	831	0.36	198	13.3	48	32.9	304	0	84	206	0.47	0.088	<0.005	<0.005	<0.01	0.61	0.01	<0.06	10.5	<0.005	<0.05		
D3A	Jun-07	7.57	1544	961	0.16	196	12.8	48.2	34.2	349	0	90	212	<0.2	0.067	<0.005	<0.005	<0.01	0.41	<0.005	0.1	10.3	<0.005	<0.05		
D3A	Jul-07	7.72	1350	881	0.29	178	11.9	45.1	32.1	294	0	77	195	0.56	0.09	<0.005	<0.005	<0.01	0.4	<0.005	0.1	9.3	<0.005	<0.05		
D3A	Aug-07	7.71	1210	679	0.38	163	10.4	43.2	31.3	231	0	106	187	1.57	0.134	<0.005	0.01	<0.01	0.38	0.01	<0.06	8.1	<0.005	<0.05		
D3A	Sep-07	7.55	1173	624	0.29	139	8.8	36.6	26	236	0	68	169	1.02	0.09	<0.005	<0.005	<0.01	0.33	<0.005	0.07	6.9	<0.005	<0.05		
D3A	Oct-07	7.61	1220	735	0.28	161	10.5	44.4	32.5	221	0	55	194	0.52	0.145	<0.005	0.01	<0.01	0.4	0.01	0.14	8.5	<0.005	<0.05		
D3A	Nov-07	7.78	1218	702	0.17	152	9.1	39.2	27.7	234	0	50	178	0.35	0.046	<0.005	0.01	<0.01	0.32	<0.005	0.08	7.3	0.02	<0.05		
D3A	Dec-07	7.48	1223	718	0.08	167	9.5	42.7	29.7	242	0	51	196	<0.2	0.033	<0.005	<0.005	<0.01	0.24	<0.005	<0.06	8	<0.005	<0.05		
D3A	Feb-08	7.65	1418	808	0.08	184	10.5	50.4	33.9	273	0	51	237	<0.2	0.041	<0.005	<0.005	<0.01	0.35	<0.005	0.06	8.9	0.01	<0.05		
D3A	Mar-08	7.82	1541	908	0.03	197	11.3	53.7	36.6	300	0	71	252	<0.2	0.104	<0.005	<0.005	<0.01	0.22	<0.005	<0.06	9.1	0.01	<0.05		
D3A	Apr-08	6.95	1602	991	0.7	197	11.6	54.1	36.2	314	0	47	279	<0.2	0.049	<0.005	<0.005	<0.01	0.82	<0.005	0.34	10.4	<0.005	<0.05		
D3A	May-08	7.6	1490	908	0.57	206	13.7	57.6	36.1	292	0	41	289	<0.2	0.027	<0.005	0.01	<0.01	0.28	0.01	0.15	10.7	0.01	<0.05		
D3A	Jun-08	7.1	1410	803	1.1	173	11.9	51.8	31.5	276	0	32	262	<0.2	0.04	<0.005	<0.005	<0.01	0.76	<0.005	0.14	9.3	0.02	<0.05		
D3A	Jul-08	6.67	1293	846	2	165	11.5	50.1	29.7	251	0	18.4	263	0.45	0.053	<0.005	0.01	<0.01	1.2	0.01	0.15	9	0.01	<0.05		
D3A	Aug-08	7.03	1181	649	0.61	154	10.4	45	27	235	0	21	243	0.73	0.009	<0.005	<0.005	<0.01	0.47	0.01	<0.06	8.3	<0.005	<0.05		
D3A	Sep-08	6.99	1225	759	0.94	162	10.2	47.9	27.6	227	0	15.2	252	0.62	0.016	<0.005	<0.005	<0.01	1.3	<0.005	0.1	7.8	0.02	<0.05		
D3A	Oct-08	7.01	1171	735	0.43	152	10.3	46.5	27.9	226	0	17.6	252	<0.2	<0.001	<0.005	<0.005	<0.01	1	0.01	<0.06	8.3	0.01	<0.05		
D3A	Nov-08	6.86	1406	715	0.61	142	9.3	47.2	27.5	262	0	12.8	251	0.41	0.005	<0.005	0.01	<0.01	2	0.04	<0.06	7.9	0.01	0.05		
D3A	Dec-08	7.12	1320	786	0.13	146	9.7	48.8	27.2	241	0	16.6	266	<0.2	0.006	<0.005	<0.005	<0.01	1.1	0.03	<0.06	7.9	<0.005	<0.05		
D3A	Jan-09	7.08	1363	843	0.06	172	11.4	56.6	33	252	0	15.8	301	<0.2	0.009	<0.005	<0.005	<0.01	0.46	<0.005	<0.06	9.4	0.01	0.08		
D3A	Feb-09	7.31	1450	858	0.1	186	12.1	58.7	33.9	276	0	22	319	<0.2	0.012	<0.005	<0.005	<0.01	0.17	<0.005	0.08	10.6	<0.005	<0.05		
D3A	Mar-09	7.27	1549	976	0.47	187	12	60.1	35.8	289	0	22	320	0.29	0.021	<0.005	<0.005	<0.01	0.91	<0.005	0.08	9.6	<0.005	<0.05		
D3A	Apr-09	7.15	1615	1060	0.04	210	13	68.2	39	294	0	22	344	<0.2	0.009	<0.005	0.01	<0.01	0.47	0.01	0.09	10.7	<0.005	<0.05		
D3A	May-09	7.42	1628	1040	0.03	213	13.3	66.4	38.8	325	0	24	355	<0.2	0.009	<0.005	<0.005	<0.01	0.12	0.01	<0.06	11.1	<0.005	<0.05		
D3A	Jun-09	7.31	1488	909	0.06	197	12.2	61.5	36.2	297	0	26	336	0.25	0.006	<0.005	<0.005	<0.01	0.98	0.02	<0.06	9.8	0.01	<0.05		
D3A	Jul-09	7.68	1557	872	0.05	176	11.2	53.5	33.3	250	0	28	288	0.6	0.006	<0.005	0.01	<0.01	0.55	0.01	<0.06	8.9	<0.005	<0.05		
D3A	Aug-09	7.42	1306	843	0.04	169	10.2	50.4	33.3	252	0	25	272	0.2	0.013	<0.005	<0.005	<0.01	0.44	<0.005	0.2	8.1	<0.005	<0.05		
D3A	Sep-09	7.78	1288	751	0.04	149	9.4	45.3	30.7	233	0	28	241	<0.2	0.013	<0.005	<0.005	<0.01	0.34	0.01	<0.06	7.3	<0.005	<0.05		
D3A	Oct-09	7.95	1225	751	0.1	152	9.4	45.2	30.4	223	0	37	239	<0.2	0.013	<0.005	0.01	<0.01	0.25	<0.005	<0.06	7.2	<0.005	<0.05		
D3A	Nov-09	7.51	1215	741	0.1	149	9.1	42.5	30.7	216	0	42	224	<0.2	0.022	<0.005	<0.005	<0.01	0.58	0.01	0.06	6.7	<0.005	<0.05		
D3A	Dec-09	7.48	1266	735	0.01	155	9.2	43.7	31.3	222	0	46	233	<0.2	0.02	<0.005	<0.005	<0.01	0.2	<0.005	<0.06	7.1	<0.005	<0.05		
D3A	Jan-10	7.67	1374	831	0.02	171	10.2	47.4	35	245	0	52	262	<0.2	0.024	<0.005	<0.005	<0.01	0.5	0.01	<0.06	8.1	<0.005	0.05		
D3A	Feb-10	7.94	1379	874	0.01	180	10.4	49.2	37.5	254	0	64	284	<0.2	0.03	<0.005	<0.005	<0.01	0.18	0.01	<0.06	8.5	<0.005	<0.05		
D3A	Mar-10	8.17	1505	961	0.02	188	11.4	50.7	38.4	277	0	74	309	<0.2	0.038	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	9.5	<0.005	<0.05		
D3A	Apr-10	8.05	1370	999	0.03	203	12.3	54.8	41.7	282	0	76	296	<0.2	0.037	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	10	<0.005	<0.05		
D3A	May-10	8.79	1492	1040	0.02	207	12.2	53.6	41.3	288	14.1	53	295	<0.2	0.035	<0.005	<0.005	<0.01	0.12	<0.005	<0.06	9.9	<0.005	<0.05		
D3A	Jun-10	8.85	1555	994	0.02	206	11.8	52.3	39.9	283	18.5	53	282	<0.2	0.039	<0.005	<0.005	<0.01	0.2	<0.005	<0.06	9.6	<0.005	<0.05		
D3A	Jul-10	9.04	1572	915	0.02	195	11.2	48.8	37.5	267	23	45	270	<0.2	0.043	<0.005	<0.005	<0.01	0.22	<0.005	<0.06	9.3	<0.005	<0.05		
D3A	Aug-10	9.39	1461	867	0.03	190	10.8	49.5	36.1	277	30	28	262	<0.2	0.041	<0.005	<0.005	<0.01	0.33	<0.005	<0.06	9	<0.005	<0.05		
D3A	Sep-10	9.14	1517	895	0.06	192	11.2	50.4	37.1	268	21	49	259	<0.2	0.039	<0.005	<0.005	<0.01	0.48	<0.005	<0.06	9.3	<0.005	<0.05		
D3A	Oct-10	8.86	1483	895	0.03	187	10.8	48.4	35	274	15.9	71	242	<0.2	0.078	<0.005	<0.005	<0.01	0.51	<0.005	<0.06	9	<0.005	<0.05		
D3A	Nov-10	8.1	1456	918	0.15	195	11.2	49.3	36.5	290	0	115	247	<0.2	0.16	<0.005	<0.005	<0.01	1.5	<0.005	0.08	9.5	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3A	Dec-10	7.75	1614	950	0.21	209	12.1	54.2	38.9	306	0	116	258	<0.2	0.18	<0.005	0.01	<0.01	1.7	0.01	<0.06	10.3	<0.005	<0.05		
D3A	Jan-11	7.8	1811	1040	0.14	222	11.9	58.9	40.9	308	0	115	296	<0.2	0.105	<0.005	0.01	<0.01	2.2	0.01	<0.06	11.2	<0.005	<0.05		
D3A	Feb-11	7.81	1854	1060	0.23	230	12.3	59.8	39.9	342	0	118	284	<0.2	0.081	<0.005	<0.005	<0.01	1	0.01	<0.06	11.5	<0.005	<0.05		
D3A	Mar-11	8.31	1907	1160	0.11	251	12.4	61.2	42.3	358	2.08	120	300	<0.2	0.106	<0.005	0.01	<0.01	0.72	0.01	<0.06	12.2	<0.005	<0.05		
D3A	Apr-11	8.37	1868	1180	0.09	253	12.6	59.2	44	384	4.49	118	325	<0.2	0.113	<0.005	<0.005	<0.01	0.67	<0.005	0.11	12.3	<0.005	<0.05		
D3A	May-11	8.28	1852	1140	0.06	272	12.6	59.1	47.9	390	0	121	318	<0.2	0.102	<0.005	0.01	<0.01	0.25	0.02	<0.06	12.5	<0.005	<0.05		
D3A	Jun-11	8.41	1737	1060	0.04	254	11.3	57.1	45.2	359	9.47	81	300	<0.2	0.133	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	11.7	<0.005	<0.05		
D3A	Jul-11	7.98	1582	982	0.03	221	10.3	49.4	40.2	317	0	110	275	<0.2	0.07	<0.005	<0.005	<0.01	0.11	0.01	<0.06	11.3	0.01	<0.05		
D3A	Aug-11	7.89	1383	919	<0.005	211	9.9	46.1	38	297	0	99	260	<0.2	0.04	<0.005	<0.005	<0.01	0.09	<0.005	0.14	10.8	0.01	<0.05		
D3A	Sep-11	8.11	1463	868	<0.005	190	8.9	42.2	35.4	268	0	97	219	<0.2	0.04	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	9.4	0.03	<0.05		
D3A	Oct-11	7.96	1478	878	0.02	194	8.3	38.5	34.9	261	0	107	212	<0.2	0.049	<0.005	<0.005	<0.01	0.04	0.01	<0.06	9	0.01	<0.05		
D3A	Nov-11	7.8	1340	854	0.05	200	8.5	42	35.6	276	0	116	216	<0.2	0.053	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	8.8	<0.005	<0.05		
D3A	Dec-11	7.86	1502	914	0.04	208	8.9	44.3	37.3	277	0	121	223	<0.2	0.052	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	9.3	0.01	<0.05		
D3A	Jan-12	8.21	1632	961	0.02	219	9.2	44.4	33	303	0	132	227	<0.2	0.064	<0.005	<0.005	<0.01	0.1	0.01	<0.06	10.1	0.02	<0.05		
D3A	Feb-12	8.13	1755	973	0.02	233	9.9	48.1	35.6	312	0	113	265	<0.2	0.08	<0.005	<0.005	<0.01	0.15	<0.005	0.09	10.8	0.01	<0.05		
D3A	Mar-12	7.95	1764	1120	0.01	245	10.3	47.1	37.3	344	0	126	267	<0.2	0.12	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	11.7	0.03	<0.05		
D3A	Apr-12	8.45	1834	1040	0.06	263	10.9	48.1	38.7	348	4.14	124	276	<0.2	0.14	<0.005	<0.005	<0.01	0.29	<0.005	<0.06	12.2	0.01	0.05		
D3A	May-12	8.53	1880	1080	0.02	257	10.6	45	37.2	356	10.6	121	260	<0.2	0.151	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	12.1	0.02	<0.05		
D3A	Jun-12	8.65	1811	1100	0.02	246	11.1	46.2	40.1	341	1.61	136	280	<0.2	0.159	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	12.7	0.02	<0.05		
D3A	Jul-12	8.34	1702	990	0.02	245	11.1	46.3	35.4	328	0	129	255	<0.2	0.109	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	10.7	0.01	<0.05		
D3A	Aug-12	8.64	1605	951	0.02	229	10.2	41	32.5	317	9.41	101	241	<0.2	0.092	<0.005	<0.005	<0.01	0.07	<0.005	0.12	10.6	0.02	<0.05		
D3A	Sep-12	9.08	1597	900	0.01	226	9.1	41	29.6	305	13.4	89	230	<0.2	0.088	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	10.4	0.01	<0.05		
D3A	Oct-12	8.64	1507	960	0.03	222	8.8	39.6	29.1	300	9.27	98	241	<0.2	0.11	<0.005	<0.005	<0.01	0.18	<0.005	0.06	10.1	0.01	<0.05		
D3A	Nov-12	8.2	1625	946	0.08	225	9.3	41.3	29.7	297	0	124	241	<0.2	0.154	<0.005	0.01	<0.01	0.33	0.01	<0.06	10.2	0.02	<0.05		
D3A	Dec-12	8.13	1658	1020	0.07	237	9.2	41.6	31.4	317	0	129	248	<0.2	0.139	<0.005	<0.005	<0.01	0.36	0.01	<0.06	10.9	0.03	<0.05		
D3A	Jan-13	8.24	1702	1020	0.03	259	10.4	45.7	32.3	323	0	135	251	<0.2	0.138	<0.005	<0.005	<0.01	0.23	<0.005	<0.06	12.3	<0.005	<0.05		
D3A	Feb-13	8.54	1893	1100	0.03	274	10.9	46.5	35.9	350	6.77	129	289	<0.2	0.173	<0.005	<0.005	<0.01	0.22	0.01	<0.06	12.8	<0.005	<0.05		
D3A	Mar-13	8.37	2056	1180	0.05	290	10.8	47.7	34.9	372	4.11	146	278	<0.2	0.22	<0.005	<0.005	<0.01	0.17	<0.005	<0.06	12.7	<0.005	<0.05		
D3A	Apr-13	8.48	1964	1180	0.05	290	11.7	47.8	34.8	368	6.5	145	286	<0.2	0.193	<0.005	<0.005	<0.01	0.13	<0.005	0.09	13.7	<0.005	<0.05		
D3A	May-13	8.48	2013	1220	0.05	278	11.2	47.1	34.1	371	5.21	152	284	<0.2	0.17	<0.005	<0.005	<0.01	0.11	0.01	<0.06	13.5	0.02	<0.05		
D3A	Jun-13	8.22	1944	1120	0.05	240	9.6	41	30.8	340	0	173	243	<0.2	0.123	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	11.8	0.01	<0.05		
D3A	Jul-13	8.29	1774	1040	0.04	263	11.4	41.4	34.4	329	0	177	240	<0.2	0.098	<0.005	<0.005	<0.01	0.03	0.01	<0.06	13.7	0.02	<0.05		
D3A	Aug-13	8.19	1554	880	0.07	218	9.3	38.4	27.9	271	0	152	230	0.26	0.082	<0.005	0.01	<0.01	0.03	<0.005	<0.06	10.8	0.02	<0.05		
D3A	Sep-13	8.18	1429	837	0.05	198	8.6	34.8	25.8	245	0	146	215	<0.2	0.075	<0.005	0.01	<0.01	0.05	<0.005	<0.06	9.8	0.03	<0.05		
D3A	Oct-13	7.94	1318	763	0.07	189	7.7	36.1	22.9	229	0	124	191	<0.2	0.069	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	8.3	0.01	<0.05		
D3A	Nov-13	8.24	1364	764	0.07	183	7.7	33.4	24.1	228	0	145	191	0.22	0.084	<0.005	<0.005	<0.01	0.12	0.01	0.12	8.4	0.02	<0.05		
D3A	Dec-13	8.4	1431	797	0.02	191	8.1	34.9	24.6	240	1.7	145	193	<0.2	0.108	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	9.1	0.01	<0.05		
D3A	Jan-14	8.68	1484	835	0.02	200	8.2	33.3	25.6	247	6.03	141	190	<0.2	0.14	<0.005	<0.005	<0.01	0.06	0.01	<0.06	9.3	<0.005	<0.05		
D3A	Feb-14	8.58	1602	976	0.015	228	9	35.4	27.3	271	4.74	164	213	<0.2	0.196	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	10.5	<0.005	<0.05		
D3A	Mar-14	8.9	1671	978	0.043	242	9.8	33.6	28.3	302	12.6	151	221	<0.2	0.23	<0.005	<0.005	<0.01	0.064	<0.005	<0.06	11.3	<0.005	<0.05		
D3A	Apr-14	8.97	1675	963	0.034	240	10	28.9	29.2	310	15.4	155	210	<0.2	0.28	<0.005	<0.005	<0.01	0.066	0.006	<0.06	11.2	<0.005	<0.05		
D3A	May-14	8.94	1652	1060	0.027	250	9.8	28.2	29.3	308	18.7	194	198	<0.2	0.285	<0.005	<0.005	<0.01	0.065	0.006	<0.06	11.1	<0.005	<0.05		
D3A	Jun-14	8.75	1620	1000	0.046	240	10.1	28.3	28.3	287	12.8	214	191	<0.2	0.284	<0.005	<0.005	<0.01	0.073	<0.005	<0.06	10.8	<0.005	<0.05		
D3A	Jul-14	8.25	1562	962	0.059	240	9.3	31	26.5	273	0	259	190	<0.2	0.211	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	10.6	0.012	<0.05		
D3A	Aug-14	8.01	1464	956	0.079	224	8.6	31.7	24.6	246	0	229	189	<0.2	0.17	<0.005	<0.005	<0.01	0.041	<0.005	<0.06	9.6	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
D3A	Sep-14	8.06	1370	864	0.107	200	7.9	28.7	22.4	227	0	210	162	<0.2	0.152	<0.005	<0.005	<0.01	0.085	0.005	<0.06	8.6	<0.005	<0.05		
D3A	Oct-14	8.26	1376	827	0.061	198	7.7	28.6	22	223	0	229	157	<0.2	0.14	<0.005	<0.005	<0.01	0.061	<0.005	<0.06	8.5	<0.005	<0.05		
D3A	Nov-14	8.26	1361	778	0.035	207	8	31.4	23.4	238	0	182	154	<0.2	0.139	<0.005	<0.005	<0.01	0.02	0.005	<0.06	8.7	<0.005	<0.05		
D3A	Dec-14	8.31	1452	819	0.031	211	8.1	32.4	24.2	243	0.49	185	164	<0.2	0.1	<0.005	<0.005	<0.01	0.041	<0.005	<0.06	9	<0.005	<0.05		
D3A	Jan-15	8.5	1531	871	0.064	225	9	36.1	27.2	264	3.56	198	171	<0.2	0.117	<0.005	<0.005	<0.01	0.066	<0.005	<0.06	9.9	0.007	<0.05		
D3A	Feb-15	8.56	1639	908	0.024	239	9.3	34.1	27.8	276	5.32	207	177	<0.2	0.141	<0.005	<0.005	<0.01	0.043	<0.005	<0.06	10.6	<0.005	<0.05		
D3A	Mar-15	8.74	1698	954	0.058	257	9.9	32.3	28.9	299	10.2	209	180	<0.2	0.166	<0.005	<0.005	<0.01	0.059	<0.005	0.08	11.4	<0.005	<0.05		
D3A	Apr-15	8.53	1708	1020	0.082	268	10.4	32.4	29.2	328	4.83	234	160	<0.2	0.167	<0.005	<0.005	<0.01	0.138	<0.005	<0.06	11.9	<0.005	<0.05		
D3A	May-15	8.44	1718	1000	0.101	256	10.4	32.9	27.2	301	3.56	240	180	<0.2	0.143	<0.005	<0.005	<0.01	0.069	<0.005	0.08	11.8	<0.005	<0.05		
D3A	Jun-15	8.47	1623	962	0.092	246	10.1	32.4	26.3	300	3.58	238	172	<0.2	0.128	<0.005	<0.005	<0.01	0.053	<0.005	0.09	11.5	<0.005	<0.05		
D3A	Jul-15	8.46	1612	911	0.073	247	9.7	32.9	26.8	286	3.42	236	166	<0.2	0.108	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	11.4	<0.005	<0.05		
D3A	Aug-15	8.36	1523	926	0.088	236	9.6	31.9	25.3	269	1.66	240	158	<0.2	0.093	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	11.2	<0.005	<0.05		
D3A	Sep-15	8.53	1483	911	0.077	227	9.1	31.4	24.3	253	4.98	214	158	<0.2	0.075	<0.005	<0.005	<0.01	0.015	<0.005	<0.06	10.6	<0.005	<0.05		
D3A	Oct-15	8.35	1478	887	0.096	233	11	35.3	24.7	263	1.49	231	157	<0.2	0.082	<0.005	<0.005	<0.01	0.031	<0.005	1.1	11	0.016	<0.05		
D3A	Nov-15	8.72	1533	886	0.046	234	9.4	29.7	25	266	9.27	215	151	<0.2	0.089	<0.005	<0.005	<0.01	0.031	<0.005	<0.06	11	<0.005	<0.05		
D3A	Dec-15	8.82	1590	877	0.036	249	9.7	28.6	26.4	292	12.9	215	155	<0.2	0.112	<0.005	<0.005	<0.01	0.032	<0.005	<0.06	11.6	<0.005	<0.05		
D3A	Jan-16	8.73	1735	1040	0.087	267	9.7	25.4	26.9	319	10.4	222	160	<0.2	0.159	<0.005	0.005	<0.01	0.136	<0.005	0.09	12.5	<0.005	<0.05		
D3A	Feb-16	8.65	1690	967	0.032	263	10.2	26.4	27.8	309	7.77	219	163	<0.2	0.16	<0.005	<0.005	<0.01	0.052	<0.005	0.06	12.1	<0.005	<0.05		
D3A	Mar-16	8.93	1762	1000	0.036	279	10.9	24.9	28.7	317	16.8	198	172	<0.2	0.172	<0.005	<0.005	<0.01	0.059	<0.005	<0.06	12.9	<0.005	<0.05		
D3A	Apr-16	8.8	1803	1020	0.048	291	11.2	24.4	29.8	326	12.3	211	177	<0.2	0.19	<0.005	<0.005	<0.01	0.071	<0.005	0.07	13.2	<0.005	<0.05	8.81	
D3A	May-16	8.67	1808	981	0.055	287	11.3	27.1	28.6	315	8.64	211	187	<0.2	0.188	<0.005	<0.005	<0.01	0.049	<0.005	0.15	13.1	<0.005	<0.05	8.64	
D3A	Jun-16	8.43	1786	965	0.054	273	10.7	28.2	26.3	303	2.96	208	186	2.37	0.175	<0.005	<0.005	<0.01	0.025	<0.005	0.1	12.9	<0.005	<0.05	8.17	
D3A	Jul-16	8.41	1630	919	0.038	257	10.4	27.6	23.9	277	2.43	214	192	<0.2	0.147	<0.005	<0.005	<0.01	0.024	<0.005	0.82	12.9	0.048	<0.05	8.14	
D3A	Aug-16	8.27	1389	772	0.077	226	9	26.5	21	243	0	196	175	<0.2	0.118	<0.005	<0.005	<0.01	0.018	<0.005	0.1	11.2	<0.005	<0.05	7.97	
D3A	Sep-16	8.27	1416	791	0.072	214	9	26.7	20.1	233	0	182	178	0.25	0.087	<0.005	<0.005	<0.01	0.053	<0.005	<0.06	10.6	<0.005	<0.05	7.91	
D3A	Oct-16	8.46	1356	741	0.029	199	8.3	25.8	19.1	215	4.14	162	167	<0.2	0.067	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	9.7	<0.005	<0.05	7.77	
D3A	Nov-16	8.43	1337	748	0.065	203	8.5	27.3	19.8	220	2.77	178	171	<0.2	0.074	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	9.8	<0.005	<0.05	8.33	
D3A	Dec-16	8.67	1384	762	0.042	210	8.7	29.4	21	228	7.6	175	176	<0.2	0.08	<0.005	<0.005	<0.01	0.091	0.011	<0.06	10	0.013	<0.05	8.67	
D3A	Jan-17	8.74	1468	822	0.012	223	9.1	30.2	22.3	236	9.37	183	181	<0.2	0.151	<0.005	<0.005	<0.01	0.104	0.008	<0.06	10.6	0.011	<0.05	8.47	
D3A	Feb-17	8.75	1584	902	0.008	234	9.3	29.7	23.8	285	11.2	188	182	0.47	0.179	<0.005	<0.005	<0.01	0.129	<0.005	0.14	10.7	0.01	<0.05	8.45	
D3A	Mar-17	8.78	1623	928	0.043	253	9.8	30.2	26.8	277	11.3	187	188	<0.2	0.175	<0.005	<0.005	<0.01	0.145	<0.005	0.21	11.1	<0.005	<0.05	8.68	
D3A	Apr-17	8.48	1700	1000	0.119	258	10.2	30.8	27.2	299	5.18	214	195	<0.2	0.132	<0.005	<0.005	<0.01	0.137	<0.005	0.22	11.2	<0.005	<0.05	8.56	
D3A	May-17	N.A.	1740	968	0.132	257	9.9	31.4	27.4	343	0	182	201	<0.2	0.091	<0.005	<0.005	<0.01	0.144	<0.005	<0.06	10.9	<0.005	<0.05	8.41	
D3A	Jun-17	8.39	1690	970	0.113	265	10.2	33.8	27.5	300	2.71	221	215	<0.2	0.054	<0.005	<0.005	<0.01	0.088	<0.005	<0.06	12	<0.005	<0.05	8.35	
D3A	Jul-17	8.33	1709	953	0.118	261	10.1	33.9	27.2	298	2.77	227	219	<0.2	0.052	<0.005	<0.005	<0.01	0.076	<0.005	0.23	12	<0.005	<0.05	8.40	
Mean		**8.12**	**1405.5**	**826.03**	**0.125**	**196**	**10.4**	**38.2**	**28.0**	**273**	**2.7**	**106**	**190.0**	**1.0**	**0.075**	**0.000**	**0.001**	**0.00**	**0.212**	**0.002**	**0.05**	**8.34**	**0.006**	**0.002**		
Min		**0.00**	**890**	**518**	**0.000**	**113**	**6.5**	**24.4**	**15.4**	**181**	**0.0**	**8**	**107.9**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**10**	**0.000**	**0.000**		
Max		**9.39**	**2056**	**1220**	**2.000**	**291**	**17.0**	**68.2**	**47.9**	**390**	**30.0**	**259**	**355**	**10.2**	**0.285**	**0.012**	**0.010**	**0.000**	**2.200**	**0.040**	**1.10**	**13.70**	**0.048**	**0.080**		
MB01_1	Apr-01	6.61	1842	1020	0.11	158	4.7	92	97.3	474	0	248	37.8	<0.2	<0.02	<0.005	0.009	<0.01	0.615	<0.005	<0.06	0.08	0.012	<0.05		
MB01_1	Jul-01	6.37	1782	1040	0.027	164	4.6	91.6	97.3	486	0	232	39.2	<0.2	<0.02	<0.005	0.013	<0.01	0.584	0.005	0.06	0.07	0.007	<0.05		
MB01_1	Nov-01	6.4	1863	1120	0.016	163	4.3	89.4	95.3	468	0	229	37.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.6	0.009	<0.06	0.07	0.015	<0.05		
MB01_1	Jan-02	6.83	2020	1340	0.052	169	4.5	94	99	530	0	221	38.5	<0.2	<0.02	<0.005	0.006	<0.01	0.68	0.006	0.06	0.07	<0.005	<0.05		
MB01_1	Apr-02	6.58	1857	1160	<0.005	170	4.7	93.6	102.7	515	0	211	40	<0.2	<0.02	<0.005	<0.005	<0.01	0.717	<0.005	<0.06	0.07	0.014	<0.05		
MB01_1	Jul-02	6.62	1905	1040	0.077	159	5	93.1	101.1	548	0	218	37.9	<0.2	<0.02	<0.005	0.008	<0.01	0.743	0.007	0.1	0.08	0.019	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_1	Nov-02	6.58	2010	1260	0.308	169	4.4	93.9	106	531	0	211	39.9	<0.2	<0.001	<0.005	0.006	<0.01	0.694	0.011	0.16	0.07	0.017	<0.05		
MB01_1	Jan-03	6.32	2230	1240	0.349	170	5	97.9	109	529	0	229	40.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.011	<0.005	0.2	0.08	<0.005	<0.05		
MB01_1	Apr-03	6.49	2170	1340	0.385	182	4.6	98.3	110	549	0	227	43.7	<0.2	0.001	<0.005	0.017	<0.01	0.691	<0.005	0.06	0.08	0.013	0.08		
MB01_1	Jul-03	6.87	2040	1240	0.035	183	5	104	112	540	0	217	42.8	<0.2	<0.001	<0.005	0.005	<0.01	0.766	0.009	0.14	0.09	0.007	<0.05		
MB01_1	Oct-03	6.3	1947	1180	<0.005	177	4.5	103	113	594	0	216	40.1	<0.2	0.002	<0.005	0.006	<0.01	0.754	0.009	0.2	0.08	<0.005	<0.05		
MB01_1	Jan-04	6.6	2140	1420	0.044	168	4.3	104	111	607	0	218	40.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.741	0.009	0.14	0.07	<0.005	<0.05		
MB01_1	Apr-04	6.43	2080	1460	0.071	171	4.3	97.3	105	529	0	202	39.7	<0.2	0.001	<0.005	0.006	<0.01	0.742	<0.005	<0.06	0.07	<0.005	0.07		
MB01_1	Jul-04	6.84	2440	1360	<0.005	179	4.7	106.1	112.1	573	0	203	41.9	<0.2	<0.001	<0.005	0.008	<0.01	0.782	<0.005	0.1	0.08	0.01	<0.05		
MB01_1	Oct-04	6.36	2110	1320	0.063	171	4.3	113	112	583	0	210	42.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.767	0.01	<0.06	0.07	0.012	<0.05		
MB01_1	Jan-05	6.35	2330	1160	0.321	198	5.1	110	123	618	0	209	40.3	0.2	0.001	<0.005	0.007	<0.01	0.77	0.008	0.11	0.09	0.01	<0.05		
MB01_1	Apr-05	6.69	2310	1300	0.078	179	4.7	104	113	651	0	204	42.6	<0.2	<0.001	<0.005	0.007	<0.01	0.759	0.006	<0.06	0.07	<0.005	<0.05		
MB01_1	Jul-05	6.68	2300	1400	0.371	198	5	105	116	621	0	197	43	0.2	<0.001	<0.005	<0.005	<0.01	0.786	0.015	0.08	0.12	0.055	<0.05		
MB01_1	Oct-05	6.26	2390	1580	0.034	211	5.3	114	127	759	0	217	43.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.87	0.007	0.11	0.09	0.006	<0.05		
MB01_1	Jan-06	6.52	2340	1400	0.041	201	4.8	108	120	670	0	213	41.5	<0.2	<0.001	<0.005	0.011	<0.01	0.806	0.012	0.13	0.08	0.027	<0.05		
MB01_1	Apr-06	6.31	2270	1440	0.14	204	4.9	110	121	688	0	203	42.3	<0.2	<0.001	<0.005	0.007	<0.01	0.836	0.007	0.12	0.08	0.014	<0.05		
MB01_1	Jul-06	6.43	2270	1380	0.022	203	5.1	110	122	683	0	207	41.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.831	0.01	0.1	0.09	0.005	<0.05		
MB01_1	Oct-06	6.55	2290	1380	0.04	199	5	108	130	700	0	212	39	<0.2	<0.001	<0.005	<0.005	<0.01	0.79	0.01	0.08	0.08	0.01	<0.05		
MB01_1	Jan-07	6.5	2230	1480	0.03	189	4.7	107	125	687	0	209	40.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.8	0.01	<0.06	0.08	0.01	<0.05		
MB01_1	Apr-07	6.55	2340	1440	0.05	201	5.1	112	131	691	0	212	41.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.88	0.01	0.08	0.09	0.01	<0.05		
MB01_1	Jul-07	6.42	2230	1680	0.02	207	5.4	114	135	682	0	217	43.9	<0.2	<0.001	<0.005	0.01	<0.01	0.84	0.01	0.06	0.09	0.01	<0.05		
MB01_1	Oct-07	6.4	2420	1440	0.02	208	5.1	114	137	688	0	209	45.4	<0.2	0.002	<0.005	0.02	<0.01	0.86	0.01	<0.06	0.07	<0.005	<0.05		
MB01_1	Jan-08	6.33	2390	1500	0.04	221	5.5	121	142	721	0	199	46	<0.2	0.001	<0.005	0.01	<0.01	0.88	0.01	0.11	0.09	0.02	<0.05		
MB01_1	Apr-08	6.22	2370	1620	0.04	208	5.1	115	138	734	0	197	46.6	0.8	0.002	<0.005	0.01	<0.01	0.86	0.01	0.42	0.08	0.01	<0.05		
MB01_1	Jul-08	6.23	2110	1420	0.02	215	5.6	118	133	726	0	198	50.2	<0.2	0.001	<0.005	0.01	<0.01	0.9	0.01	0.13	0.08	0.01	<0.05		
MB01_1	Oct-08	6.43	2270	1540	<0.005	217	5.6	120	142	737	0	203	51.4	<0.2	0.003	<0.005	<0.005	<0.01	0.96	0.02	0.19	0.08	0.02	<0.05		
MB01_1	Jan-09	6.4	2600	1600	0.02	221	5.6	121	135	734	0	206	49.6	<0.2	0.002	<0.005	<0.005	<0.01	0.89	<0.005	0.13	0.08	0.01	<0.05		
MB01_1	Apr-09	6.43	2600	1760	<0.005	219	5.6	118	134	763	0	209	46.3	<0.2	<0.001	<0.005	0.03	<0.01	0.91	0.01	0.23	0.09	<0.005	<0.05		
MB01_1	Jul-09	6.45	2480	1500	0.02	218	5.6	117	131	704	0	208	46.1	<0.2	<0.001	<0.005	0.02	<0.01	0.93	0.01	0.14	0.08	<0.005	<0.05		
MB01_1	Oct-09	6.5	2320	1460	0.01	221	5.3	118	144	738	0	216	46.9	<0.2	<0.001	<0.005	0.01	<0.01	0.91	0.01	0.13	0.08	<0.005	<0.05		
MB01_1	Jan-10	6.29	2460	1520	0.01	225	5.9	121	154	788	0	213	48.1	<0.2	0.001	<0.005	0.01	<0.01	0.88	0.01	0.11	0.08	0.01	<0.05		
MB01_1	Apr-10	7.02	2430	1600	0.01	218	5.7	119	150	742	0	234	49.2	<0.2	0.001	<0.005	0.01	<0.01	0.91	0.01	0.14	0.08	<0.005	<0.05		
MB01_1	Jul-10	6.57	2500	1540	0.03	223	6	124	151	759	0	228	47.6	<0.2	0.001	<0.005	0.02	<0.01	0.95	0.01	<0.06	0.08	<0.005	<0.05		
MB01_1	Oct-10	6.35	2380	1580	0.07	215	5.2	114	144	740	0	218	45.3	<0.2	<0.001	<0.005	0.01	<0.01	0.88	0.01	<0.06	0.07	<0.005	<0.05		
MB01_1	Jan-11	6.42	2510	1540	<0.005	214	5.6	113	142	747	0	221	44.7	<0.2	0.001	<0.005	0.01	<0.01	0.86	0.01	0.09	0.09	0.01	<0.05		
MB01_1	Apr-11	6.72	2480	1460	0.11	215	5.5	114	140	737	0	223	48.4	<0.2	<0.001	<0.005	0.01	<0.01	0.87	0.01	0.22	0.09	0.02	<0.05		
MB01_1	Jul-11	6.56	2400	1600	0.06	227	4.8	115	145	733	0	224	41.9	<0.2	<0.001	<0.005	0.01	<0.01	0.86	0.01	<0.06	0.09	0.03	<0.05		
MB01_1	Oct-11	6.47	2570	1500	0.02	222	4.6	114	149	740	0	250	43.4	<0.2	<0.001	<0.005	0.01	<0.01	0.83	0.01	<0.06	0.09	0.04	0.05		
MB01_1	Jan-12	6.35	2400	1660	0.04	233	4.9	121	132	763	0	245	44.2	<0.2	<0.001	<0.005	0.01	<0.01	0.9	0.01	<0.06	0.09	0.03	<0.05		
MB01_1	Apr-12	6.54	2550	1540	0.08	219	4.9	114	125	763	0	210	42.9	<0.2	0.001	<0.005	0.01	<0.01	0.86	<0.005	<0.06	0.09	0.04	<0.05		
MB01_1	Jul-12	6.33	2530	1460	0.08	223	5.7	118	122	737	0	210	42.9	<0.2	<0.001	<0.005	0.01	<0.01	0.86	0.01	<0.06	0.09	0.02	<0.05		
MB01_1	Oct-12	6.68	2560	1560	0.13	224	5.1	121	121	744	0	219	42.5	<0.2	0.001	<0.005	0.01	<0.01	0.88	<0.005	<0.06	0.09	0.04	<0.05		
MB01_1	Jan-13	6.68	2540	1540	0.12	227	5	118	121	741	0	213	42.2	<0.2	0.001	<0.005	0.01	<0.01	0.89	0.01	<0.06	0.09	<0.005	<0.05		
MB01_1	Apr-13	6.47	2570	1540	0.26	220	5.1	119	118	738	0	212	44.5	<0.2	0.005	<0.005	0.01	<0.01	0.93	0.01	<0.06	0.09	<0.005	<0.05		
MB01_1	Jul-13	6.6	2570	1460	0.19	218	5.1	111	124	731	0	212	43.3	<0.2	0.001	<0.005	0.01	<0.01	0.9	0.01	<0.06	0.09	0.04	<0.05		
MB01_1	Oct-13	6.57	2540	1600	0.16	221	4.8	117	124	796	0	206	42.9	<0.2	0.001	<0.005	0.01	<0.01	0.95	0.02	<0.06	0.09	0.05	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_1	Jan-14	6.63	2490	1500	0.14	215	4.8	113	119	703	0	196	42.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.91	0.01	0.09	0.08	<0.005	<0.05		
MB01_1	Apr-14	6.61	2560	1560	0.173	222	4.8	111	116	766	0	197	42.3	<0.2	0.002	<0.005	<0.005	<0.01	0.923	<0.005	<0.06	0.1	<0.005	<0.05		
MB01_1	Jul-14	6.23	2470	1560	0.24	228	5	121	119	699	0	246	41	<0.2	0.003	<0.005	0.007	<0.01	0.918	0.008	<0.06	0.08	<0.005	<0.05		6.21
MB01_1	Oct-14	6.35	2570	1620	0.201	228	5.1	124	122	720	0	255	41.2	<0.2	0.002	<0.005	<0.005	<0.01	0.915	0.005	0.14	0.1	0.062	<0.05		5.89
MB01_1	Jan-15	6.69	2540	1600	0.173	223	5	123	120	728	0	216	39.3	<0.2	0.002	<0.005	0.005	<0.01	0.902	<0.005	<0.06	0.11	0.022	<0.05		6.12
MB01_1	Apr-15	6.54	2530	1420	0.209	232	5.2	123	121	735	0	217	37.3	<0.2	0.002	<0.005	0.006	<0.01	0.882	0.008	0.1	0.09	<0.005	<0.05		5.93
MB01_1	Jul-15	6.68	2540	1580	0.247	224	5	119	121	719	0	232	41.8	<0.2	0.002	<0.005	0.01	<0.01	0.896	0.007	<0.06	0.1	<0.005	<0.05		6.2
MB01_1	Oct-15	6.43	2525	1520	0.27	230	5.2	125	122	715	0	235	41	<0.2	0.001	<0.005	0.011	<0.01	0.925	0.006	<0.06	0.1	<0.005	<0.05		
MB01_1	Jan-16	6.44	2408	1500	0.319	225	5.1	120	120	730	0	229	40	<0.2	0.001	<0.005	0.005	<0.01	0.927	0.01	0.16	0.1	<0.005	<0.05		6.20
MB01_1	Apr-16	6.49	2544	1460	0.321	226	5.7	127	112	681	0	214	41.1	<0.2	0.002	<0.005	0.008	<0.01	0.927	0.009	<0.06	0.1	<0.005	<0.05		6.4
MB01_1	Jul-16	6.62	2600	1560	0.485	230	5.2	126	127	731	0	211	41.3	<0.2	0.002	<0.005	0.005	<0.01	0.945	0.009	0.09	0.1	<0.005	<0.05		6.28
MB01_1	Oct-16	6.36	2740	1600	0.136	234	4.9	127	130	730	0	213	42.1	<0.2	0.001	<0.005	0.008	<0.01	0.9	0.008	<0.06	0.1	<0.005	<0.05		6.16
MB01_1	Jan-17	6.22	2620	1560	0.406	234	5	127	130	772	0	141	47.4	<0.2	<0.001	<0.005	<0.005	0.01	0.906	0.028	0.08	0.1	0.048	<0.05		5.9
MB01_1	Apr-17	6.39	2575	1660	0.5	228	5	123	125	732	0	233	46.7	<0.2	0.002	<0.005	<0.005	<0.01	0.914	0.008	<0.06	0.1	<0.005	<0.05		7.08
MB01_1	Jul-17	6.39	2570	1660	0.792	234	5.7	128	123	797	0	229	49.2	<0.2	0.002	<0.005	<0.005	<0.01	0.872	0.012	0.23	0.1	0.079	<0.05		6.16
Mean		**6.49**	**2357.1**	**1455.8**	**0.134**	**207**	**5.1**	**112.8**	**123.8**	**682**	**0.0**	**216**	**43.0**	**0.0**	**0.001**	**0.000**	**0.007**	**0.00**	**0.831**	**0.008**	**0.08**	**0.09**	**0.014**	**0.003**		
Min		**6.22**	**1782**	**1020**	**0.000**	**158**	**4.3**	**89.4**	**95.3**	**468**	**0.0**	**141**	**37.1**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.011**	**0.000**	**0.00**	**0.07**	**0.000**	**0.000**		
Max		**7.02**	**2740**	**1760**	**0.792**	**234**	**6.0**	**128.0**	**154.0**	**797**	**0.0**	**255**	**51.4**	**0.8**	**0.005**	**0.000**	**0.030**	**0.010**	**0.960**	**0.028**	**0.42**	**0.12**	**0.079**	**0.080**		
MB01_11	Apr-01	6.41	8290	4820	0.273	1530	12.3	112.5	162.1	2780	0	253	95	<0.2	0.07	<0.005	0.02	<0.01	1.7	0.015	<0.06	0.07	0.016	<0.05		
MB01_11	Jul-01	6.29	8060	4860	1.4	1553	11	102.4	157.8	2620	0	224	92.5	<0.2	0.04	<0.005	0.026	<0.01	2.6	0.013	<0.06	0.05	0.038	<0.05		
MB01_11	Nov-01	6.36	8420	4900	3.1	1413	11.2	86.7	136.2	2760	0	176	88.8	<0.2	0.12	<0.005	0.041	<0.01	3.3	0.026	<0.06	0.05	0.016	<0.05		
MB01_11	Jan-02	6.42	8690	5200	3.6	1506	10.3	81.1	144.6	2740	0	153	85.9	<0.2	0.16	<0.005	0.04	<0.01	2.8	0.03	<0.06	0.04	0.01	<0.05		
MB01_11	Apr-02	6.25	8070	5020	3.5	1485	10.8	79	151.4	2640	0	141	84.8	<0.2	0.14	<0.005	0.044	<0.01	2.3	0.032	<0.06	0.05	0.029	<0.05		
MB01_11	Jul-02	6.04	8070	4700	2.8	1464	10.3	76.7	149.6	2780	0	134	81.9	<0.2	0.14	<0.005	0.034	<0.01	2	0.031	<0.06	0.05	0.018	<0.05		
MB01_11	Nov-02	7.5	8460	5020	6.4	1409	14	75.8	149	2880	0	136	81	<0.2	0.091	<0.005	0.039	0.01	1.9	0.032	0.07	0.05	0.069	<0.05		
MB01_11	Jan-03	6.13	8730	4900	5.5	1470	12	72.1	149	2780	0	140	84.9	0.3	0.066	<0.005	0.029	<0.01	0.024	<0.005	<0.06	0.05	<0.005	<0.05		
MB01_11	Apr-03	6.3	8350	4860	3.1	1490	11.7	76.4	155	2600	0	143	86.4	<0.2	0.065	<0.005	0.035	<0.01	1.3	0.017	0.1	0.06	0.08	0.06		
MB01_11	Jul-03	6.37	8030	4880	0.93	1580	12.7	91.2	174	2760	0	145	79.9	<0.2	0.066	<0.005	0.032	<0.01	1.2	0.026	<0.06	0.06	0.013	<0.05		
MB01_11	Oct-03	6.13	7220	5060	1.3	1490	12	94.9	173	3100	0	142	74.2	<0.2	0.132	<0.005	0.044	<0.01	1.4	0.031	0.08	0.05	0.018	<0.05		
MB01_11	Jan-04	6.61	8290	5500	1.8	1400	11.6	95	169	2560	0	144	75.2	<0.2	0.187	<0.005	0.039	<0.01	1.4	0.037	<0.06	0.04	<0.005	<0.05		
MB01_11	Apr-04	6.19	7680	5020	0.496	1410	8.2	73.9	143	2860	0	131	76	<0.2	0.048	<0.005	0.024	<0.01	1	0.024	<0.06	0.04	<0.005	<0.05		
MB01_11	Jul-04	6.22	6920	5240	0.622	1470	11.5	88.3	162.1	2640	0	136	75	<0.2	0.112	<0.005	0.038	<0.01	1.1	0.03	<0.06	0.06	0.012	<0.05		
MB01_11	Oct-04	6.06	7610	5080	0.783	1390	10.6	96.3	158	3300	0	136	82	<0.2	0.079	<0.005	0.032	<0.01	1.1	0.032	0.13	0.05	0.039	<0.05		
MB01_11	Jan-05	6.5	9020	5320	1	1530	12.1	84.2	164	3060	0	137	68.5	<0.2	0.038	<0.005	0.023	<0.01	0.956	0.023	0.07	0.05	0.011	<0.05		
MB01_11	Apr-05	6.33	9160	5260	1.1	1420	12.2	94.3	170	2980	0	139	72	<0.2	0.068	<0.005	0.033	<0.01	1.2	0.022	<0.06	0.05	<0.005	<0.05		
MB01_11	Jul-05	6.21	8730	5200	0.057	1520	12.4	90.7	166	2800	0	131	73.2	0.2	0.021	<0.005	<0.005	<0.01	0.014	0.007	<0.06	0.05	0.035	<0.05		
MB01_11	Oct-05	5.92	9380	5680	0.402	1650	14	106	189	3440	0	147	80.8	<0.2	0.048	<0.005	0.037	0.01	1.3	0.032	0.17	0.07	0.064	<0.05		
MB01_11	Jan-06	6.26	8780	5400	0.837	1630	14.9	113	190	3680	0	151	82	<0.2	0.105	<0.005	0.056	0.04	1.7	0.041	0.12	0.09	0.066	<0.05		
MB01_11	Apr-06	6.04	8540	5400	1.2	1640	16.5	115	192	3100	0	148	79.6	<0.2	0.087	<0.005	0.042	0.04	1.6	0.041	0.21	0.12	0.19	<0.05		
MB01_11	Jul-06	6.07	8860	4960	0.482	1600	13.5	105	182	3120	0	147	79.1	<0.2	0.048	<0.005	0.039	0.02	1.3	0.037	0.1	0.07	0.133	<0.05		
MB01_11	Oct-06	6.73	8400	5560	0.23	1600	13	112	201	2880	0	153	72.6	<0.2	0.037	<0.005	0.04	<0.01	1.3	0.02	0.08	0.07	0.05	<0.05		
MB01_11	Jan-07	6.21	8080	5340	0.36	1460	12.6	101	183	2980	0	153	67.9	<0.2	0.038	<0.005	0.04	0.08	1.3	0.03	0.08	0.06	0.05	<0.05		
MB01_11	Apr-07	6.24	8640	5340	2.2	1600	13.4	105	200	3140	0	151	70.8	<0.2	0.018	<0.005	0.04	<0.01	1.3	0.03	0.06	0.06	0.02	<0.05		
MB01_11	Jul-07	5.99	8440	5520	0.76	1600	13.7	107	205	3180	0	155	74.9	<0.2	0.056	<0.005	0.04	<0.01	1.3	0.03	0.12	0.06	0.02	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_11	Oct-07	6.31	8060	5640	0.75	1590	14.1	107	210	3140	0	147	74.6	<0.2	0.061	<0.005	0.05	<0.01	1.4	0.04	<0.06	0.05	<0.005	<0.05		
MB01_11	Jan-08	6.64	8290	5320	0.88	1590	13.4	106	206	3120	0	152	74	<0.2	0.028	<0.005	0.04	<0.01	1.3	0.03	0.06	0.06	0.03	<0.05		
MB01_11	Apr-08	6.02	8290	5480	0.4	1580	15.9	116	216	3500	0	148	76.1	<0.2	0.084	<0.005	0.05	0.02	1.4	0.03	0.35	0.07	0.12	<0.05		
MB01_11	Jul-08	6.16	8080	5340	0.02	1530	17.5	104	190	3180	0	148	73.1	<0.2	0.184	<0.005	0.03	0.02	1.2	0.06	<0.06	0.09	0.82	<0.05		
MB01_11	Oct-08	6.46	8050	5620	0.53	1520	14.2	107	202	3120	0	157	76.8	<0.2	0.037	<0.005	0.05	<0.01	1.3	0.04	0.12	0.06	0.02	<0.05		
MB01_11	Jan-09	6.36	9500	5320	1.3	1630	16	114	204	3320	0	161	80.4	<0.2	0.042	<0.005	0.05	<0.01	1.4	0.03	0.11	0.06	0.04	<0.05		
MB01_11	Apr-09	6.29	10790	5520	0.94	1550	14.5	107	195	3100	0	158	75.9	<0.2	0.036	<0.005	0.05	<0.01	1.4	0.03	0.09	0.13	0.01	<0.05		
MB01_11	Jul-09	6.53	9220	5420	0.82	1570	14.5	108	197	3140	0	158	75.3	<0.2	0.031	<0.005	0.04	<0.01	1.4	0.03	<0.06	0.05	0.01	<0.05		
MB01_11	Oct-09	6.55	8300	5400	1.3	1630	15.7	113	222	3120	0	164	79	<0.2	0.035	<0.005	0.04	<0.01	1.3	0.04	0.14	0.06	<0.005	<0.05		
MB01_11	Jan-10	6.58	9800	5980	0.23	1640	16.1	113	232	3380	0	163	79.6	<0.2	0.032	<0.005	0.04	<0.01	1.2	0.04	<0.06	0.06	0.01	<0.05		
MB01_11	Apr-10	7.09	8630	5360	1.2	1620	16.7	116	237	3300	0	180	82.9	<0.2	0.036	<0.005	0.04	<0.01	1.4	0.03	0.14	0.06	<0.005	<0.05		
MB01_11	Jul-10	6.31	9140	5900	0.91	1670	16	117	235	3220	0	169	82.7	<0.2	0.028	<0.005	0.05	<0.01	1.3	0.03	<0.06	0.06	<0.005	<0.05		
MB01_11	Oct-10	6.33	8520	5740	0.12	1600	16.1	112	231	3320	0	163	83	<0.2	0.026	<0.005	0.04	<0.01	1.2	0.03	0.11	0.06	<0.005	<0.05		
MB01_11	Jan-11	6.33	8980	5940	0.25	1580	16	111	225	3380	0	164	78	<0.2	0.032	<0.005	0.04	<0.01	1.2	0.03	<0.06	0.06	0.01	<0.05		
MB01_11	Jul-11	6.21	8630	6000	0.86	1750	12.9	124	244	3480	0	161	86.6	<0.2	0.041	<0.005	0.06	<0.01	1.5	0.03	<0.06	0.06	0.04	<0.05		
MB01_11	Oct-11	6.25	9550	6060	0.59	1670	15	125	251	3640	0	185	87.7	<0.2	0.032	<0.005	0.06	<0.01	1.5	0.03	<0.06	0.09	0.04	<0.05		
MB01_11	Jan-12	6.01	9480	6300	0.6	1760	15.1	135	234	3820	0	188	88.5	<0.2	0.043	<0.005	0.06	<0.01	1.5	0.03	<0.06	0.07	0.04	<0.05		
MB01_11	Apr-12	6.39	11660	5980	0.08	1630	14	120	210	3460	0	149	86.1	<0.2	0.011	<0.005	0.05	<0.01	1.3	0.03	<0.06	0.07	0.08	<0.05		
MB01_11	Oct-12	6.32	10600	6600	0.21	1790	16.1	139	215	3820	0	153	99.3	<0.2	0.024	<0.005	0.05	<0.01	1.4	0.03	<0.06	0.23	0.06	<0.05		
MB01_11	Jan-13	6.43	10550	6500	0.26	1710	14.1	127	206	3600	0	153	91.2	<0.2	0.007	<0.005	0.05	<0.01	1.2	0.03	<0.06	0.06	0.01	<0.05		
MB01_11	Apr-13	6.14	10980	7120	0.68	1890	17.1	156	238	4040	0	149	109	<0.2	0.041	<0.005	0.07	<0.01	1.7	0.05	<0.06	0.08	<0.005	<0.05		
MB01_11	Jul-13	6.28	10910	6180	0.18	1740	15	135	207	3680	0	149	97.6	<0.2	0.016	<0.005	0.05	0.01	1.3	0.03	<0.06	0.06	0.06	<0.05		
MB01_11	Oct-13	6.57	11200	6940	0.42	1900	14.5	144	218	4000	0	145	107	<0.2	0.026	<0.005	0.05	0.01	1.4	0.04	<0.06	0.06	0.08	<0.05		
MB01_11	Jan-14	6.31	10770	6560	0.22	1750	13.7	138	210	3720	0	138	104	<0.2	0.019	<0.005	0.05	<0.01	1.3	0.03	<0.06	0.06	0.02	<0.05		
MB01_11	Apr-14	6.49	11480	6840	0.315	1880	16.1	158	240	4100	0	135	117	<0.2	0.02	<0.005	0.056	<0.01	1.6	0.039	<0.06	0.07	0.006	<0.05		
MB01_11	Jul-14	5.95	11150	6840	0.232	1850	16.3	153	232	3900	0	167	108	<0.2	0.029	<0.005	0.045	<0.01	1.4	0.039	<0.06	0.06	0.22	<0.05		5.77
MB01_11	Oct-14	5.39	11390	6880	0.237	1880	17	163	249	4140	0	166	117	<0.2	0.04	<0.005	0.045	<0.01	1.5	0.036	<0.06	0.07	0.143	<0.05		5.81
MB01_11	Jan-15	6.3	11330	6520	0.309	1820	17.5	157	240	3540	0	145	109	<0.2	0.025	<0.005	0.046	<0.01	1.5	0.021	0.1	0.07	0.224	<0.05		6.01
MB01_11	Apr-15	6.24	10740	6160	0.086	1790	16.2	141	215	3840	0	149	94.2	<0.2	0.014	<0.005	0.024	<0.01	1.1	0.028	0.23	0.07	0.03	<0.05		
MB01_11	Jul-15	6.41	11160	6720	0.115	1880	15.3	149	222	3880	0	155	113	<0.2	0.025	<0.005	0.042	<0.01	1.2	0.027	<0.06	0.07	0.017	<0.05		5.88
MB01_11	Oct-15	6.18	10550	6580	0.169	1810	21.8	151	228	3820	0	151	110	<0.2	0.02	<0.005	0.044	<0.01	1.3	0.032	0.22	0.07	0.046	<0.05		5.98
MB01_11	Jan-16	6.21	11390	6800	0.269	1900	17.3	158	254	3720	0	153	120	<0.2	0.022	<0.005	0.05	<0.01	1.5	0.039	0.23	0.08	<0.005	<0.05		6.04
MB01_11	Apr-16	6.16	11320	6700	0.184	1830	16.6	152	233	3740	0	139	114	<0.2	0.012	<0.005	0.039	<0.01	1.3	0.027	<0.06	0.07	<0.005	<0.05		6.04
MB01_11	Jul-16	6.27	13390	6780	0.175	2130	15.4	153	239	3920	0	135	122	<0.2	0.015	<0.005	0.034	<0.01	1.3	0.032	0.34	0.07	<0.005	<0.05		6.04
MB01_11	Oct-16	5.98	13390	6800	0.198	1890	16	153	237	3780	0	141	119	<0.2	0.015	<0.005	0.033	<0.01	1.2	0.033	0.22	0.07	0.006	<0.05		5.96
MB01_11	Jan-17	6.18	14240	7500	0.281	2070	18.7	145	235	4120	0	147	123	<0.2	0.013	<0.005	0.009	<0.01	1.2	0.05	<0.06	0.07	0.092	<0.05		5.65
MB01_11	Apr-17	6.1	13550	7120	0.353	1840	15.8	153	239	3940	0	150	126	<0.2	0.021	<0.005	<0.005	<0.01	1.3	0.034	<0.06	0.07	0.007	<0.05		6.53
MB01_11	Jul-17	6.08	10770	6900	0.378	1800	14.9	148	233	3900	0	153	123	<0.2	0.017	<0.005	<0.005	0.01	1.3	0.034	<0.06	0.07	0.034	<0.05		5.77
Mean		**6.29**	**9543**	**5803.1**	**0.958**	**1650**	**14.3**	**116.6**	**201.7**	**3330**	**0.0**	**154**	**89.5**	**0.0**	**0.052**	**0.000**	**0.040**	**0.00**	**1.400**	**0.031**	**0.06**	**0.07**	**0.052**	**0.001**		
Min		**5.39**	**6920**	**4700**	**0.020**	**1390**	**8.2**	**72.1**	**136.2**	**2560**	**0.0**	**131**	**67.9**	**0.0**	**0.007**	**0.000**	**0.000**	**0.00**	**0.014**	**0.000**	**0.00**	**0.04**	**0.000**	**0.000**		
Max		**7.50**	**14240**	**7500**	**6.400**	**2130**	**21.8**	**163.0**	**254.0**	**4140**	**0.0**	**253**	**126**	**0.3**	**0.187**	**0.000**	**0.070**	**0.080**	**3.300**	**0.060**	**0.35**	**0.23**	**0.820**	**0.060**		
MB01_13	Apr-01	6.57	1455	849	1.9	165	3.9	69.8	53.1	346	0	198	54.3	<0.2	0.03	<0.005	<0.005	<0.01	0.847	0.007	<0.06	0.02	0.017	<0.05		
MB01_13	Jul-01	6.63	1380	809	5.2	164	3.6	70.4	53.9	353	0	220	70.6	0.2	<0.02	<0.005	0.006	<0.01	1	<0.005	0.07	0.02	<0.005	<0.05		
MB01_13	Nov-01	6.64	1373	751	11	153	3.2	57.4	40.5	333	0	169	56.9	<0.2	0.03	<0.005	0.017	<0.01	1.5	0.012	<0.06	0.01	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_13	Jan-02	7.04	1428	896	11.2	163	3.5	61.3	46.7	341	0	183	54.4	<0.2	0.03	<0.005	0.014	<0.01	1.4	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_13	Apr-02	6.87	1346	900	0.578	162	3.3	60.5	49.7	327	0	184	54	<0.2	<0.02	<0.005	0.005	<0.01	0.806	0.009	<0.06	0.01	<0.005	<0.05		
MB01_13	Jul-02	6.79	1412	831	12	155	3.8	63.4	52.6	356	0	203	51.2	<0.2	<0.02	<0.005	0.015	<0.01	1.2	<0.005	<0.06	0.02	0.02	<0.05		
MB01_13	Nov-02	6.74	1337	840	7.8	157	4.9	52	42.9	329	0	166	56	<0.2	<0.001	<0.005	0.017	0.02	0.629	0.011	0.09	0.03	0.095	<0.05		
MB01_13	Jan-03	6.5	1433	797	7	162	4	57.9	45.7	328	0	176	59.1	0.3	<0.001	<0.005	0.013	<0.01	0.011	<0.005	0.07	0.02	<0.005	<0.05		
MB01_13	Jul-03	6.8	1418	712	8.2	176	4	65.4	53.9	368	0	185	59.7	<0.2	0.005	<0.005	0.01	0.01	0.624	0.012	0.11	0.03	0.109	<0.05		
MB01_13	Oct-03	6.37	1275	741	7.9	160	2.8	49.8	44.6	339	0	157	50.8	<0.2	0.005	<0.005	0.013	<0.01	0.52	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_13	Jan-04	7.14	1314	761	3.9	148	3.6	54.7	45	382	0	154	50.5	<0.2	0.003	<0.005	0.011	<0.01	0.395	0.013	0.08	0.02	0.038	<0.05		
MB01_13	Jul-04	7.22	1508	846	10.3	156	3.2	55.2	47.3	315	0	150	51.2	<0.2	<0.001	<0.005	0.02	<0.01	0.49	0.012	0.41	0.02	0.013	<0.05		
MB01_13	Oct-04	6.69	1354	766	5.3	151	3.1	58.7	46.4	321	0	150	52.5	<0.2	<0.001	<0.005	0.012	<0.01	0.422	0.009	0.07	0.02	0.011	<0.05		
MB01_13	Jan-05	6.98	1370	769	4.4	167	3	51.8	47.5	317	0	141	48.4	<0.2	0.001	<0.005	0.023	<0.01	0.392	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_13	Apr-05	6.65	1371	743	5.4	151	3.2	50.6	45.3	323	0	139	49.6	<0.2	<0.001	<0.005	0.018	<0.01	0.417	0.012	<0.06	0.01	<0.005	<0.05		
MB01_13	Jul-05	6.74	1298	833	3.9	169	3.5	51.2	46.7	313	0	131	51.9	0.7	<0.001	<0.005	0.021	<0.01	0.424	0.011	<0.06	0.02	0.051	<0.05		
MB01_13	Oct-05	6.46	1382	863	4.1	188	4.6	48.1	43.6	361	0	171	55.5	<0.2	0.002	0.008	0.008	0.01	0.333	0.006	0.22	0.03	0.2	<0.05		
MB01_13	Jan-06	6.69	1290	709	3.5	182	3.5	44.7	41.6	334	0	151	56.3	<0.2	0.004	<0.005	0.009	0.02	0.291	0.011	0.06	0.03	0.019	<0.05		
MB01_13	Apr-06	6.55	1287	744	2.7	182	4.3	45.8	42.6	335	0	150	54.3	<0.2	0.003	<0.005	0.007	0.02	0.313	0.006	0.09	0.03	0.12	<0.05		
MB01_13	Jul-06	6.66	1357	828	3.2	184	3.6	47.8	42.6	341	0	149	54.5	<0.2	<0.001	<0.005	0.015	0.02	0.317	0.011	<0.06	0.03	0.047	<0.05		
MB01_13	Oct-06	7.12	1336	829	5.3	165	3.5	57.9	55.3	352	0	174	48.3	<0.2	0.002	<0.005	0.01	<0.01	0.39	0.01	0.28	0.02	0.01	<0.05		
MB01_13	Jan-07	6.74	1343	770	2.9	152	4	53.4	49.4	336	0	189	45.6	<0.2	0.003	<0.005	0.01	0.03	0.3	0.01	0.11	0.03	0.06	<0.05		
MB01_13	Apr-07	6.94	1397	745	7.3	159	3.9	63.1	58.2	349	0	201	43.3	<0.2	0.002	<0.005	<0.005	<0.01	0.38	0.01	0.28	0.03	0.01	<0.05		
MB01_13	Jul-07	6.69	1346	841	4.7	160	3.9	65.4	60.6	343	0	208	44.7	<0.2	0.006	<0.005	0.01	<0.01	0.31	0.01	<0.06	0.03	0.01	<0.05		
MB01_13	Oct-07	6.92	1400	790	2.7	159	4.4	66.3	59.9	342	0	198	45.9	<0.2	0.007	<0.005	0.01	0.01	0.31	0.01	0.07	0.03	0.07	<0.05		
MB01_13	Apr-08	6.79	1381	792	3.2	157	6.8	68.3	60.3	446	0	195	42.1	<0.2	0.007	<0.005	0.01	0.04	0.27	0.01	0.31	0.05	0.18	<0.05		
MB01_13	Jul-08	7.04	1380	806	2.4	170	5.7	69	62.4	353	0	205	40.9	<0.2	0.017	<0.005	0.01	0.01	0.56	0.02	0.13	0.05	0.24	<0.05		
MB01_13	Oct-08	7.39	1285	859	0.57	150	5.3	56.5	54.6	342	0	194	38.2	<0.2	0.009	<0.005	0.01	0.01	0.31	<0.005	0.17	0.05	0.04	<0.05		
MB01_13	Jan-09	7.05	1445	911	16.3	159	4.8	78.1	67.2	410	0	185	40.4	<0.2	0.009	<0.005	0.03	<0.01	0.46	0.04	1.1	0.03	0.02	<0.05		
MB01_13	Apr-09	7.28	1460	953	3.1	155	4.3	65.9	58.7	359	0	182	33.8	<0.2	0.003	<0.005	0.01	<0.01	0.3	0.01	0.11	0.04	0.01	<0.05		
MB01_13	Jul-09	7.23	1435	834	3.7	147	4.3	63	55.6	352	0	173	34.8	<0.2	0.005	<0.005	0.01	<0.01	0.29	<0.005	0.08	0.03	<0.005	<0.05		
MB01_13	Oct-09	7.42	1490	922	3.7	157	4.4	65.1	63	374	0	177	34.7	<0.2	0.003	<0.005	0.01	<0.01	0.29	<0.005	0.08	0.03	<0.005	<0.05		
MB01_13	Jan-10	6.88	1416	925	4	156	4.4	64.4	65	387	0	170	34.8	<0.2	0.004	<0.005	0.01	<0.01	0.28	0.01	<0.06	0.03	<0.005	<0.05		
MB01_13	Apr-10	7.67	1356	918	4	148	4.3	64.3	63.7	361	0	185	34.5	<0.2	0.005	<0.005	0.01	<0.01	0.27	0.01	0.11	0.03	<0.005	<0.05		
MB01_13	Jul-10	7.18	1433	865	3.8	151	4.5	66.3	63.8	373	0	175	31.9	<0.2	0.006	<0.005	0.01	<0.01	0.24	0.01	<0.06	0.04	<0.005	<0.05		
MB01_13	Oct-10	6.96	1369	864	3.7	141	4.4	61.7	61.4	382	0	171	31.9	<0.2	0.005	<0.005	0.01	<0.01	0.25	0.01	0.11	0.03	<0.005	<0.05		
MB01_13	Jan-11	7.22	1446	899	3.2	144	4.2	62	61.5	377	0	167	30	<0.2	0.005	<0.005	<0.005	<0.01	0.22	0.01	<0.06	0.04	<0.005	<0.05		
MB01_13	Jul-11	7.1	1355	868	3.5	156	3.6	64.9	65.5	394	0	161	30.3	<0.2	0.004	<0.005	0.01	<0.01	0.21	0.01	<0.06	0.04	0.05	<0.05		
MB01_13	Oct-11	7.23	1476	802	3	147	3.7	62.8	64.5	376	0	176	29.1	<0.2	0.004	<0.005	0.01	<0.01	0.18	0.01	<0.06	0.05	0.02	<0.05		
MB01_13	Jan-12	7	1406	840	2.4	153	3.9	65.1	55.6	380	0	189	30.4	<0.2	0.003	<0.005	<0.005	<0.01	0.19	0.01	<0.06	0.04	0.02	<0.05		
MB01_13	Apr-12	6.99	1460	820	2.6	146	4.1	65.3	53.8	383	0	151	29.7	<0.2	0.006	<0.005	0.01	<0.01	0.19	<0.005	<0.06	0.04	0.03	<0.05		
MB01_13	Jul-12	6.91	1437	855	2.7	149	4.6	68.5	53	381	0	145	29.9	<0.2	0.004	<0.005	<0.005	<0.01	0.2	0.01	0.11	0.04	0.02	<0.05		
MB01_13	Oct-12	7.21	1449	861	3.2	151	3.8	67	54.4	394	0	149	31.2	<0.2	0.004	<0.005	<0.005	<0.01	0.2	<0.005	<0.06	0.03	0.02	<0.05		
MB01_13	Jan-13	7.3	1472	896	3.3	152	3.8	65.8	53.8	386	0	146	30.5	<0.2	0.002	<0.005	0.01	<0.01	0.2	0.01	<0.06	0.04	<0.005	<0.05		
MB01_13	Apr-13	7.15	1457	892	3.1	146	4	67.9	52.3	384	0	146	30.5	<0.2	0.009	<0.005	0.02	<0.01	0.21	0.01	<0.06	0.03	<0.005	<0.05		
MB01_13	Jul-13	7.16	1480	819	3.4	145	3.7	61.2	56	381	0	146	29.4	<0.2	0.003	<0.005	0.01	<0.01	0.19	<0.005	<0.06	0.03	0.03	<0.05		
MB01_13	Oct-13	7.18	1440	858	2.8	146	3.8	65.1	53.3	383	0	140	30.3	<0.2	0.006	<0.005	0.01	<0.01	0.18	0.01	<0.06	0.03	0.04	<0.05		
MB01_13	Jan-14	7.11	1479	867	2.7	145	3.8	66	51.6	371	0	134	30.1	<0.2	0.001	<0.005	<0.005	<0.01	0.18	<0.005	<0.06	0.03	0.01	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_13	Apr-14	7.08	1479	827	2.9	148	4	63.9	50.9	403	0	146	31	<0.2	0.009	<0.005	<0.005	<0.01	0.195	<0.005	0.2	0.04	<0.005	<0.05		
MB01_13	Jul-14	6.74	1434	821	3.3	154	3.6	66	53	364	0	184	29.6	<0.2	0.006	<0.005	<0.005	<0.01	0.188	0.006	<0.06	0.02	0.02	<0.05		6.91
MB01_13	Oct-14	6.9	1503	916	2.8	155	3.8	68.7	54.7	375	0	191	29.4	<0.2	0.006	<0.005	<0.005	<0.01	0.166	<0.005	0.09	0.04	0.041	<0.05		6.13
MB01_13	Jan-15	7.18	1462	877	2.7	153	3.8	67.9	54.7	380	0	141	28.4	<0.2	0.005	<0.005	<0.005	<0.01	0.181	0.005	<0.06	0.04	0.038	<0.05		6.93
MB01_13	Apr-15	7.11	1479	787	3.1	155	3.8	70	54.6	384	0	145	26.1	<0.2	0.005	<0.005	<0.005	<0.01	0.152	0.006	<0.06	0.04	<0.005	<0.05		6.46
MB01_13	Jul-15	7.15	1490	895	2.9	152	3.8	66.3	53.8	378	0	152	29.6	<0.2	0.007	<0.005	0.01	<0.01	0.169	<0.005	0.07	0.04	<0.005	<0.05		7.52
MB01_13	Oct-15	7.05	1511	929	2.9	157	3.8	70.8	55.8	393	0	152	30	<0.2	0.006	<0.005	<0.005	<0.01	0.169	<0.005	<0.06	0.04	<0.005	<0.05		6.29
MB01_13	Jan-16	7.08	1471	854	2.5	163	3.9	70	56	392	0	155	29	<0.2	0.006	<0.005	0.006	<0.01	0.158	<0.005	<0.06	0.04	<0.005	<0.05		6.84
MB01_13	Apr-16	7.28	1711	857	2.5	147	4	69.5	50.7	366	0	136	28.7	<0.2	0.007	<0.005	<0.005	<0.01	0.133	<0.005	<0.06	0.05	<0.005	<0.05		7.06
MB01_13	Jul-16	7.22	1514	842	2.7	155	3.9	69.7	56.1	384	0	134	29	<0.2	0.006	<0.005	<0.005	<0.01	0.147	<0.005	0.1	0.04	<0.005	<0.05		6.67
MB01_13	Oct-16	7.27	2044	869	2	155	4.3	66.9	53.8	399	0	136	27.4	<0.2	0.006	<0.005	0.007	<0.01	0.109	<0.005	0.1	0.06	<0.005	<0.05		7.77
MB01_13	Apr-17	7.06	1479	888	3.1	150	4	65.7	53.9	382	0	153	31	<0.2	0.008	<0.005	<0.005	<0.01	0.148	0.006	0.37	0.04	<0.005	<0.05		6.88
Mean		**6.98**	**1426.6**	**837.52**	**4.336**	**157**	**4.0**	**62.4**	**53.6**	**364**	**0.0**	**166**	**40.5**	**0.0**	**0.006**	**0.000**	**0.009**	**0.00**	**0.363**	**0.007**	**0.09**	**0.03**	**0.029**	**0.000**		
Min		**6.37**	**1275**	**709**	**0.570**	**141**	**2.8**	**44.7**	**40.5**	**313**	**0.0**	**131**	**26.1**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.011**	**0.000**	**0.00**	**0.01**	**0.000**	**0.000**		
Max		**7.67**	**2044**	**953**	**16.300**	**188**	**6.8**	**78.1**	**67.2**	**446**	**0.0**	**220**	**70.6**	**0.7**	**0.030**	**0.008**	**0.030**	**0.040**	**1.500**	**0.040**	**1.10**	**0.06**	**0.240**	**0.000**		
MB01_9	Apr-01	6.78	529	333	0.78	51	2.7	26.8	22.1	97	0	112	5.3	<0.2	<0.02	<0.005	0.005	<0.01	0.51	<0.005	0.08	0.02	<0.005	<0.05		
MB01_9	Jul-01	6.84	502	335	0.812	51	2.5	26.3	21.7	115	0	113	6	<0.2	<0.02	<0.005	<0.005	<0.01	0.507	<0.005	0.1	0.02	<0.005	<0.05		
MB01_9	Nov-01	6.87	512	308	1	55	2.4	25.8	20.3	98	0	111	5.6	<0.2	<0.02	<0.005	<0.005	<0.01	0.522	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jan-02	7.17	527	357	0.964	53	2.4	25.2	19.8	101	0	110	4.9	<0.2	0.02	<0.005	0.006	<0.01	0.525	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_9	Apr-02	6.95	489	355	0.797	54	2.4	25.2	20.7	99	0	109	4.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.529	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-02	6.8	496	344	0.775	51	2.3	24.2	20.3	104	0	104	5	<0.2	<0.02	<0.005	<0.005	<0.01	0.495	<0.005	0.07	0.02	0.008	<0.05		
MB01_9	Nov-02	7.13	510	349	0.604	53	2.4	25	21.1	113	0	107	5.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.502	0.006	<0.06	0.02	0.088	<0.05		
MB01_9	Jan-03	6.61	553	331	0.897	52	2.6	25	21	92	0	116	5	<0.2	<0.001	<0.005	<0.005	<0.01	0.008	<0.005	0.07	0.02	<0.005	<0.05		
MB01_9	Apr-03	6.81	556	330	0.981	56	2.7	26.8	23.5	98	0	115	5.8	<0.2	<0.001	<0.005	0.006	<0.01	0.496	<0.005	0.18	0.02	<0.005	<0.05		
MB01_9	Jul-03	6.82	567	334	0.668	56	2.5	27.3	22.7	109	0	109	5.1	<0.2	<0.001	<0.005	0.005	<0.01	0.529	<0.005	0.16	0.02	<0.005	0.06		
MB01_9	Oct-03	6.72	538	281	0.709	54	2.3	26.3	22	118	0	108	4.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.532	<0.005	0.1	0.02	<0.005	<0.05		
MB01_9	Jan-04	7.15	540	364	0.418	52	2.2	26.9	21.9	118	0	108	4.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.519	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_9	Apr-04	6.79	529	353	0.55	50	2	24.8	20.6	111	0	104	4	<0.2	0.001	<0.005	<0.005	<0.01	0.545	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-04	7.06	612	386	0.617	54	2.4	27.7	22.5	100	0	103	4.6	<0.2	<0.001	<0.005	0.005	<0.01	0.547	<0.005	0.07	0.02	<0.005	<0.05		
MB01_9	Oct-04	6.7	568	373	0.766	52	2.2	29.9	22	113	0	104	5.1	<0.2	0.003	<0.005	<0.005	<0.01	0.557	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jan-05	6.9	567	345	0.537	58	2.5	28.1	23.5	127	0	105	4.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.52	<0.005	0.06	0.02	<0.005	<0.05		
MB01_9	Apr-05	7.19	575	335	0.677	53	2.4	26.8	22.2	126	0	102	4.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.524	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-05	7.02	542	400	0.799	61	2.7	26.8	22.9	110	0	99	6	0.6	<0.001	<0.005	<0.005	<0.01	0.465	<0.005	<0.06	0.04	0.056	<0.05		
MB01_9	Oct-05	6.55	600	413	0.824	57	2.6	26.9	23	120	0	110	4.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.549	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jan-06	7.04	558	302	0.802	56	2.4	26.3	22.3	121	0	110	4	<0.2	0.001	<0.005	<0.005	<0.01	0.544	<0.005	0.08	0.02	0.008	<0.05		
MB01_9	Apr-06	6.7	546	334	0.71	58	2.5	27.3	23.1	117	0	105	4.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.566	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-06	6.79	550	358	0.708	57	2.4	26.8	22.8	121	0	106	4	<0.2	<0.001	<0.005	<0.005	<0.01	0.565	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Oct-06	7	559	356	0.83	58	2.5	27.9	25	139	0	109	4	<0.2	<0.001	<0.005	<0.005	<0.01	0.55	<0.005	0.12	0.02	<0.005	<0.05		
MB01_9	Jan-07	6.75	560	348	0.61	51	2.2	25.5	22.5	114	0	106	3.8	<0.2	0.001	<0.005	<0.005	<0.01	0.51	<0.005	0.07	0.02	<0.005	<0.05		
MB01_9	Apr-07	6.95	576	343	0.69	55	2.4	27.4	24.2	128	0	106	3.9	<0.2	0.002	<0.005	<0.005	<0.01	0.56	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-07	6.59	551	407	0.65	59	2.5	29	25.8	121	0	107	4.6	<0.2	0.01	<0.005	0.01	<0.01	0.56	<0.005	0.11	0.02	<0.005	<0.05		
MB01_9	Oct-07	6.7	484	353	0.72	55	2.4	27.6	25.4	119	0	105	4.9	<0.2	0.001	<0.005	0.02	<0.01	0.55	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Jan-08	6.81	593	317	0.71	58	2.4	29	25.7	132	0	97	4.7	<0.2	0.002	<0.005	<0.005	<0.01	0.56	<0.005	0.1	0.02	0.01	<0.05		
MB01_9	Apr-08	6.63	550	376	0.73	56	2.4	27.8	24.9	124	0	129	4.5	<0.2	0.001	<0.005	<0.005	<0.01	0.55	<0.005	0.42	0.02	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB01_9	Jul-08	6.64	551	317	0.71	58	2.8	28.8	24.8	122	0	102	4.5	<0.2	0.001	<0.005	<0.005	<0.01	0.57	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Oct-08	6.81	598	340	0.7	54	2.7	27.5	24.4	128	0	106	4.8	<0.2	0.002	<0.005	<0.005	<0.01	0.57	<0.005	0.09	0.02	<0.005	<0.05		
MB01_9	Jan-09	6.68	585	327	0.65	57	2.6	25.8	23.8	132	0	106	4.1	<0.2	0.001	<0.005	<0.005	<0.01	0.54	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Apr-09	6.75	585	347	0.65	55	2.5	27.7	23.7	129	0	107	4.3	<0.2	0.001	<0.005	<0.005	<0.01	0.57	<0.005	0.11	0.02	<0.005	<0.05		
MB01_9	Jul-09	7.01	596	400	0.73	56	2.7	27.4	23.3	129	0	111	4	<0.2	<0.001	<0.005	<0.005	<0.01	0.58	<0.005	0.08	0.02	<0.005	<0.05		
MB01_9	Oct-09	6.94	587	369	0.73	58	2.7	28.6	26.3	139	0	111	4.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.57	<0.005	0.15	0.02	<0.005	<0.05		
MB01_9	Jan-10	6.72	601	381	0.68	58	2.8	28.3	27.9	141	0	109	4.4	<0.2	0.001	<0.005	<0.005	<0.01	0.56	<0.005	0.13	0.02	<0.005	<0.05		
MB01_9	Apr-10	7.12	559	380	0.65	56	2.6	27.6	26.6	131	0	118	4.3	<0.2	0.001	<0.005	<0.005	<0.01	0.57	<0.005	0.07	0.02	<0.005	<0.05		
MB01_9	Jul-10	6.83	596	385	0.72	57	2.6	28.6	26.6	145	0	114	4.4	<0.2	0.004	<0.005	0.01	<0.01	0.6	<0.005	<0.06	0.01	<0.005	<0.05		
MB01_9	Oct-10	6.77	561	385	0.63	54	2.8	27.7	26.6	141	0	111	4.5	<0.2	0.003	<0.005	<0.005	<0.01	0.57	<0.005	0.14	0.02	<0.005	<0.05		
MB01_9	Jan-11	7.02	573	395	0.61	56	2.6	27.4	26.5	141	0	109	4.4	<0.2	0.001	<0.005	<0.005	<0.01	0.56	<0.005	0.06	0.03	<0.005	<0.05		
MB01_9	Apr-11	6.98	600	378	0.64	55	2.3	28	26.5	136	0	110	4.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.58	<0.005	0.33	0.02	<0.005	<0.05		
MB01_9	Jul-11	6.8	588	403	0.71	60	2.2	28.7	28	149	0	106	3.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.59	<0.005	<0.06	0.02	0.01	<0.05		
MB01_9	Oct-11	6.78	613	370	0.76	58	2.3	27.9	28.3	134	0	124	4.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.58	<0.005	<0.06	0.02	0.01	<0.05		
MB01_9	Jan-12	6.64	608	413	0.77	59	2.3	29.7	24.6	142	0	128	3.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.61	<0.005	<0.06	0.02	0.01	<0.05		
MB01_9	Apr-12	6.76	605	379	0.74	57	2.4	28.4	24	144	0	101	3.8	<0.2	0.001	<0.005	0.01	<0.01	0.59	<0.005	<0.06	0.02	0.01	<0.05		
MB01_9	Jul-12	6.66	614	398	0.69	57	2.7	30.2	24.1	147	0	100	4.2	<0.2	0.001	<0.005	0.01	<0.01	0.59	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Oct-12	6.94	617	407	0.73	59	2.3	30.6	24.1	154	0	101	4.2	<0.2	0.001	<0.005	0.01	<0.01	0.61	<0.005	<0.06	<0.01	0.01	<0.05		
MB01_9	Jan-13	7.05	623	387	0.78	59	2.3	29.8	24.1	151	0	101	4.1	<0.2	0.001	<0.005	<0.005	<0.01	0.61	<0.005	<0.06	0.02	<0.005	<0.05		
MB01_9	Apr-13	7.05	628	398	0.84	57	2.3	30.4	23.6	150	0	101	4	<0.2	0.003	<0.005	<0.005	<0.01	0.64	0.01	<0.06	0.02	<0.005	<0.05		
MB01_9	Jul-13	6.89	638	400	0.83	57	2.3	28.1	25.7	151	0	109	3.9	<0.2	0.001	<0.005	<0.005	<0.01	0.63	<0.005	<0.06	0.02	0.02	<0.05		
MB01_9	Oct-13	6.88	624	416	0.81	58	2.3	29.1	24.5	155	0	109	3.9	<0.2	0.001	<0.005	<0.005	<0.01	0.64	<0.005	<0.06	0.01	0.02	<0.05		
MB01_9	Jan-14	6.92	621	367	0.8	56	2.3	28.4	24.2	143	0	111	4.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.64	0.01	0.24	0.01	<0.005	0.05		
MB01_9	Apr-14	6.87	650	381	0.825	57	2.3	29	23.6	168	0	98	4.1	<0.2	0.003	<0.005	<0.005	<0.01	0.659	<0.005	0.12	0.02	<0.005	<0.05		
MB01_9	Jul-14	6.47	639	403	0.811	61	2.3	31.8	25	145	0	140	3.7	<0.2	0.003	<0.005	<0.005	<0.01	0.652	<0.005	<0.06	<0.01	<0.005	<0.05		6.59
MB01_9	Oct-14	6.54	660	443	0.782	62	2.4	32.7	25.3	153	0	137	3.9	<0.2	0.001	<0.005	<0.005	<0.01	0.644	<0.005	0.06	0.03	0.02	<0.05		6.78
MB01_9	Jan-15	6.98	632	412	0.787	61	2.4	32.9	25.8	156	0	98	3.7	<0.2	0.001	<0.005	<0.005	<0.01	0.654	<0.005	<0.06	0.02	0.013	<0.05		7.35
MB01_9	Apr-15	6.81	652	377	0.801	62	2.3	34.2	26	158	0	98	3.7	<0.2	0.001	<0.005	<0.005	<0.01	0.646	<0.005	<0.06	0.02	<0.005	<0.05		6.20
MB01_9	Jul-15	6.85	666	409	0.812	62	2.4	32.5	25.5	159	0	103	3.9	<0.2	0.001	<0.005	0.005	<0.01	0.64	<0.005	<0.06	0.02	<0.005	<0.05		7.55
MB01_9	Oct-15	6.86	697	419	0.8	62	2.4	34.5	26.4	159	0	104	3.8	<0.2	0.001	<0.005	<0.005	<0.01	0.669	<0.005	<0.06	0.02	<0.005	<0.05		6.14
MB01_9	Jan-16	6.77	678	423	0.817	62	2.5	34.2	26.1	156	0	103	3.7	<0.2	0.001	<0.005	0.006	<0.01	0.678	<0.005	0.15	0.03	<0.005	<0.05		6.76
MB01_9	Apr-16	6.88	683	405	0.88	62	2.4	35	22.5	155	0	96	3.8	<0.2	0.003	<0.005	<0.005	<0.01	0.67	<0.005	<0.06	0.02	<0.005	<0.05		7.58
MB01_9	Jul-16	6.87	688	404	0.798	64	2.5	34.2	27	163	0	92	3.7	<0.2	0.001	<0.005	<0.005	<0.01	0.671	<0.005	0.07	0.03	<0.005	<0.05		6.71
MB01_9	Oct-16	6.76	704	425	0.737	63	2.6	34.3	26.6	158	0	98	3.8	<0.2	0.001	<0.005	0.005	<0.01	0.632	<0.005	<0.06	0.03	<0.005	<0.05		6.78
MB01_9	Jan-17	6.84	661	414	0.67	63	2.4	32.6	26.7	164	0	101	4.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.643	0.01	<0.06	0.02	0.014	<0.05		6.65
MB01_9	Apr-17	6.8	693	441	0.86	64	2.5	33.2	26.8	166	0	103	5	<0.2	0.001	<0.005	<0.005	<0.01	0.674	<0.005	0.16	0.02	<0.005	<0.05		6.46
MB01_9	Jul-17	6.74	675	437	0.94	62	2.6	34	26.5	170	0	104	5.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.654	0.005	0.09	0.02	0.016	<0.05		6.50
Mean		**6.84**	**590.73**	**373.56**	**0.746**	**57**	**2.5**	**28.7**	**24.2**	**133**	**0.0**	**108**	**4.4**	**0.0**	**0.001**	**0.000**	**0.002**	**0.00**	**0.570**	**0.001**	**0.06**	**0.02**	**0.005**	**0.002**		
Min		**6.47**	**484**	**281**	**0.418**	**50**	**2.0**	**24.2**	**19.8**	**92**	**0.0**	**92**	**3.7**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.008**	**0.000**	**0.00**	**<0.01**	**0.000**	**0.000**		
Max		**7.19**	**704**	**443**	**1.000**	**64**	**2.8**	**35.0**	**28.3**	**170**	**0.0**	**140**	**6**	**0.6**	**0.020**	**0.000**	**0.020**	**0.000**	**0.678**	**0.010**	**0.42**	**0.04**	**0.088**	**0.060**		
MB05_01	Jul-05	5.87	1464	805	25.2	222	2.7	25.1	19.3	385	0	42	76	<0.2	<0.001	<0.005	0.016	<0.01	1.4	0.012	<0.06	1.5	0.043	<0.05		
MB05_01	Oct-05	5.94	1061	607	28.1	188	1.7	16.7	19.3	316	0	57	33.2	<0.2	0.002	<0.005	0.011	0.01	0.888	0.018	<0.06	0.22	0.04	<0.05		
MB05_01	Jan-06	5.78	932	464	10.9	153	0.77	10.2	20.8	282	0	1.17	26.1	0.3	0.001	<0.005	0.02	<0.01	0.706	0.014	<0.06	0.07	0.064	<0.05		
MB05_01	Apr-06	5.89	950	504	20.4	155	0.53	8.4	19.8	272	0	33	26.5	<0.2	0.001	<0.005	0.006	<0.01	0.554	0.012	<0.06	0.03	0.024	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB05_01	Jul-06	6.09	996	540	32.6	152	0.36	7.2	19.1	277	0	43	26.9	<0.2	0.001	<0.005	<0.005	<0.01	0.453	0.017	<0.06	0.02	0.024	<0.05		
MB05_01	Oct-06	6.21	154	82	1.5	25	0.07	2.3	3.4	39	0	14.7	4.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_01	Jan-07	5.53	571	337	1.9	78	0.23	6.7	12.3	157	0	12.1	6.8	<0.2	<0.001	<0.005	0.01	<0.01	0.15	0.02	<0.06	0.01	0.04	<0.05		
MB05_01	Apr-07	5.93	631	285	0.99	91	0.53	9.5	14.4	184	0	18.2	10.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.14	0.02	<0.06	0.23	0.06	<0.05		
MB05_01	Jul-07	5.27	312	174	3.7	55	0.14	2.6	5.3	85	0	5.58	6.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.06	0.01	0.09	0.02	0.02	<0.05		
MB05_01	Oct-07	6.02	174	99	0.4	27	<0.05	3.7	4.7	38	0	18.4	5.5	<0.2	<0.001	<0.005	0.01	<0.01	0.04	0.01	<0.06	<0.01	<0.005	<0.05		
MB05_01	Jan-08	5.63	485	308	0.32	89	0.41	8.4	14.9	173	0	14.9	8.5	<0.2	0.002	<0.005	<0.005	0.01	0.09	<0.005	<0.06	0.01	0.02	<0.05		
MB05_01	Apr-08	4.97	872	451	7.3	134	0.18	9.2	24.4	278	0	5.48	17.9	<0.2	0.001	<0.005	0.02	<0.01	0.12	0.01	0.17	<0.01	0.03	<0.05		
MB05_01	Jul-08	5.66	193	117	0.11	34	0.3	2	3.7	42	0	11.7	9.2	<0.2	0.003	<0.005	<0.005	0.01	0.02	<0.005	<0.06	0.09	0.02	<0.05		
MB05_01	Oct-08	5.99	205	127	0.07	31	0.26	3	4.2	44	0	24	5	<0.2	0.005	<0.005	0.01	0.01	0.01	<0.005	<0.06	0.01	0.04	<0.05		
MB05_01	Jan-09	5.02	896	479	7.3	139	0.26	8.5	23.5	266	0	6.77	21.5	<0.2	0.001	<0.005	0.01	0.02	0.11	<0.005	<0.06	0.01	0.02	<0.05		
MB05_01	Apr-09	4.85	1127	585	10	162	1.4	14.4	28.4	306	0	4.14	45.7	<0.2	0.012	<0.005	0.01	0.01	0.16	0.01	0.11	0.89	0.03	<0.05		
MB05_01	Jul-09	5.23	992	543	11.5	146	0.38	8.2	23.1	287	0	8.62	24.5	<0.2	0.001	<0.005	0.01	0.02	0.13	<0.005	<0.06	0.12	0.04	<0.05		
MB05_01	Oct-09	6.27	240	141	0.29	38	0.19	3.8	5.5	65	0	18.6	8.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	0.01	0.09	0.1	<0.005	<0.05		
MB05_01	Jan-10	5.27	740	398	2.7	113	0.45	8.4	19.9	211	0	8.52	16.7	<0.2	0.001	<0.005	<0.005	<0.01	0.07	<0.005	0.15	0.18	0.03	<0.05		
MB05_01	Apr-10	5.68	919	573	9.2	141	0.36	8.2	25.9	267	0	53	22.9	<0.2	0.001	<0.005	0.01	<0.01	0.11	0.01	0.1	0.08	0.03	<0.05		
MB05_01	Jul-10	5.03	1030	528	9.6	150	0.57	9.2	26.6	288	0	6.05	27.2	<0.2	0.001	<0.005	0.02	<0.01	0.13	0.01	0.06	0.22	0.03	<0.05		
MB05_01	Oct-10	5	1088	629	11.6	158	0.43	8.3	29	353	0	6.41	23.6	<0.2	0.002	<0.005	<0.005	0.01	0.14	0.01	0.08	0.02	0.03	<0.05		
MB05_01	Jan-11	4.71	1199	666	11.9	174	0.4	9.4	31.8	377	0	2.27	25.2	<0.2	0.001	<0.005	0.01	<0.01	0.15	0.01	<0.06	0.1	0.04	<0.05		
MB05_01	Apr-11	5.49	2930	1900	15.6	454	3	44.9	130	982	0	20	84.2	<0.2	0.002	<0.005	0.02	0.01	0.4	0.03	<0.06	0.09	0.06	<0.05		
MB05_01	Jul-11	6.4	458	256	0.64	82	<0.05	4.2	8.6	123	0	24	21.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_01	Oct-11	6.43	598	334	0.39	95	0.31	6	12.8	157	0	35	20	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	0.01	0.04	<0.05		
MB05_01	Jan-12	6.23	897	523	2	149	0.48	10.6	19.7	234	0	52	47.1	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_01	Apr-12	6.33	1080	581	0.37	165	0.91	13	22.7	263	0	46	71.2	<0.2	0.001	<0.005	<0.005	<0.01	0.05	0.01	<0.06	0.01	0.05	<0.05		
MB05_01	Jul-12	6.21	984	583	0.54	144	0.85	12.6	21.3	236	0	29	89.7	<0.2	<0.001	<0.005	0.01	<0.01	0.01	<0.005	0.22	0.34	0.01	<0.05		
MB05_01	Oct-12	6.27	1073	615	0.91	181	1.5	14.4	21.7	274	0	46	79.5	<0.2	0.001	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	0.07	0.02	<0.05		
MB05_01	Jan-13	6.41	1179	674	4.9	186	1.3	17	26.7	269	0	55	121	<0.2	0.001	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	0.03	0.01	<0.05		
MB05_01	Apr-13	6.39	1156	642	3.8	180	1.4	17.6	26.5	247	0	53	134	<0.2	0.002	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	0.01	0.04	<0.05		
MB05_01	Jul-13	6.37	1341	742	6.9	203	1.2	15.6	31	298	0	49	143	<0.2	0.004	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	0.02	0.04	<0.05		
MB05_01	Oct-13	6.65	863	473	6.7	129	1.1	12	19.6	207	0	38	78.5	<0.2	0.001	<0.005	0.01	<0.01	0.09	<0.005	<0.06	0.04	0.02	<0.05		
MB05_01	Jan-14	6.38	1039	587	7.4	156	1.7	13.4	23.4	221	0	64	107	<0.2	<0.001	<0.005	<0.005	<0.01	0.11	0.01	<0.06	0.04	0.03	<0.05		
MB05_01	Apr-14	6.23	1266	692	8.9	196	2	17.7	28.6	283	0	57	156	<0.2	0.003	<0.005	0.006	<0.01	0.182	<0.005	<0.06	0.06	0.014	<0.05		
MB05_01	Jul-14	6.1	1368	748	8.2	226	2.9	18.1	28.7	260	0	75	201	<0.2	0.001	<0.005	<0.005	<0.01	0.229	<0.005	<0.06	2.6	0.015	<0.05		
MB05_01	Oct-14	6.39	1260	801	5.6	204	4.1	17.2	23	238	0	110	161	<0.2	0.001	<0.005	<0.005	<0.01	0.27	<0.005	<0.06	3	0.008	<0.05		6.58
MB05_01	Jan-15	6.68	1356	765	7.3	218	5.2	22.5	30.5	245	0	88	201	<0.2	0.002	<0.005	<0.005	<0.01	0.406	<0.005	0.07	2.6	0.022	<0.05		6.52
MB05_01	Apr-15	6.51	1504	840	10.5	245	5.5	25.8	33.2	282	0	90	227	<0.2	0.003	<0.005	<0.005	<0.01	0.567	0.005	0.15	2.6	0.017	<0.05		6.34
MB05_01	Jul-15	6.51	1570	921	11.3	246	5.6	24.2	32.5	308	0	81	222	0.36	0.002	<0.005	0.007	<0.01	0.798	<0.005	<0.06	2.7	0.02	<0.05		7.02
MB05_01	Oct-15	6.31	1438	815	10	230	5.9	32.2	29.5	289	0	87	207	<0.2	0.001	<0.005	<0.005	<0.01	0.663	<0.005	0.18	3	0.038	<0.05		6.41
MB05_01	Jan-16	6.5	1469	854	14.2	235	5.9	24.3	30.2	276	0	118	206	<0.2	0.002	<0.005	0.008	<0.01	0.882	<0.005	0.16	3.2	0.026	<0.05		6.40
MB05_01	Apr-16	6.45	1663	941	15.4	256	6.7	28.7	32.8	289	0	116	259	<0.2	0.003	<0.005	<0.005	<0.01	1.1	<0.005	<0.06	2.9	<0.005	<0.05		6.82
MB05_01	Jul-16	6.69	1497	827	3.1	236	5.9	25.9	31.3	252	0	91	244	<0.2	0.001	<0.005	<0.005	<0.01	0.974	<0.005	0.18	2.7	<0.005	<0.05		6.9
MB05_01	Oct-16	6.43	1317	643	6.6	206	4.8	18.9	23.3	230	0	84	154	<0.2	0.001	<0.005	0.005	<0.01	0.539	<0.005	<0.06	2.7	<0.005	<0.05		6.89
MB05_01	Jan-17	6.79	1382	832	7.3	229	6.7	21.7	27.7	235	0	151	198	<0.2	<0.001	<0.005	<0.005	<0.01	0.43	0.009	0.1	4.7	0.029	<0.05		6.06

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
Mean		5.98	1019.6	575.13	7.790	160	1.9	13.9	23.7	249	0.0	44	83.2	0.0	0.001	0.000	0.005	0.00	0.294	0.006	0.04	0.79	0.026	0.000		
Min		4.71	154	82	0.070	25	0.0	2.0	3.4	38	0.0	1	4.1	0.0	0.000	0.000	0.000	0.00	0.010	0.000	0.00	<0.01	0.000	0.000		
Max		6.79	2930	1900	32.600	454	6.7	44.9	130.0	982	0.0	151	259	0.4	0.012	0.000	0.020	0.020	1.400	0.030	0.22	4.70	0.064	0.000		
MB05_02	Jul-05	6.06	498	282	11.7	71	1.8	11.2	8.8	113	0	59	12.2	0.2	<0.001	<0.005	0.014	<0.01	2.3	0.011	<0.06	0.19	0.015	<0.05		
MB05_02	Oct-05	5.98	432	255	24.8	79	2.1	10.6	7.5	115	0	57	8.8	<0.2	0.002	0.007	0.018	0.01	1.8	0.013	<0.06	0.03	0.094	<0.05		
MB05_02	Jan-06	5.74	401	169	20.8	58	0.79	5.1	8.1	112	0	23	6.2	<0.2	0.003	<0.005	0.018	<0.01	1.1	0.014	<0.06	0.02	0.056	<0.05		
MB05_02	Apr-06	5.68	362	194	30.9	48	0.81	4.2	7.1	100	0	27	4.3	<0.2	0.002	<0.005	0.005	0.01	0.857	0.022	<0.06	0.02	0.054	<0.05		
MB05_02	Jul-06	6.06	370	206	29.2	58	0.66	3.4	6.8	107	0	40	5.6	<0.2	<0.001	<0.005	0.005	<0.01	0.594	0.005	<0.06	0.02	0.064	<0.05		
MB05_02	Oct-06	6.58	476	315	25.8	90	0.93	6.8	16.5	148	0	45	7.7	<0.2	0.006	<0.005	0.01	<0.01	0.32	<0.005	<0.06	0.07	0.08	<0.05		
MB05_02	Jan-07	5.7	457	247	28	66	0.47	2.7	6.7	120	0	5.46	6.9	<0.2	0.003	<0.005	0.01	<0.01	0.22	0.01	<0.06	0.01	0.04	<0.05		
MB05_02	Apr-07	5.96	513	243	30.8	76	0.65	3.7	7.7	133	0	46	9.2	<0.2	0.005	<0.005	0.01	<0.01	0.26	0.01	<0.06	0.03	0.04	<0.05		
MB05_02	Jul-07	5.82	489	307	30.1	75	0.63	3.3	8	124	0	52	9.4	<0.2	0.001	<0.005	0.01	0.01	0.17	0.01	<0.06	0.03	0.29	<0.05		
MB05_02	Oct-07	5.71	500	344	30.6	82	0.52	4	8.4	125	0	43	11.3	<0.2	0.009	<0.005	0.01	<0.01	0.12	0.01	<0.06	0.01	0.03	<0.05		
MB05_02	Jan-08	5.75	443	284	32.4	71	0.42	2.4	7.2	135	0	39	14.2	<0.2	0.003	<0.005	0.01	<0.01	0.13	<0.005	<0.06	0.01	0.03	<0.05		
MB05_02	Apr-08	5.64	468	244	29.7	73	0.59	4.1	7.5	138	0	35	9.3	<0.2	0.012	<0.005	<0.005	<0.01	0.17	0.01	0.15	0.05	0.08	<0.05		
MB05_02	Jul-08	5.7	467	261	26	73	0.7	2.9	7.5	129	0	32	8.9	<0.2	0.003	<0.005	<0.005	<0.01	0.17	<0.005	<0.06	0.01	0.03	<0.05		
MB05_02	Oct-08	5.63	464	296	34	71	0.5	2.1	6.8	126	0	25	7.4	<0.2	0.006	<0.005	<0.005	<0.01	0.11	0.01	<0.06	0.01	0.07	<0.05		
MB05_02	Jan-09	5.83	427	219	34.8	58	0.57	2.4	7	87	0	41	9.5	<0.2	0.005	<0.005	0.01	<0.01	0.18	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_02	Apr-09	5.9	432	210	32.6	58	0.52	2.2	6.5	99	0	46	12.6	<0.2	0.015	<0.005	<0.005	<0.01	0.16	<0.005	<0.06	0.01	0.01	<0.05		
MB05_02	Jul-09	6.02	462	287	32.6	59	0.5	2	6.5	91	0	41	10.8	<0.2	0.004	<0.005	0.01	<0.01	0.13	<0.005	<0.06	<0.01	0.01	<0.05		
MB05_02	Oct-09	5.5	354	209	32.7	55	0.49	2.4	7.2	100	0	13.8	8.6	<0.2	0.004	<0.005	<0.005	<0.01	0.13	0.01	<0.06	<0.01	<0.005	<0.05		
MB05_02	Jan-10	5.85	430	216	33.2	56	0.49	1.7	7.3	82	0	44	9.2	<0.2	0.004	<0.005	<0.005	<0.01	0.11	0.01	<0.06	0.01	0.01	<0.05		
MB05_02	Apr-10	5.57	425	251	33.6	57	0.46	1.8	7	69	0	52	9.1	<0.2	0.004	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	0.01	<0.005	<0.05		
MB05_02	Jul-10	5.38	444	241	33.5	61	0.48	1.9	7	107	0	16.6	8	<0.2	0.005	<0.005	0.01	<0.01	0.11	0.01	<0.06	<0.01	0.01	<0.05		
MB05_02	Oct-10	5.85	458	235	25.1	55	0.56	3	6.5	74	0	40	9.1	<0.2	0.003	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	<0.01	<0.005	<0.05		
MB05_02	Jan-11	5.59	460	260	26.3	61	0.65	4.5	7.2	110	0	19.1	6	<0.2	0.003	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	0.01	0.04	<0.05		
MB05_02	Apr-11	6.08	458	266	27.5	61	0.38	3	7.1	93	0	52	12.5	<0.2	0.002	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	<0.01	<0.005	<0.05		
MB05_02	Jul-11	4.81	454	255	21.7	65	0.48	5	7.2	128	0	4.83	5.7	<0.2	0.003	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	<0.01	0.03	<0.05		
MB05_02	Oct-11	4	417	211	25.2	55	0.47	4	7.6	108	0	0	4.9	<0.2	0.003	<0.005	0.01	<0.01	0.1	0.01	<0.06	0.01	0.04	<0.05		
MB05_02	Jan-12	5.82	439	271	24.6	79	0.52	4.9	6.4	110	0	52	4.2	<0.2	0.003	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	<0.01	0.01	<0.05		
MB05_02	Apr-12	5.34	438	223	18.8	57	1.7	5.5	6.1	117	0	14.6	5.5	<0.2	0.007	<0.005	<0.005	<0.01	0.1	0.01	<0.06	0.03	0.03	<0.05		
MB05_02	Jul-12	5.61	438	265	30.9	58	0.26	9.1	7.5	117	0	28	1.2	<0.2	0.002	<0.005	0.01	<0.01	0.06	<0.005	<0.06	<0.01	0.01	<0.05		
MB05_02	Oct-12	4.66	373	232	25.6	55	0.65	4.1	6.3	114	0	2.35	4.1	<0.2	0.005	<0.005	0.01	<0.01	0.07	<0.005	<0.06	<0.01	0.04	<0.05		
MB05_02	Jan-13	3.78	437	229	25.3	55	0.77	6.7	6.7	123	0	0	4	<0.2	<0.001	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	0.01	0.05	<0.05		
MB05_02	Apr-13	5.84	540	307	31.4	72	1.4	5.2	8.1	132	0	32	3.5	<0.2	0.003	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_02	Jul-13	4.77	533	272	31.1	66	0.62	5	8.1	136	0	4.53	5.1	<0.2	0.003	0.01	<0.005	<0.01	0.06	<0.005	<0.06	<0.01	0.03	<0.05		
MB05_02	Oct-13	4.88	471	256	34.9	68	0.51	2	7	125	0	5.07	3.6	<0.2	0.005	0.01	<0.005	<0.01	0.04	<0.005	<0.06	<0.01	0.02	<0.05		
MB05_02	Jan-14	5.33	460	253	31.6	57	0.69	5	7.3	113	0	11.5	3.8	<0.2	0.002	0.01	<0.005	<0.01	0.05	0.01	<0.06	<0.01	0.03	<0.05		
MB05_02	Apr-14	5.89	502	290	27.6	62	0.86	7.1	7.4	123	0	33	3.8	<0.2	0.003	<0.005	<0.005	<0.01	0.053	<0.005	<0.06	<0.01	0.011	<0.05		
MB05_02	Jul-14	5.2	481	253	33	64	0.71	5.4	7.6	135	0	13.9	3.8	<0.2	0.008	<0.005	<0.005	<0.01	0.051	0.006	<0.06	<0.01	0.013	<0.05		5.68
MB05_02	Oct-14	5.6	532	340	31	66	0.78	6.8	8	148	0	49	3.7	<0.2	0.007	<0.005	<0.005	<0.01	0.059	<0.005	<0.06	0.01	0.075	<0.05		5.42
MB05_02	Jan-15	5.71	511	287	33.4	64	1.1	4.2	7.8	152	0	23	3.6	<0.2	0.004	<0.005	<0.005	<0.01	0.056	<0.005	0.24	0.01	0.116	<0.05		5.62
MB05_02	Apr-15	5.67	527	287	37.3	67	0.56	2.5	7.9	151	0	28	3.5	<0.2	0.004	0.005	<0.005	<0.01	0.048	<0.005	0.08	<0.01	0.014	<0.05		5.50
MB05_02	Jul-15	5.67	547	305	25.2	71	1.6	11	8.7	159	0	27	4.5	<0.2	0.009	<0.005	<0.005	<0.01	0.053	<0.005	0.09	<0.01	0.029	<0.05		6.49

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB05_02	Oct-15	5.81	584	307	37.9	68	0.61	2.7	8	156	0	40	4.1	<0.2	0.006	0.005	<0.005	<0.01	0.053	0.005	<0.06	0.01	0.041	<0.05		5.47
MB05_02	Jan-16	5.8	580	308	37.3	72	0.71	4.6	8.7	161	0	39	4.3	<0.2	0.004	0.005	0.006	<0.01	0.056	<0.005	<0.06	0.03	0.032	<0.05		6.30
MB05_02	Apr-16	5.82	582	321	38.6	56	0.62	3.4	7.4	149	0	35	4.7	<0.2	0.005	<0.005	<0.005	<0.01	0.067	<0.005	<0.06	0.01	<0.005	<0.05		5.91
MB05_02	Jul-16	5.95	606	312	40.9	74	0.62	2.6	8.8	167	0	34	4.3	<0.2	0.005	<0.005	<0.005	<0.01	0.026	<0.005	0.15	0.01	<0.005	<0.05		5.69
MB05_02	Oct-16	5.71	627	308	37.6	73	0.89	4.8	8.6	164	0	35	3.9	<0.2	0.006	0.007	0.005	<0.01	0.032	<0.005	0.08	<0.01	0.008	<0.05		645
MB05_02	Jan-17	4.27	637	326	38.9	71	0.77	3.2	9.3	209	0	0	4.4	<0.2	0.003	0.005	0.006	<0.01	<0.005	0.016	0.48	0.02	0.012	<0.05		5.4
Mean		**5.56**	**476.72**	**265.09**	**30.138**	**65**	**0.7**	**4.4**	**7.7**	**124**	**0.0**	**30**	**6.6**	**0.0**	**0.004**	**0.001**	**0.004**	**0.00**	**0.230**	**0.005**	**0.03**	**0.01**	**0.037**	**0.000**		
Min		**3.78**	**354**	**169**	**11.700**	**48**	**0.3**	**1.7**	**6.1**	**69**	**0.0**	**0**	**1.2**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**<0.01**	**0.000**	**0.000**		
Max		**6.58**	**637**	**344**	**40.900**	**90**	**2.1**	**11.2**	**16.5**	**209**	**0.0**	**59**	**14.2**	**0.2**	**0.015**	**0.010**	**0.018**	**0.010**	**2.300**	**0.022**	**0.48**	**0.19**	**0.290**	**0.000**		
MB1	Jan-92	4.2	500	300	10.5	80	0.8	7	12	140	0	0	25	<0.5	0.02	<0.005	<0.05	0.05	1.05	-	-	-	<0.05	<0.05		
MB1	Aug-92	5.6	590	350	4.6	70	0.7	11	15	160	0	30	15	<0.5	<0.01	<0.005	<0.05	0.05	0.45	-	0.4	-	<0.05	<0.05		
MB1	Dec-92	5.65	680	430	11	80	0.6	13	17	170	0	15	40	<0.5	<0.01	<0.005	<0.05	<0.05	0.2	-	-	-	<0.05	<0.05		
MB1	May-93	5.75	550	320	0.7	90	1	9	16	150	0	20	30	1	<0.01	<0.005	<0.05	0.15	0.25	-	-	-	0.15	<0.05		
MB1	Sep-93	5.4	630	400	8.1	80	0.5	11	18	150	0	20	55	0.8	0.01	<0.005	<0.05	<0.05	0.2	-	-	-	0.05	<0.05		
MB1	Dec-93	5.8	520	290	9.5	60	1	12	13	110	0	20	40	<0.05	<0.005	<0.005	<0.05	<0.05	0.1	-	<0.05	-	<0.05	<0.05		
MB1	Mar-94	5.75	590	370	7.6	85	1.2	9	13	150	0	30	30	1.3	<0.005	<0.005	<0.05	<0.05	0.25	-	<0.05	-	<0.05	<0.05		
MB1	Dec-94	6.35	615	390	3.2	70	1.5	13	18	170	0	35	<5	0.2	<0.005	<0.005	<0.05	<0.05	0.3	-	<0.05	-	0.05	<0.05		
MB1	Mar-95	7.6	510	155	4.3	62	<0.05	12	15	140	0	30	<5	1.8	<0.005	<0.005	<0.05	<0.05	15	-	5.9	-	0.05	<0.05		
MB1	Aug-95	6.4	470	310	3.5	58	0.8	10	14	120	0	35	15	0.3	<0.005	<0.005	<0.05	<0.05	-	-	<0.05	0.02	<0.05	<0.05		
MB1	Oct-95	5.8	510	330	4.1	60	0.7	11	15	120	0	40	20	<0.1	0.01	<0.005	<0.05	<0.05	-	-	<0.05	<0.01	<0.05	-		
MB1	Dec-95	6.2	550	300	4.4	67	1.1	10	16	160	0	25	15	<0.1	<0.005	<0.005	<0.05	<0.05	-	-	0.1	0.02	<0.05	-		
MB1	Feb-96	5.7	500	280	3.4	500	11	12	15	110	0	35	14	<0.1	0.01	<0.005	<0.05	<0.05	0.3	<0.05	<0.05	0.01	<0.05	-		
MB1	Apr-96	6.2	450	190	2.8	53	1	10	14	110	0	30	12	0.8	<0.005	<0.005	<0.05	<0.05	0.2	<0.05	<0.05	<0.02	<0.05	<0.05		
MB1	May-96	6.1	600	260	5.1	70	0.9	12	17	170	0	30	<5	<0.2	0.02	<0.005	<0.05	<0.05	0.4	<0.05	0.1	<0.05	<0.05	<0.05		
MB1	Oct-96	6.1	580	370	5.1	70	2	12	18	110	0	70	30	0.2	0.01	<0.005	<0.05	0.3	0.4	0.05	<0.05	<0.02	0.1	0.1		
MB1	Jan-97	6.07	570	345	3.7	79	0.9	14	20	185	0	39	10	<0.1	<0.02	<0.005	0.01	<0.010	0.33	<0.005	<0.060	<0.01	0.024	<0.05		
MB1	Apr-97	6.4	486	350	3.9	63	1	13	17	159	0	36	13	<0.02	<0.02	<0.005	0.01	<0.010	0.27	0.006	<0.060	0.02	0.023	<0.05		
MB1	Jul-97	6.24	544	388	3.7	68	1	13	18	164	0	35	12	0.3	<0.02	<0.005	0.01	<0.010	0.29	<0.005	<0.060	<0.01	0.012	<0.05		
MB1	Oct-97	6.12	530	320	5.2	62	1.5	18.1	18.8	130	0	32	36.9	0.1	<0.02	<0.005	0.007	<0.01	0.239	0.01	<0.06	<0.01	0.049	<0.05		
MB1	Jan-98	6.37	613	300	4.7	71	1.2	16.5	20.3	179	0	36	17.8	<0.2	<0.02	<0.005	0.011	<0.01	0.29	<0.005	<0.06	<0.01	0.031	<0.05		
MB1	Apr-98	6.38	844	456	7.1	99	1.7	22.8	25.5	215	0	48	53.9	<0.2	0.03	<0.005	0.008	<0.01	0.39	<0.005	<0.06	<0.01	0.042	<0.05		
MB1	Jul-98	6.33	992	533	11.3	109	1.8	23	27.6	253	0	49	54.7	<0.2	<0.02	<0.005	0.005	<0.01	0.377	<0.005	<0.06	0.01	0.023	<0.05		
MB1	Oct-98	6.54	1047	533	16.9	128	2.3	25.1	31.6	316	0	56	54.2	<0.2	0.02	<0.005	0.011	<0.01	0.407	<0.005	<0.06	<0.01	0.027	<0.05		
MB1	Jan-99	6.58	1004	545	19	128	2.1	26.3	32.7	307	0	50	55	<0.2	<0.02	<0.005	0.015	<0.01	0.401	0.007	<0.06	<0.01	0.023	<0.05		
MB1	Apr-99	6.37	1105	614	21.5	141	2.1	30.1	37.6	281	0	63	99	<0.2	<0.02	<0.005	0.015	<0.01	0.55	0.008	0.07	0.03	0.026	<0.05		
MB1	Jul-99	6.32	953	508	18.6	135	2	24.2	33.1	224	0	57	74.5	<0.2	<0.02	<0.005	0.012	<0.01	0.455	<0.005	<0.06	<0.01	0.028	<0.05		
MB1	Oct-99	6.52	1057	592	19.7	135	2.1	26	35.2	296	0	73	69.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.439	0.007	0.09	<0.01	0.009	<0.05		
MB1	Jan-00	6.22	1144	650	24.2	150	2.5	29.4	38.8	311	0	96	92.4	0.2	<0.02	<0.005	0.011	<0.01	0.471	<0.005	0.11	<0.01	0.028	<0.05		
MB1	Mar-00	6.5	1180	706	25.2	154	3	29.6	38.5	270	0	76	130	<0.2	0.05	<0.005	0.005	<0.01	0.424	<0.005	0.07	<0.01	0.007	<0.05		
MB1	Sep-00	6.23	1076	662	22.6	143	2.9	25.1	34.2	240	0	91	128.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.446	0.006	<0.06	0.11	0.02	<0.05		
MB1	Oct-00	6.25	1037	615	19.3	140	2.9	25.1	35.3	240	0	78	102.9	<0.2	<0.02	0.019	0.008	<0.01	0.445	0.005	0.07	0.08	0.012	<0.05		
MB1	Feb-01	6.22	1056	605	18.6	131	3.2	24	32.2	236	0	77	107.4	<0.2	<0.02	<0.005	0.013	<0.01	0.448	<0.005	<0.06	0.19	0.018	<0.05		
MB1	Apr-01	6.21	1084	609	19.9	139	3.9	26.2	35.1	246	0	77	116.7	0.2	<0.02	<0.005	0.009	<0.01	0.475	<0.005	<0.06	0.45	0.015	<0.05		
MB1	Jul-01	6.35	1074	641	18.5	144	4.1	25.2	34.3	276	0	83	101	<0.2	<0.02	<0.005	0.006	<0.01	0.458	<0.005	<0.06	0.35	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB1	Nov-01	5.95	1048	567	18.7	147	3.3	23.9	33.7	245	0	47	84.8	<0.2	<0.02	<0.005	0.008	<0.01	0.512	0.006	<0.06	0.22	0.016	<0.05		
MB1	Jan-02	6.22	1177	740	19.4	147	3.5	26.7	33.6	339	0	68	83.5	0.4	0.02	<0.005	0.01	<0.01	0.526	<0.005	<0.06	0.18	0.007	<0.05		
MB1	Apr-02	6.25	1046	658	19.7	142	3.7	25	34	252	0	44	87.8	<0.2	0.02	<0.005	0.01	<0.01	0.528	<0.005	<0.06	0.15	0.011	<0.05		
MB1	Jul-02	6	1082	663	20	145	4	26.5	35.8	315	0	47	102.9	<0.2	0.05	<0.005	0.009	<0.01	0.566	0.005	<0.06	0.22	0.016	<0.05		
MB1	Nov-02	6.64	1104	640	18.2	140	3.8	27.3	36	252	0	55	99.1	<0.2	0.002	<0.005	0.013	<0.01	0.775	0.009	<0.06	0.15	0.017	<0.05		
MB1	Jan-03	6.18	1134	617	18	131	3.6	23.2	32.6	242	0	101	80.5	<0.2	<0.001	<0.005	0.009	<0.01	0.008	<0.005	0.07	0.13	<0.005	<0.05		
MB1	Apr-03	6.22	1084	608	18.4	138	3.3	24.3	35.4	262	0	66	86.5	<0.2	0.001	<0.005	0.017	<0.01	0.483	<0.005	<0.06	0.37	0.009	0.08		
MB1	Jul-03	6.17	1081	624	20.5	143	3.8	24.9	36	274	0	64	89.4	<0.2	0.002	<0.005	0.013	0.02	0.54	0.015	<0.06	0.64	0.027	<0.05		
MB1	Oct-03	6.02	997	481	18	123	2.8	21.7	31.3	246	0	69	56.4	<0.2	<0.001	<0.005	0.008	<0.01	0.498	0.007	<0.06	0.26	<0.005	<0.05		
MB1	Jan-04	6.1	1028	583	16.6	121	2.8	22.6	32.2	245	0	70	59	<0.2	0.002	<0.005	0.009	<0.01	0.507	0.007	0.16	0.27	<0.005	<0.05		
MB1	Apr-04	6.21	979	542	14.1	115	2.5	20.9	30.6	250	0	64	52.2	<0.2	0.006	<0.005	0.014	<0.01	0.499	<0.005	<0.06	0.51	<0.005	<0.05		
MB1	Jul-04	6.41	1040	573	16.5	131	3.2	22	33	238	0	60	66.3	<0.2	<0.001	<0.005	0.013	<0.01	0.5	0.005	<0.06	0.88	0.014	<0.05		
MB1	Oct-04	6.33	1055	596	18.1	121	2.8	23.3	31.3	246	0	38	67.1	<0.2	0.001	<0.005	0.013	<0.01	0.541	0.006	<0.06	0.86	0.01	<0.05		
MB1	Jan-05	6.39	1049	569	15.6	137	3.2	23.9	35.1	256	0	110	63.7	<0.2	0.002	<0.005	0.012	<0.01	0.52	<0.005	0.07	0.79	0.013	<0.05		
MB1	Apr-05	6.28	1033	524	14.3	124	3.3	22.8	33.1	242	0	41	65.3	<0.2	<0.001	<0.005	0.015	<0.01	0.545	<0.005	<0.06	1.4	<0.005	<0.05		
MB1	Jul-05	6.41	1149	719	20.4	151	5.4	22.5	33	286	0	64	86.3	<0.2	0.001	<0.005	0.009	<0.01	0.506	<0.005	<0.06	2.4	0.038	<0.05		
MB1	Oct-05	6.01	1229	695	17.2	146	3.8	23.9	35.5	316	0	81	76.5	0.3	0.001	<0.005	0.013	<0.01	0.607	0.008	0.25	1.7	0.007	<0.05		
MB1	Jan-06	6.23	1226	687	22.5	162	5.1	24.9	34.8	285	0	70	105	<0.2	0.008	<0.005	0.012	<0.01	0.625	0.006	0.14	2.3	0.036	<0.05		
MB1	Apr-06	6.26	1199	691	22.6	160	6.2	24.5	33.2	309	0	140	111	<0.2	0.002	<0.005	0.009	<0.01	0.585	0.005	0.07	2.5	0.005	<0.05		
MB1	Jul-06	6.3	1090	657	21	152	5.5	23.7	33.3	279	0	77	94.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.574	0.005	<0.06	2.4	<0.005	<0.05		
MB1	Oct-06	6.29	1133	710	20.8	150	5.4	24	35.1	275	0	80	92.5	<0.2	0.002	<0.005	0.01	<0.01	0.58	<0.005	<0.06	3.2	<0.005	<0.05		
MB1	Jan-07	6.24	1197	670	22.7	150	6.1	23.7	32.6	287	0	75	97.4	<0.2	0.002	<0.005	0.01	<0.01	0.56	<0.005	0.19	3.1	<0.005	<0.05		
MB1	Apr-07	6.46	1120	591	20.6	141	5.4	22.8	33	280	0	83	75.2	<0.2	0.001	<0.005	0.01	<0.01	0.56	0.01	0.08	2.2	0.01	<0.05		
MB1	Jul-07	6.4	1101	673	22.2	154	5.9	23.4	34.3	281	0	80	90.5	<0.2	0.001	<0.005	0.01	<0.01	0.55	<0.005	<0.06	2.8	0.01	<0.05		
MB1	Oct-07	6.16	1094	678	20.9	145	5.2	22.7	33.3	279	0	77	75.8	<0.2	0.007	<0.005	0.02	<0.01	0.56	0.01	<0.06	2.4	<0.005	<0.05		
MB1	Jan-08	6.43	1054	589	20.5	141	4.9	22.7	33.8	272	0	89	68.5	<0.2	0.003	<0.005	0.01	<0.01	0.53	<0.005	<0.06	1.7	0.02	<0.05		
MB1	Apr-08	5.9	1004	597	17.6	135	4.8	22.1	32.6	242	0	57	67.5	<0.2	0.003	<0.005	0.01	<0.01	0.53	<0.005	0.61	2	0.02	<0.05		
MB1	Jul-08	6.1	1041	508	19.1	141	5.8	22.1	30.3	272	0	81	77.5	<0.2	0.004	<0.005	0.01	<0.01	0.52	0.01	<0.06	2.7	0.01	<0.05		
MB1	Oct-08	5.97	1028	587	17.6	134	4.8	22	31.1	286	0	46	61.6	<0.2	0.007	<0.005	0.02	<0.01	0.53	<0.005	<0.06	2.1	0.01	<0.05		
MB1	Jan-09	6.32	1195	630	19.5	150	5.9	22.8	31.7	301	0	83	69.8	<0.2	0.003	<0.005	0.01	<0.01	0.52	<0.005	<0.06	2.4	0.01	<0.05		
MB1	Apr-09	6.28	903	595	11.2	114	3.5	20.5	30.4	239	0	64	33.6	<0.2	0.002	<0.005	0.02	<0.01	0.51	0.01	<0.06	0.99	<0.005	<0.05		
MB1	Jul-09	6.29	1176	743	19.4	139	5.8	21.4	29.3	268	0	66	79.4	<0.2	0.003	<0.005	0.01	<0.01	0.51	0.01	<0.06	2.5	<0.005	<0.05		
MB1	Oct-09	6.12	946	552	17.4	138	5	21.3	32.3	255	0	53	67	<0.2	0.002	<0.005	0.01	<0.01	0.51	<0.005	0.12	2.2	<0.005	<0.05		
MB1	Jan-10	6.25	996	672	16.9	139	5.1	21.2	33.9	248	0	152	64.2	<0.2	0.003	<0.005	0.02	<0.01	0.48	0.01	<0.06	1.9	0.04	<0.05		
MB1	Apr-10	6.11	1002	636	18.2	133	5.3	20.8	32.1	241	0	89	71.5	<0.2	0.003	<0.005	0.01	<0.01	0.5	0.01	<0.06	2.1	<0.005	<0.05		
MB1	Jul-10	6.26	1048	600	17.9	140	5.8	22.1	32.7	243	0	70	74.5	<0.2	0.004	<0.005	0.02	<0.01	0.55	0.01	<0.06	2.6	<0.005	<0.05		
MB1	Oct-10	6.22	1145	737	19	148	5.6	24.8	37.9	331	0	76	71.4	<0.2	0.002	<0.005	0.01	<0.01	0.55	<0.005	<0.06	2.4	<0.005	<0.05		
MB1	Jan-11	6.18	1068	669	17.2	137	5.3	22.5	34.4	279	0	59	59.7	<0.2	0.002	<0.005	<0.005	<0.01	0.47	<0.005	<0.06	2	0.01	<0.05		
MB1	Apr-11	6.08	939	499	10.8	112	3.3	19.5	32.1	234	0	66	40.5	<0.2	0.002	<0.005	0.01	<0.01	0.44	<0.005	<0.06	1.2	0.01	<0.05		
MB1	Jul-11	6.27	1085	687	17.4	147	5.3	21.8	32.9	278	0	66	78.9	<0.2	<0.001	<0.005	0.01	<0.01	0.46	0.01	<0.06	3	0.01	<0.05		
MB1	Oct-11	6.14	1032	581	17.2	134	4.3	21.2	33.7	248	0	73	57.7	<0.2	0.002	<0.005	0.01	<0.01	0.52	0.01	<0.06	1.8	0.02	<0.05		
MB1	Jan-12	6.35	1119	674	17.9	158	5.7	21.4	26.7	262	0	128	80.4	<0.2	0.002	<0.005	0.01	<0.01	0.44	<0.005	<0.06	2.7	0.01	<0.05		
MB1	Apr-12	6.36	1108	609	17.1	148	5.7	22.4	28	251	0	91	83.1	<0.2	0.004	<0.005	0.01	<0.01	0.49	<0.005	<0.06	2.7	0.02	<0.05		
MB1	Jul-12	6.38	1098	670	18	153	6.6	23.7	28.2	250	0	79	88.9	<0.2	0.005	<0.005	0.01	<0.01	0.44	<0.005	<0.06	2.9	0.01	<0.05		
MB1	Oct-12	6.39	1063	609	17.6	145	5.4	21	25.3	248	0	72	78.2	<0.2	0.005	<0.005	0.01	<0.01	0.38	<0.005	<0.06	2.5	0.01	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB1	Jan-13	6.43	1135	632	18.4	152	5.6	20.6	24.8	242	0	83	87.7	<0.2	0.002	<0.005	0.01	<0.01	0.39	<0.005	<0.06	2.9	0.01	<0.05		
MB1	Apr-13	6.53	992	576	14.8	121	4.7	20.7	24.8	225	0	87	64.4	<0.2	0.007	<0.005	0.01	<0.01	0.41	0.01	<0.06	2.1	<0.005	<0.05		
MB1	Jul-13	6.38	1090	605	16.8	129	4.9	19.8	27.4	242	0	78	72.8	<0.2	0.003	<0.005	<0.005	<0.01	0.4	<0.005	<0.06	2.5	0.02	<0.05		
MB1	Oct-13	6.36	941	526	18.2	126	4.6	18.5	24.5	224	0	78	61.2	<0.2	0.003	<0.005	<0.005	<0.01	0.38	<0.005	<0.06	1.8	0.02	<0.05		
MB1	Jan-14	6.52	928	525	14	121	5	16.9	21.6	200	0	89	68.1	<0.2	0.001	<0.005	<0.005	<0.01	0.34	<0.005	<0.06	2.3	<0.005	<0.05		
MB1	Apr-14	6.42	983	565	14.3	124	5	19.6	23.9	215	0	112	69.4	<0.2	0.005	<0.005	0.006	<0.01	0.42	<0.005	<0.06	2.2	<0.005	<0.05		
MB1	Jul-14	6.14	1039	624	17.1	146	5.8	22.6	25.5	215	0	127	94.5	<0.2	0.003	<0.005	<0.005	<0.01	0.402	<0.005	<0.06	3.2	<0.005	<0.05		6.27
MB1	Oct-14	6.31	996	573	17.8	141	5.7	20.6	23.3	203	0	127	80.9	<0.2	0.003	<0.005	<0.005	<0.01	0.378	<0.005	<0.06	2.5	0.054	<0.05		6.25
MB1	Jan-15	6.59	916	521	14.1	126	5.4	20.3	22.9	198	0	97	69.6	<0.2	0.004	<0.005	0.009	<0.01	0.347	<0.005	<0.06	2.4	0.036	<0.05		6.34
MB1	Apr-15	6.48	941	532	12	125	4.7	22	25.2	209	0	95	64	<0.2	0.002	<0.005	0.009	<0.01	0.391	<0.005	<0.06	2.2	0.005	<0.05		6.06
MB1	Jul-15	6.65	1056	622	16.8	148	6.2	22.1	24.3	218	0	112	93.7	<0.2	0.007	<0.005	0.014	<0.01	0.363	<0.005	<0.06	3.8	0.005	<0.05		6.56
MB1	Oct-15	6.48	1023	590	17.3	141	5.6	20.6	22.9	210	0	114	77.3	<0.2	0.005	<0.005	0.006	<0.01	0.32	<0.005	<0.06	3	<0.005	<0.05		6.38
MB1	Jan-16	6.84	1044	620	16.3	139	5.7	21	23	207	0	136	78.1	<0.2	0.004	<0.005	<0.005	<0.01	0.372	<0.005	0.07	3.1	0.009	<0.05		6.52
MB1	Apr-16	6.63	1006	567	16	135	5.6	21.7	19.6	200	0	122	74.2	<0.2	0.005	<0.005	0.009	<0.01	0.391	<0.005	<0.06	3	<0.005	<0.05		6.74
MB1	Jul-16	6.65	1008	571	16.4	140	5.7	20.1	23	207	0	115	75	<0.2	0.004	<0.005	0.008	<0.01	0.326	<0.005	0.14	3.2	<0.005	<0.05		6.34
MB1	Oct-16	6.46	911	467	14.6	121	4.8	18.6	21.4	198	0	100	49	<0.2	0.004	<0.005	0.009	<0.01	0.328	<0.005	<0.06	2	<0.005	<0.05		6.51
MB1	Jan-17	6.56	731	420	11.1	101	5	15.1	16.7	154	0	103	48.4	<0.2	0.003	<0.005	<0.005	<0.01	0.246	0.016	0.3	2.3	0.01	<0.05		7.2
MB1	Apr-17	6.71	852	504	11.7	111	4.7	18.2	21.4	177	0	121	57	<0.2	0.005	<0.005	<0.005	<0.01	0.356	0.005	0.43	2.3	<0.005	<0.05		6.18
Mean		**6.25**	**942.43**	**543.44**	**15.038**	**127**	**3.8**	**20.4**	**27.5**	**230**	**0.0**	**70**	**65.1**	**0.1**	**0.005**	**0.000**	**0.008**	**0.01**	**0.576**	**0.003**	**0.10**	**1.27**	**0.015**	**0.002**		
Min		**4.20**	**450**	**155**	**0.700**	**53**	**0.0**	**7.0**	**12.0**	**110**	**0.0**	**0**	**0.0**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**-**	**0.000**	**0.000**		
Max		**7.60**	**1229**	**743**	**25.200**	**500**	**11.0**	**30.1**	**38.8**	**339**	**0.0**	**152**	**130**	**1.8**	**0.050**	**0.019**	**0.020**	**0.300**	**15.000**	**0.050**	**5.90**	**3.80**	**0.150**	**0.100**		
MB3	Jan-92	5.7	5040	3370	4.4	950	6.5	54	110	1600	0	170	140	<0.5	0.01	<0.005	<0.05	<0.05	0.7	-	-	-	<0.05	<0.05		
MB3	Aug-92	6	5580	3580	0.5	1070	6.1	55	120	1800	0	175	185	<0.5	<0.01	<0.005	<0.05	0.15	0.65	-	0.1	-	0.05	<0.05		
MB3	Dec-92	7	5940	3300	0.7	950	6	53	110	1660	0	180	160	<0.5	<0.01	<0.005	<0.05	<0.05	0.7	-	-	-	<0.05	<0.05		
MB3	May-93	6.5	5840	3190	2.1	975	6	49	105	1650	0	120	140	<0.5	0.01	<0.005	<0.05	0.1	0.55	-	-	-	0.15	<0.05		
MB3	Sep-93	6.4	5650	3400	0.8	925	5.5	50	115	1750	0	170	110	2.6	0.02	<0.005	<0.05	<0.05	0.65	-	-	-	<0.05	<0.05		
MB3	Dec-93	6.6	5350	3070	0.6	1050	6	40	100	1700	0	165	165	1	<0.005	<0.005	<0.05	<0.05	0.5	-	<0.05	-	<0.05	<0.05		
MB3	Mar-94	6.5	5380	3240	2.1	995	5.9	51	95	1700	0	200	75	0.9	<0.005	<0.005	<0.05	<0.05	0.5	-	<0.05	-	<0.05	<0.05		
MB3	Dec-94	6.6	4500	2880	0.1	850	5.5	38	75	1385	0	195	160	0.9	<0.005	<0.005	<0.05	<0.05	0.4	-	<0.05	-	0.1	<0.05		
MB3	Mar-95	8.05	5240	2700	<0.05	840	4	44	86	1490	0	185	150	0.5	0.01	<0.005	<0.05	<0.05	-	-	7.7	-	0.2	<0.05		
MB3	Aug-95	7	4900	2800	0.1	900	5.3	42	85	1400	0	190	170	0.6	0.02	<0.005	<0.05	<0.05	-	-	0.1	0.04	0.15	<0.05		
MB3	Oct-95	6.4	400	2900	<0.05	870	5.7	42	85	1500	0	185	160	1.6	0.01	0.01	<0.05	<0.05	-	-	-	0.05	<0.05	-		
MB3	Dec-95	7.4	4700	2700	<0.05	870	5.5	36	80	1400	0	185	110	<0.1	<0.005	<0.005	<0.05	<0.05	-	-	0.3	0.03	<0.05	-		
MB3	Feb-96	6	4800	2800	<0.05	970	5.3	40	86	1500	0	195	160	<0.1	0.01	<0.005	<0.05	<0.05	0.45	<0.05	<0.05	0.03	<0.05	-		
MB3	Apr-96	6.8	5000	2700	<0.05	940	5.7	44	86	1400	0	185	150	0.5	0.02	<0.005	<0.05	<0.05	0.5	<0.05	<0.05	<0.02	<0.05	<0.05		
MB3	May-96	7	1400	670	<0.05	200	4	22	28	360	0	30	72	<0.1	<0.005	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	1.5	<0.05	<0.05		
MB3	May-96	6.5	4900	2800	<0.05	920	5	40	84	1600	0	190	83	2.8	0.02	<0.005	<0.05	<0.05	0.4	<0.05	0.1	0.05	<0.05	<0.05		
MB3	Oct-96	6.7	4800	3100	0.5	920	6	37	85	1500	0	180	120	2.5	0.01	<0.005	<0.05	0.15	0.55	0.05	0.1	<0.02	0.1	0.1		
MB3	Jan-97	6.82	4770	2720	0.1	805	5.1	40	84	1625	0	217	141	<0.1	<0.02	<0.005	<0.005	<0.010	0.4	0.01	0.1	0.1	0.011	<0.05		
MB3	Apr-97	6.93	4660	2906	0.1	807	5.1	41	88	1590	0	191	141	<0.02	<0.02	<0.005	0.01	<0.010	0.41	0.01	<0.060	0.22	0.01	<0.05		
MB3	Jul-97	7.2	4720	2882	<0.05	868	5	41	90	1583	0	165	143	<0.02	<0.02	<0.005	0.01	<0.010	0.45	0.008	<0.060	0.04	0.029	<0.05		
MB3	Oct-97	7.32	4270	2560	0.085	822	5.4	39	80.9	1300	0	200	151.4	0.5	<0.02	0.011	0.01	<0.01	0.409	0.01	0.08	0.06	0.028	<0.05		
MB3	Jan-98	7.35	4730	2700	0.126	842	5	40.9	88.9	1520	0	193	139	<0.2	<0.02	<0.005	0.01	<0.01	0.437	0.011	<0.06	0.06	0.034	<0.05		
MB3	Apr-98	7.55	4700	2600	0.042	817	4.9	39.7	84	1480	0	195	136.9	<0.2	0.03	<0.005	0.015	<0.01	0.399	<0.005	<0.06	0.07	0.013	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB3	Jul-98	6.74	4620	2640	0.043	759	5.1	36.1	75.8	1460	0	193	131.2	<0.2	<0.02	<0.005	0.008	<0.01	0.392	<0.005	<0.06	0.1	0.068	<0.05		
MB3	Oct-98	7.21	4280	2340	0.148	781	5.4	36	78.3	1220	0	200	147	<0.2	<0.02	0.022	0.011	<0.01	0.393	0.011	<0.06	0.07	0.021	<0.05		
MB3	Jan-99	7.01	4550	2680	0.192	834	5	40.8	88.8	1640	0	200	140	0.2	<0.02	<0.005	0.012	<0.01	0.441	0.015	<0.06	0.05	0.046	<0.05		
MB3	Apr-99	7.55	4480	2580	0.01	702	4.2	34.9	74.2	1440	0	191	115	<0.2	<0.02	<0.005	0.007	<0.01	0.412	0.013	<0.06	0.2	0.025	<0.05		
MB3	Jul-99	7.13	4370	2480	0.022	681	4.2	32.1	69	1280	0	202	123.8	<0.2	<0.02	<0.005	0.01	<0.01	0.358	<0.005	<0.06	0.04	0.031	<0.05		
MB3	Oct-99	7.45	4520	2540	0.111	799	6.3	36.9	80.1	1380	0	198	136.2	<0.2	<0.02	<0.005	0.018	<0.01	0.375	0.017	0.16	0.09	0.015	<0.05		
MB3	Jan-00	6.24	4400	2860	0.352	853	5.7	40.7	91.3	1500	0	188	146.2	<0.2	<0.02	<0.005	0.015	<0.01	0.461	0.008	0.23	0.07	0.045	<0.05		
MB3	Mar-00	7.14	4390	2620	0.224	826	5.4	38.3	87.6	1280	0	182	140.3	<0.2	<0.02	<0.005	0.006	<0.01	0.419	<0.005	0.13	0.06	0.012	<0.05		
MB3	Sep-00	6.34	4080	2400	0.875	739	4.8	33.4	74.8	1220	0	205	140.8	<0.2	<0.02	<0.005	0.007	<0.01	0.386	0.019	0.11	0.04	0.008	<0.05		
MB3	Oct-00	6.41	4130	2520	0.157	759	5.9	34.3	78	1300	0	201	133.7	<0.2	<0.02	0.011	<0.005	<0.01	0.363	0.011	0.09	0.06	0.02	<0.05		
MB3	Feb-01	6.32	4450	2540	0.315	762	5	36	81.9	1340	0	186	132.4	<0.2	<0.02	<0.005	0.007	<0.01	0.385	0.009	<0.06	0.05	0.01	<0.05		
MB3	Apr-01	6.31	4270	2460	0.219	805	5.5	36.9	84.6	1160	0	186	137.6	<0.2	<0.02	<0.005	0.01	<0.01	0.383	0.009	<0.06	0.05	0.038	<0.05		
MB3	Jul-01	6.4	4100	2420	0.172	775	5	34.7	79.6	1300	0	187	134.4	<0.2	0.03	<0.005	0.009	<0.01	0.369	<0.005	0.08	0.05	<0.005	<0.05		
MB3	Nov-01	6.48	4110	2320	0.242	778	4.8	32.9	78.2	1180	0	189	131.1	<0.2	<0.02	<0.005	0.006	<0.01	0.383	<0.005	<0.06	0.05	0.016	<0.05		
MB3	Jan-02	6.95	4270	2360	0.195	748	4.9	33.9	73.8	1160	0	191	130	<0.2	0.04	<0.005	0.007	<0.01	0.378	0.007	<0.06	0.04	<0.005	<0.05		
MB3	Apr-02	6.61	3960	2400	0.127	741	5	32.9	75.8	1200	0	188	130.4	<0.2	<0.02	<0.005	0.009	<0.01	0.396	0.006	<0.06	0.04	<0.005	<0.05		
MB3	Jul-02	6.5	3930	2300	0.266	720	4.8	32	73.6	1280	0	303	127.4	<0.2	0.04	<0.005	0.007	<0.01	0.355	0.006	0.07	0.05	0.011	<0.05		
MB3	Nov-02	6.53	3800	2220	0.171	679	4.5	29	67.4	1060	0	190	131	<0.2	<0.001	<0.005	0.009	<0.01	0.321	0.01	<0.06	0.04	0.01	<0.05		
MB3	Jan-03	6.4	4370	2360	0.184	741	5	38.5	77.7	1220	0	198	138	0.2	<0.001	<0.005	0.01	0.01	0.006	<0.005	0.13	0.05	<0.005	<0.05		
MB3	Apr-03	6.45	4000	2280	0.437	713	5.3	30.7	73.4	1120	0	203	136	<0.2	0.001	<0.005	0.018	<0.01	0.319	<0.005	0.09	0.05	0.007	<0.05		
MB3	Jul-03	6.54	3970	2220	0.101	721	4.6	31	72.5	1240	0	193	135	<0.2	0.002	<0.005	0.008	<0.01	0.313	0.006	0.13	0.05	0.041	<0.05		
MB3	Oct-03	6.26	3670	2280	0.168	723	4.7	32.2	70.4	1260	0	193	137	<0.2	0.003	<0.005	0.006	<0.01	0.358	0.016	0.08	0.06	0.023	<0.05		
MB3	Jan-04	6.41	4140	2400	0.073	704	4.6	38.9	74.1	1340	0	187	132	0.2	0.003	<0.005	0.007	<0.01	0.363	0.014	0.17	0.06	0.018	<0.05		
MB3	Apr-04	6.43	3880	2340	0.194	674	4	30.1	67.9	1160	0	181	127	0.2	0.003	<0.005	0.012	<0.01	0.356	0.007	<0.06	0.04	0.01	0.06		
MB3	Jul-04	6.84	4180	2180	0.484	656	4	28.3	64	1000	0	174	126	<0.2	<0.001	<0.005	<0.005	<0.01	0.316	0.007	<0.06	0.05	0.037	<0.05		
MB3	Oct-04	6.36	3650	2140	0.13	641	3.9	30.1	61.3	1040	0	190	132	<0.2	0.002	<0.005	0.009	<0.01	0.326	0.007	0.15	0.04	0.027	0.05		
MB3	Jan-05	6.48	4070	2180	0.116	719	4.6	30.6	69.3	1220	0	187	123	<0.2	0.002	<0.005	0.007	<0.01	0.339	0.009	0.09	0.04	0.016	<0.05		
MB3	Apr-05	6.67	3860	2100	0.082	636	4	27.8	62.6	1120	0	188	127	<0.2	<0.001	<0.005	<0.005	<0.01	0.29	0.009	<0.06	0.05	<0.005	<0.05		
MB3	Jul-05	6.62	3660	2140	0.262	663	4.5	27.9	61	935	0	191	129	<0.2	0.001	0.018	0.011	<0.01	0.295	<0.005	0.16	0.04	0.049	<0.05		
MB3	Oct-05	6.2	4010	2280	0.098	725	5.3	30.3	67.8	1180	0	203	133	<0.2	0.003	<0.005	0.011	<0.01	0.326	0.007	0.19	0.07	0.061	<0.05		
MB3	Jan-06	6.51	3810	2140	0.215	698	4.4	27.3	61.2	1360	0	200	130	<0.2	0.004	<0.005	0.01	<0.01	0.311	0.006	0.12	0.06	0.056	<0.05		
MB3	Apr-06	6.69	3510	2040	0.296	658	4.3	25	55.7	1040	0	196	127	<0.2	0.002	<0.005	0.008	<0.01	0.297	0.009	0.19	0.07	0.02	<0.05		
MB3	Jul-06	6.55	3420	1900	0.281	645	4.3	24.6	55.4	1000	0	198	124	<0.2	<0.001	<0.005	<0.005	<0.01	0.273	0.005	<0.06	0.05	0.041	<0.05		
MB3	Oct-06	6.47	3310	2100	0.2	628	4.3	24.8	59.3	954	0	206	119	<0.2	0.004	<0.005	<0.005	<0.01	0.25	0.01	<0.06	0.05	0.05	<0.05		
MB3	Jan-07	6.45	3380	2020	0.17	594	3.9	23.5	55.7	958	0	203	115	<0.2	0.002	<0.005	0.01	<0.01	0.24	<0.005	0.2	0.05	0.01	<0.05		
MB3	Apr-07	6.57	3330	1920	0.52	636	4.2	24.8	58.2	972	0	206	121	<0.2	0.002	<0.005	<0.005	0.01	0.27	0.01	0.16	0.08	0.04	<0.05		
MB3	Jul-07	6.34	3070	1900	0.23	596	4.2	24.3	59.1	864	0	182	119	<0.2	<0.001	<0.005	0.01	<0.01	0.24	0.01	<0.06	0.05	0.08	<0.05		
MB3	Oct-07	6.52	3170	1940	0.51	602	4.1	23.4	56.5	871	0	210	124	<0.2	0.013	<0.005	0.01	<0.01	0.26	0.01	<0.06	0.05	0.04	<0.05		
MB3	Jan-08	6.33	3340	1900	0.14	642	4.4	26.7	63.7	1040	0	197	134	<0.2	0.003	<0.005	0.01	<0.01	0.3	0.01	<0.06	0.04	0.02	<0.05		
MB3	Apr-08	6.8	3210	1960	0.35	626	4.4	26	61	992	0	205	131	<0.2	0.008	<0.005	0.01	<0.01	0.29	<0.005	0.51	0.04	0.08	<0.05		
MB3	Jul-08	6.38	2860	1660	0.01	561	4.4	22.3	50.5	791	0	187	126	<0.2	0.003	<0.005	0.01	<0.01	0.22	0.01	0.16	0.04	0.02	<0.05		
MB3	Oct-08	6.42	3000	1840	0.22	604	4.2	24.1	56.1	939	0	199	130	<0.2	0.005	<0.005	0.01	<0.01	0.26	0.01	<0.06	0.04	0.03	<0.05		
MB3	Jan-09	6.59	3450	1860	0.48	609	4.6	23	55.1	965	0	212	131	<0.2	0.003	<0.005	<0.005	<0.01	0.25	<0.005	0.13	0.04	0.03	<0.05		
MB3	Apr-09	6.6	3390	1900	0.38	601	4.2	22.4	51.6	822	0	209	125	0.2	0.003	<0.005	0.02	<0.01	0.3	0.01	0.07	0.05	<0.005	<0.05		
MB3	Jul-09	6.62	3140	1920	0.36	581	4.3	23.1	52.3	872	0	201	126	<0.2	0.003	<0.005	<0.005	<0.01	0.28	0.01	<0.06	0.03	0.02	0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB3	Oct-09	6.97	2790	1780	0.5	584	4.3	21.2	52.6	928	0	227	128	<0.2	0.003	<0.005	0.01	<0.01	0.26	<0.005	0.22	0.03	0.01	<0.05		
MB3	Jan-10	6.73	3160	1900	0.4	614	4.7	22.9	58.6	872	0	217	127	<0.2	0.004	<0.005	0.01	<0.01	0.29	<0.005	0.15	0.04	0.03	<0.05		
MB3	Apr-10	6.82	3080	1920	0.06	613	4.4	22	56.3	885	0	226	129	<0.2	0.002	<0.005	<0.005	<0.01	0.24	0.01	<0.06	0.04	0.01	<0.05		
MB3	Jul-10	6.62	3120	1780	0.25	581	4.3	19.9	50.9	826	0	229	127	<0.2	0.002	<0.005	0.01	<0.01	0.22	0.01	<0.06	0.04	0.01	<0.05		
MB3	Oct-10	6.47	3080	1800	<0.005	547	4	21.2	53.5	928	0	211	117	<0.2	0.002	<0.005	<0.005	<0.01	0.22	<0.005	<0.06	0.03	<0.005	<0.05		
MB3	Jan-11	6.71	3030	1820	0.06	578	5	29.7	59.8	902	0	222	123	<0.2	0.002	<0.005	<0.005	<0.01	0.25	<0.005	0.08	0.04	0.02	<0.05		
MB3	Apr-11	6.84	3150	1880	0.01	548	3.7	20.6	49.9	789	0	225	130	<0.2	0.004	<0.005	<0.005	<0.01	0.22	0.01	0.06	0.04	0.01	<0.05		
MB3	Jul-11	6.75	2060	1200	0.05	370	2.7	14.8	36.6	551	0	149	86.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.08	0.01	<0.06	0.03	0.06	<0.05		
MB3	Oct-11	6.69	2420	1380	0.62	425	3.1	19.9	52.9	658	0	200	96.5	<0.2	0.002	<0.005	0.01	0.01	0.23	0.01	0.08	0.04	0.1	<0.05		
MB3	Jan-12	6.54	2730	1600	0.01	522	3.3	20.8	42.4	751	0	237	118	<0.2	0.002	<0.005	0.01	<0.01	0.19	<0.005	<0.06	0.03	0.03	<0.05		
MB3	Apr-12	6.49	2840	1620	0.03	524	3.4	19	41.8	808	0	207	125	<0.2	0.001	<0.005	0.01	<0.01	0.21	<0.005	<0.06	0.04	0.04	<0.05		
MB3	Jul-12	6.48	2350	1380	<0.005	428	3.6	20.1	39.2	652	0	158	101	<0.2	0.002	<0.005	<0.005	<0.01	0.11	0.01	<0.06	0.03	0.07	<0.05		
MB3	Oct-12	6.74	2560	1440	<0.005	453	3.1	20.5	41.6	689	0	174	107	<0.2	0.004	<0.005	0.01	<0.01	0.09	<0.005	<0.06	0.08	0.07	<0.05		
MB3	Jan-13	6.8	3020	1660	0.01	536	3.3	22.1	43.7	798	0	198	124	<0.2	0.002	<0.005	0.01	<0.01	0.22	<0.005	<0.06	0.04	0.04	<0.05		
MB3	Apr-13	6.71	3040	1660	0.01	537	3.5	21.4	41.4	819	0	96	129	<0.2	0.003	<0.005	0.01	<0.01	0.26	<0.005	<0.06	0.04	0.03	<0.05		
MB3	Jul-13	6.74	2086	1120	0.01	375	2.7	15.2	33.4	523	0	144	91.5	<0.2	0.002	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	0.03	0.08	<0.05		
MB3	Oct-13	7.22	2300	1320	0.17	420	2.9	19.5	38	655	0	171	105	0.22	0.002	<0.005	<0.005	<0.01	0.14	<0.005	0.17	0.02	0.1	<0.05		
MB3	Jan-14	6.93	2820	1620	0.08	503	3.4	22.9	39.7	738	0	186	120	<0.2	0.001	<0.005	<0.005	0.01	0.21	<0.005	<0.06	0.03	0.05	<0.05		
MB3	Apr-14	6.65	2880	1600	0.005	539	3.4	20.1	40.3	790	0	194	127	<0.2	0.003	<0.005	<0.005	<0.01	0.241	<0.005	0.27	0.04	0.039	<0.05		
MB3	Jul-14	6.45	1310	710	0.064	231	1.9	14.2	22.7	340	0	104	49.5	<0.2	0.004	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	<0.01	0.057	<0.05		6.35
MB3	Oct-14	6.44	2177	1240	<0.005	389	3	20.2	37.2	524	0	190	94.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.113	0.008	0.07	0.03	0.118	<0.05		6.12
MB3	Jan-15	6.7	2620	1500	0.029	489	3.8	21.5	40	710	0	193	117	<0.2	0.003	<0.005	0.006	<0.01	0.205	0.006	<0.06	0.04	0.134	<0.05		6.18
MB3	Apr-15	6.66	2780	1580	0.068	520	3.9	30.1	38.1	765	0	208	126	<0.2	0.002	<0.005	<0.005	<0.01	0.196	0.006	0.18	0.03	0.034	<0.05		6.41
MB3	Jul-15	6.71	2360	1360	0.068	428	4	29.6	35.1	623	0	176	110	<0.2	0.007	<0.005	<0.005	<0.01	0.099	<0.005	0.12	0.03	0.094	<0.05		6.39
MB3	Oct-15	6.57	2530	1420	0.09	475	4.2	30.7	38	673	0	194	121	<0.2	0.004	<0.005	<0.005	<0.01	0.124	<0.005	0.17	0.04	0.095	<0.05		6.42
MB3	Jan-16	6.72	2630	1520	0.044	505	3.4	23.2	38.4	710	0	223	123	<0.2	0.003	<0.005	<0.005	<0.01	0.177	<0.005	0.12	0.04	0.035	<0.05		6.29
MB3	Apr-16	6.64	2600	1400	0.012	478	3.2	19.1	36.9	673	0	190	116	<0.2	0.002	<0.005	<0.005	<0.01	0.181	<0.005	<0.06	0.03	<0.005	<0.05		6.39
MB3	Jul-16	6.78	1836	969	0.011	296	2.2	17.6	30.9	450	0	114	65.4	<0.2	0.002	<0.005	<0.005	<0.01	0.039	<0.005	0.06	0.02	0.058	<0.05		6.31
MB3	Oct-16	6.48	2640	1400	0.019	499	3.1	18.3	34.5	646	0	214	122	<0.2	0.003	<0.005	<0.005	<0.01	0.144	0.007	0.11	0.04	0.024	<0.05		6.1
MB3	Jan-17	6.67	2570	1480	0.425	519	3.8	25.8	36.7	671	0	230	129	<0.2	0.002	0.005	<0.005	<0.01	0.177	0.015	0.16	0.04	0.05	<0.05		6.2
MB3	Apr-17	6.63	2630	1520	0.436	498	4.1	30.4	34.1	675	0	232	130	<0.2	0.004	<0.005	<0.005	<0.01	0.172	0.008	0.27	0.04	0.031	<0.05		6.77
MB3	Jul-17	6.57	2580	1520	0.307	500	3.4	28.5	34.2	716	0	230	129	<0.2	0.003	0.005	<0.005	<0.01	0.158	0.009	<0.06	0.04	0.034	<0.05		6.18
Mean		**6.67**	**3646.1**	**2142.5**	**0.267**	**670**	**4.5**	**30.6**	**64.7**	**1089**	**0.0**	**191**	**126.7**	**0.2**	**0.004**	**0.001**	**0.005**	**0.00**	**0.293**	**0.006**	**0.14**	**0.06**	**0.036**	**0.003**		
Min		**5.70**	**400**	**670**	**0.000**	**200**	**1.9**	**14.2**	**22.7**	**340**	**0.0**	**30**	**49.5**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**-**	**0.000**	**0.000**		
Max		**8.05**	**5940**	**3580**	**4.400**	**1070**	**6.5**	**55.0**	**120.0**	**1800**	**0.0**	**303**	**185**	**2.8**	**0.040**	**0.022**	**0.020**	**0.150**	**0.700**	**0.050**	**7.70**	**1.50**	**0.200**	**0.100**		
MB97_1	Jan-98	5.94	6430	3660	12.8	905	15.8	119.4	217	2260	0	9.81	167.8	0.6	<0.02	<0.005	0.065	0.02	1.9	0.074	<0.06	0.15	0.16	<0.05		
MB97_1	Apr-98	6.28	6440	3820	13.5	906	14.3	115.6	213.4	2320	0	27	170	<0.2	0.03	<0.005	0.065	<0.01	1.9	0.073	<0.06	0.18	0.085	<0.05		
MB97_1	Jul-98	5.7	6690	3800	11.9	896	15.7	112.8	211.7	2240	0	29	166.7	<0.2	0.02	<0.005	0.069	<0.01	2	0.081	0.08	0.22	0.109	<0.05		
MB97_1	Oct-98	5.54	6200	3620	15.3	968	16.2	118.1	233.3	2160	0	33	177	<0.2	<0.02	<0.005	0.067	<0.01	2.1	0.088	0.11	0.19	0.081	0.08		
MB97_1	Jan-99	5.91	6390	3820	15.5	947	16	118.8	233.9	2520	0	19.8	170.2	<0.2	0.03	<0.005	0.073	0.01	2.1	0.088	0.1	0.15	0.13	<0.05		
MB97_1	Apr-99	5.39	6390	3700	20.1	1022	17.3	127.6	245.7	2320	0	11.3	173.5	<0.2	<0.02	<0.005	0.084	0.02	2.6	0.114	<0.06	0.29	0.093	<0.05		
MB97_1	Jul-99	5.57	6380	3780	14.7	842	14.8	107.5	211.7	2200	0	31	156.2	<0.2	0.03	<0.005	0.065	<0.01	2	0.083	<0.06	0.15	0.069	<0.05		
MB97_1	Jan-00	5.39	6280	4100	19.7	1004	17.7	133.6	264.7	2260	0	30	180.9	0.3	0.04	<0.005	0.084	<0.01	2.3	0.094	0.17	0.18	0.106	<0.05		
MB97_1	Mar-00	5.52	6180	4040	17.9	968	16.7	128.2	254.6	2200	0	25	172.4	<0.2	0.04	<0.005	0.063	0.01	2.2	0.092	0.11	0.16	0.073	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_1	Sep-00	5.48	6810	3740	21.1	966	17.2	136.2	261.2	2380	0	33	173.9	<0.2	0.02	<0.005	0.082	0.01	2.3	0.093	0.11	0.15	0.081	<0.05		
MB97_1	Oct-00	5.44	6790	3980	20.9	972	18.7	135.9	269.4	2340	0	30	163.3	<0.2	<0.02	0.01	0.073	<0.01	2.2	0.089	0.09	0.16	0.079	<0.05		
MB97_1	Feb-01	5.36	6990	3840	22.3	949	17	135.9	263.9	2300	0	30	175.2	<0.2	0.03	<0.005	0.066	0.01	2.3	0.088	0.09	0.15	0.08	<0.05		
MB97_1	Apr-01	5.51	6850	3980	21.7	957	17.2	136.2	267.4	2260	0	28	170	<0.2	<0.02	<0.005	0.076	0.01	2.2	0.079	0.08	0.16	0.076	<0.05		
MB97_1	Jul-01	5.37	6740	3860	22.1	965	17.1	137.2	269.8	2280	0	32	172.5	<0.2	0.03	<0.005	0.074	0.01	2.3	0.087	0.13	0.15	0.08	<0.05		
MB97_1	Nov-01	5.62	6840	3960	23.7	948	16.9	138.5	258.5	2280	0	29	170.2	<0.2	0.04	<0.005	0.069	<0.01	2.3	0.083	<0.06	0.15	0.07	<0.05		
MB97_1	Jan-02	5.56	7130	4460	23.8	949	16.6	140.3	257.2	2160	0	24	167.6	<0.2	0.03	<0.005	0.068	<0.01	2.4	0.088	<0.06	0.15	0.067	<0.05		
MB97_1	Apr-02	5.33	6750	4140	24.1	936	16.9	138.1	265.3	2360	0	17.2	169.9	<0.2	<0.02	<0.005	0.071	<0.01	2.4	0.091	0.08	0.15	0.071	<0.05		
MB97_1	Jul-02	4.98	6780	3780	24.8	917	17.1	136	263.7	2400	0	9.63	165.6	<0.2	0.03	<0.005	0.068	0.01	2.3	0.091	0.06	0.15	0.078	<0.05		
MB97_1	Nov-02	5.53	6550	4100	20.9	890	16.1	118	237	2180	0	9.65	163	<0.2	0.011	<0.005	0.073	0.02	2.1	0.086	0.2	0.16	0.115	<0.05		
MB97_1	Jan-03	5.4	7020	3900	17.3	911	16.4	116	236	2220	0	29	161	<0.2	0.008	<0.005	0.072	0.01	0.033	<0.005	<0.06	0.16	<0.005	<0.05		
MB97_1	Apr-03	5.32	6680	3880	19	935	15.3	120	242	2300	0	26	164	<0.2	0.011	<0.005	0.07	0.01	2	0.074	<0.06	0.17	0.07	<0.05		
MB97_1	Jul-03	5.66	6470	3920	24.3	980	16.5	138	271	2340	0	25	175	<0.2	0.015	<0.005	0.075	0.01	2.3	0.082	0.09	0.16	0.068	<0.05		
MB97_1	Oct-03	5.42	5420	3700	17.3	923	15.3	121	233	2300	0	29	165	<0.2	0.041	<0.005	0.07	<0.01	2.1	0.092	0.18	0.17	0.104	<0.05		
MB97_1	Jan-04	5.69	6430	4160	18.3	871	14.6	114	226	2240	0	28	157	<0.2	0.011	<0.005	0.068	<0.01	2	0.088	0.11	0.15	0.05	<0.05		
MB97_1	Apr-04	5.1	6370	4240	22.5	892	14.6	121	234	2260	0	12.7	159	<0.2	0.015	<0.005	0.073	<0.01	2.2	0.084	<0.06	0.15	0.052	0.12		
MB97_1	Jul-04	5.53	5590	4240	20.2	987	17.1	127	253	2360	0	31	174	<0.2	0.014	<0.005	0.072	0.01	2.2	0.085	<0.06	0.18	0.072	0.06		
MB97_1	Oct-04	4.94	5790	3880	22	860	14	126	227	2280	0	8.89	171	<0.2	0.012	<0.005	0.073	0.01	2.2	0.089	0.11	0.15	0.071	<0.05		
MB97_1	Jan-05	5.04	7110	3720	17.9	996	18.9	127	251	2120	0	6.83	169	<0.2	0.01	<0.005	0.066	0.02	2.1	0.089	0.11	0.18	0.109	<0.05		
MB97_1	Apr-05	4.66	7170	3940	21.3	911	15.8	125	244	2280	0	3.49	167	<0.2	0.011	<0.005	0.073	0.01	2.2	0.086	<0.06	0.16	0.026	<0.05		
MB97_1	Jul-05	5.67	6770	4100	14.3	945	16	113	229	2080	0	18.5	180	<0.2	<0.001	<0.005	0.065	<0.01	2.1	0.088	<0.06	0.16	0.083	<0.05		
MB97_1	Oct-05	5.11	5500	3300	14.6	798	13.6	86.5	179	2040	0	19.6	153	<0.2	0.01	<0.005	0.053	<0.01	1.7	0.067	0.13	0.13	0.052	<0.05		
MB97_1	Jan-06	5.38	6320	3760	16.3	932	15.3	109	220	2140	0	22	167	<0.2	0.013	<0.005	0.072	0.01	2	0.086	0.08	0.16	0.06	<0.05		
MB97_1	Apr-06	5.36	6520	4000	19.3	965	16.8	125	238	2280	0	28	172	<0.2	0.015	<0.005	0.068	0.04	2.2	0.094	0.2	0.18	0.129	<0.05		
MB97_1	Jul-06	5.42	6540	3660	20.5	950	16.4	126	244	2340	0	29	162	<0.2	0.009	<0.005	0.062	0.01	2.3	0.087	<0.06	0.17	0.064	<0.05		
MB97_1	Oct-06	6.02	5860	3580	18	881	14.5	103	222	2080	0	29	168	<0.2	0.018	<0.005	0.06	<0.01	1.9	0.08	<0.06	0.14	0.06	<0.05		
MB97_1	Jan-07	5.56	5310	3260	15.9	787	12.7	84.8	181	1880	0	29	173	<0.2	0.01	<0.005	0.06	<0.01	1.6	0.07	0.12	0.13	0.05	<0.05		
MB97_1	Apr-07	5.48	5860	3600	19.6	879	15.5	100	218	2060	0	28	165	<0.2	0.01	<0.005	0.06	0.01	2	0.08	0.24	0.15	0.07	<0.05		
MB97_1	Jul-07	5.51	5670	3880	16.3	906	15.6	104	231	1940	0	30	177	<0.2	0.026	<0.005	0.07	0.01	1.9	0.08	<0.06	0.16	0.06	<0.05		
MB97_1	Oct-07	5.23	4450	2880	19.1	726	11.2	69.4	157	1520	0	20	190	<0.2	0.033	<0.005	0.06	<0.01	1.3	0.06	0.07	0.09	0.04	<0.05		
MB97_1	Jan-08	4.92	4520	2740	23.4	754	10.8	68.2	151	1560	0	7.26	205	<0.2	0.041	<0.005	0.05	<0.01	1.2	0.05	0.06	0.1	0.07	<0.05		
MB97_1	Apr-08	5.27	4940	3060	18.4	787	12.2	76.2	177	1800	0	26	184	<0.2	0.05	<0.005	0.05	<0.01	1.5	0.06	0.45	0.12	0.06	<0.05		
MB97_1	Jul-08	5.42	4460	2680	17.8	707	12.6	69.5	147	1600	0	30	196	<0.2	0.045	<0.005	0.05	<0.01	1.3	0.06	0.14	0.1	0.05	<0.05		
MB97_1	Oct-08	5.38	3240	2220	12.9	588	10.1	51.3	112	1220	0	22	181	<0.2	0.03	<0.005	0.04	<0.01	1	0.04	0.13	0.09	0.04	<0.05		
MB97_1	Jan-09	5.54	3870	2160	10.7	571	10.1	45.4	99.8	1160	0	34	170	<0.2	0.037	<0.005	0.03	<0.01	0.86	0.02	0.09	0.09	0.03	0.05		
MB97_1	Apr-09	5.56	4350	2480	11.8	637	11.4	57	124	1300	0	32	161	<0.2	0.033	<0.005	0.06	<0.01	1.1	0.06	0.11	0.11	0.03	<0.05		
MB97_1	Jul-09	5.56	3870	2340	11.9	597	10.8	52.9	112	1240	0	33	163	<0.2	0.037	<0.005	0.04	<0.01	1.1	0.04	0.13	0.09	0.03	<0.05		
MB97_1	Oct-09	5.07	2590	1640	11.6	473	7.4	32.4	77.8	827	0	10.9	136	<0.2	0.061	<0.005	0.03	<0.01	0.62	0.02	0.14	0.06	0.02	<0.05		
MB97_1	Jan-10	5.5	3220	1940	11.6	535	8.8	38.6	94.9	980	0	31	142	<0.2	0.058	<0.005	0.03	<0.01	0.7	0.03	0.11	0.07	0.03	<0.05		
MB97_1	Apr-10	5.69	3550	2260	12.4	572	9.8	46.5	113	1160	0	37	147	<0.2	0.05	<0.005	0.03	<0.01	0.9	0.05	<0.06	0.09	0.02	<0.05		
MB97_1	Jul-10	5.56	3620	2180	12.2	578	10.2	47.2	112	1060	0	28	149	<0.2	0.056	<0.005	0.05	<0.01	0.91	0.04	0.11	0.09	0.03	<0.05		
MB97_1	Oct-10	5.37	2800	1780	10.4	466	8.5	35	83.9	931	0	34	138	<0.2	0.051	<0.005	0.02	<0.01	0.68	0.03	<0.06	0.06	0.02	<0.05		
MB97_1	Jan-11	5.44	3220	1940	9.7	499	9.3	39.1	93.9	984	0	25	144	<0.2	0.056	<0.005	0.02	<0.01	0.74	0.03	0.1	0.08	0.03	<0.05		
MB97_1	Jul-11	5.37	3700	2280	13.2	596	9.1	54.9	131	1240	0	17.8	147	<0.2	0.035	<0.005	0.04	<0.01	1	0.05	<0.06	0.1	0.05	<0.05		
MB97_1	Oct-11	5.49	2270	1420	9.5	360	5.7	24.1	58.4	660	0	31	127	<0.2	0.063	<0.005	0.02	<0.01	0.45	0.02	0.09	0.06	0.06	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_1	Jan-12	5.63	2250	1360	7.2	376	5.9	24.6	50.4	685	0	47	125	<0.2	0.05	<0.005	0.02	<0.01	0.47	0.02	<0.06	0.05	0.02	<0.05		
MB97_1	Apr-12	5.4	2750	1540	9.1	416	7.3	34.4	64.5	826	0	19.5	131	<0.2	0.066	<0.005	0.03	<0.01	0.61	0.02	0.08	0.07	0.04	<0.05		
MB97_1	Jul-12	5.62	2840	1640	9.7	422	7.8	36.1	70.4	857	0	34	125	<0.2	0.043	<0.005	0.03	<0.01	0.64	0.03	<0.06	0.07	0.03	<0.05		
MB97_1	Oct-12	5.75	1960	1160	6	317	5.3	20.6	39.7	540	0	30	112	<0.2	0.048	<0.005	0.01	<0.01	0.38	0.02	0.13	0.06	0.02	<0.05		
MB97_1	Jan-13	5.77	1966	1120	4.9	309	5.4	26.5	36.7	512	0	31	112	<0.2	0.047	<0.005	0.01	<0.01	0.35	0.02	<0.06	0.05	0.03	<0.05		
MB97_1	Apr-13	5.6	2540	1480	8.4	383	6.7	30.5	57.3	729	0	35	113	<0.2	0.07	<0.005	0.03	<0.01	0.6	0.03	<0.06	0.06	0.02	<0.05		
MB97_1	Jul-13	5.22	2880	1540	11.6	406	7.3	34.9	72.2	849	0	15.7	113	<0.2	0.052	<0.005	0.03	<0.01	0.7	0.03	<0.06	0.07	0.05	<0.05		
MB97_1	Oct-13	5.56	1982	1140	7.3	309	4.7	19.3	41	568	0	14	82.9	<0.2	0.065	<0.005	<0.005	<0.01	0.4	0.01	<0.06	0.04	0.03	<0.05		
MB97_1	Jan-14	5.36	2156	1140	8	329	4.4	17.7	39.9	604	0	14.4	84.4	<0.2	0.143	<0.005	0.01	<0.01	0.37	0.01	<0.06	0.04	0.03	<0.05		
MB97_1	Apr-14	5.5	2268	1220	8.1	352	5	20.9	43.6	662	0	16.2	91.5	<0.2	0.134	<0.005	0.02	<0.01	0.431	0.017	0.18	0.05	0.013	<0.05		
MB97_1	Jul-14	5.47	2063	1140	9.4	339	5.1	22.2	43.5	567	0	37	93.6	<0.2	0.093	<0.005	0.014	<0.01	0.421	0.042	0.08	0.04	0.256	<0.05		
MB97_1	Oct-14	5.53	1882	1060	7.7	308	4	17.2	34.6	504	0	40	83.4	<0.2	0.236	<0.005	0.009	<0.01	0.314	0.015	0.17	0.04	0.092	<0.05		5.37
MB97_1	Jan-15	5.69	1731	1020	10.2	285	4.3	16.6	33.3	468	0	26	76.7	<0.2	0.14	<0.005	0.015	<0.01	0.312	0.01	0.32	0.04	0.107	<0.05		5.40
MB97_1	Apr-15	5.49	1871	1000	4.7	305	5.7	34.9	34.7	508	0	23	85.6	<0.2	0.126	<0.005	0.008	<0.01	0.272	0.012	0.27	0.04	0.033	<0.05		5.22
MB97_1	Jul-15	5.77	1968	1140	8.6	306	4.6	19.8	38.9	523	0	37	86.3	<0.2	0.251	<0.005	0.013	<0.01	0.357	0.019	0.17	0.05	0.025	<0.05		5.44
MB97_1	Oct-15	5.92	1498	869	5.9	248	3.9	13.8	26.7	386	0	42	76.1	<0.2	0.163	<0.005	0.01	<0.01	0.254	0.014	0.23	0.04	0.006	<0.05		5.59
MB97_1	Jan-16	5.8	1436	788	5.3	238	3.6	12.8	24.8	387	0	41	71.6	<0.2	0.145	<0.005	0.008	<0.01	0.242	0.012	0.22	0.04	0.01	<0.05		5.65
MB97_1	Apr-16	5.55	1863	977	7.2	293	4.8	19.6	32	470	0	28	78.9	<0.2	0.13	<0.005	0.014	<0.01	0.348	0.011	0.11	0.05	<0.005	<0.05		5.48
MB97_1	Jul-16	5.8	1659	904	6.3	271	4.2	15.8	31	439	0	32	75.1	<0.2	0.124	<0.005	0.011	<0.01	0.289	0.016	0.21	0.05	<0.005	<0.05		5.48
MB97_1	Oct-16	5.49	1911	1020	7	297	5	24.3	37.6	488	0	30	74.4	<0.2	0.113	<0.005	0.014	<0.01	0.327	0.013	0.16	0.05	<0.005	<0.05		5.1
MB97_1	Jan-17	5.7	1920	1120	10.4	311	4.5	20	40.3	531	0	33	74.2	<0.2	0.17	0.005	0.011	<0.01	0.347	0.021	0.26	0.05	0.03	<0.05		5.22
MB97_1	Apr-17	5.65	1839	1040	8.2	289	4.6	24.4	35.9	494	0	37	73.6	<0.2	0.224	0.005	<0.005	<0.01	0.305	0.017	0.58	0.05	0.02	<0.05		5.72
MB97_1	Jul-17	5.61	1984	1140	11.8	306	4.8	21.3	42.7	576	0	35	79.2	<0.2	0.244	0.005	0.008	<0.01	0.396	0.017	0.51	0.06	0.063	<0.05		5.26
Mean		**5.49**	**4544.1**	**2720.2**	**14.562**	**676**	**11.5**	**77.4**	**154.5**	**1524**	**0.0**	**26**	**144.2**	**0.0**	**0.055**	**0.000**	**0.047**	**0.00**	**1.343**	**0.055**	**0.11**	**0.11**	**0.058**	**0.004**		
Min		**4.66**	**1436**	**788**	**4.700**	**238**	**3.6**	**12.8**	**24.8**	**386**	**0.0**	**3**	**71.6**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.033**	**0.000**	**0.00**	**0.04**	**0.000**	**0.000**		
Max		**6.28**	**7170**	**4460**	**24.800**	**1022**	**18.9**	**140.3**	**271.0**	**2520**	**0.0**	**47**	**205**	**0.6**	**0.251**	**0.010**	**0.084**	**0.040**	**2.600**	**0.114**	**0.58**	**0.29**	**0.256**	**0.120**		
MB97_2	Jan-98	7.4	4600	2580	0.568	779	7.6	36.1	96.8	1580	0	127	32.3	0.2	<0.02	<0.005	0.026	0.03	0.941	0.056	0.08	0.1	0.191	<0.05		
MB97_2	May-98	7.17	4760	2700	0.503	764	7.2	33.9	99.6	1480	0	131	33	<0.2	<0.02	<0.005	0.022	<0.01	0.851	0.054	<0.06	0.11	0.123	<0.05		
MB97_2	Jul-98	6.5	5450	3060	0.667	801	10.4	52.4	153.6	1880	0	134	47.5	<0.2	<0.02	<0.005	0.027	0.02	1.5	0.064	<0.06	0.19	0.132	<0.05		
MB97_2	Oct-98	6.86	5780	3200	3	919	13.8	68.4	208	1980	0	132	61.7	0.2	<0.02	<0.005	0.028	0.05	1.9	0.078	1.1	0.22	0.224	<0.05		
MB97_2	Jan-99	6.84	5340	3100	0.598	880	10.2	45.7	148.9	1900	0	116	40.9	<0.2	<0.02	<0.005	0.029	0.01	1.1	0.079	<0.06	0.12	0.11	<0.05		
MB97_2	Apr-99	7.06	5510	3120	0.664	936	11.2	54.8	175	2100	0	116	49.8	<0.2	<0.02	<0.005	0.015	0.01	1.4	0.098	<0.06	0.27	0.12	<0.05		
MB97_2	Jul-99	6.85	5540	3280	0.502	896	10.3	49.4	165.2	1940	0	109	44.6	<0.2	<0.02	<0.005	0.021	<0.01	0.949	0.084	0.12	0.13	0.088	<0.05		
MB97_2	Jan-00	7.11	5440	3420	1.9	1003	11.3	52.1	182.1	1940	0	108	50	<0.2	0.05	<0.005	0.031	0.02	1.3	0.109	0.24	0.16	0.132	<0.05		
MB97_2	Mar-00	6.21	5310	3280	1.4	1007	7.8	38.7	145.1	1740	0	84	31.4	<0.2	<0.02	<0.005	0.025	0.02	0.739	0.111	0.16	0.1	0.086	<0.05		
MB97_2	Sep-00	6	5010	2800	2.2	870	6.9	29	105.9	1760	0	107	27.3	<0.2	<0.02	<0.005	0.025	0.02	0.63	0.088	0.25	0.09	0.091	<0.05		
MB97_2	Oct-00	6.54	4910	2840	0.672	817	8.9	34.5	124.1	1780	0	110	34.4	<0.2	<0.02	<0.005	0.012	0.02	0.684	0.077	0.25	0.12	0.075	<0.05		
MB97_2	Feb-01	6.02	4530	2460	0.873	784	6.9	26.4	100.1	1500	0	104	32	<0.2	<0.02	<0.005	0.014	<0.01	0.666	0.067	<0.06	0.08	0.042	<0.05		
MB97_2	Apr-01	5.37	4300	2300	0.849	749	6.3	23	87.3	1300	0	108	30.7	<0.2	<0.02	<0.005	0.009	<0.01	0.492	0.061	0.08	0.07	0.055	<0.05		
MB97_2	Jul-01	6.02	4230	2420	0.705	759	6.9	25.1	96.9	1480	0	109	36.9	<0.2	<0.02	<0.005	0.022	<0.01	0.578	0.063	0.16	0.08	0.057	<0.05		
MB97_2	Nov-01	6.21	3890	2160	0.618	689	5.8	19.6	71.9	1280	0	106	27.4	<0.2	<0.02	<0.005	0.015	<0.01	0.414	0.051	<0.06	0.07	0.038	<0.05		
MB97_2	Jan-02	6.52	3690	2140	0.463	652	5.1	16.9	61.5	1100	0	104	24.7	<0.2	0.03	<0.005	0.009	<0.01	0.358	0.048	<0.06	0.05	0.04	<0.05		
MB97_2	Apr-02	6.28	3480	2180	0.389	647	5.4	18.6	70	1140	0	100	26.4	2.6	<0.02	<0.005	0.008	<0.01	0.385	0.057	0.08	0.06	0.028	<0.05		
MB97_2	Jul-02	6.12	3500	2020	0.742	624	5.5	19.2	72.3	1180	0	108	31.1	<0.2	<0.02	<0.005	0.007	<0.01	0.42	0.052	0.12	0.07	0.038	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_2	Nov-02	6.31	4150	2480	1	676	7.5	32.6	102	1380	0	87	42.8	<0.2	0.014	<0.005	0.013	0.02	0.533	0.061	0.19	0.11	0.07	<0.05		
MB97_2	Jan-03	6.02	3890	2160	1.3	624	6	20.9	77	1040	0	108	31.2	0.5	<0.001	<0.005	0.014	0.01	0.008	<0.005	0.12	0.07	<0.005	<0.05		
MB97_2	Apr-03	6.07	3940	2300	1.1	667	6.8	24.4	93.5	1240	0	104	35.8	<0.2	<0.001	<0.005	0.02	<0.01	0.465	0.034	0.07	0.09	0.048	<0.05		
MB97_2	Jul-03	6.15	4180	2380	0.336	735	7.7	34.8	116	1520	0	94	41.3	<0.2	0.003	<0.005	0.01	0.01	0.586	0.069	0.17	0.1	0.073	<0.05		
MB97_2	Oct-03	6.02	3730	2240	0.15	704	4.2	20.5	63.9	1260	0	55	14.5	<0.2	0.002	<0.005	0.007	<0.01	0.283	0.058	<0.06	0.05	0.034	<0.05		
MB97_2	Jan-04	6.43	4800	2900	1.9	708	7.6	41.9	147	1660	0	106	44.5	<0.2	0.001	<0.005	0.013	<0.01	1.1	0.065	<0.06	0.09	0.025	<0.05		
MB97_2	Apr-04	6.09	3860	2340	0.522	623	5.7	26.8	96.4	1300	0	101	36.5	<0.2	0.002	<0.005	0.015	<0.01	0.551	0.052	<0.06	0.08	0.036	0.13		
MB97_2	Jul-04	6.14	3710	2560	0.224	731	7.6	34.5	124	1320	0	110	45.3	<0.2	<0.001	<0.005	0.011	<0.01	0.67	0.057	<0.06	0.1	0.035	<0.05		
MB97_2	Oct-04	6.13	4510	2780	2.2	696	7.3	46.7	151	1660	0	118	46.6	<0.2	0.003	<0.005	0.018	<0.01	1.4	0.061	0.07	0.1	0.045	<0.05		
MB97_2	Jan-05	6.64	5150	3020	5	748	10.4	51.6	170	1600	0	143	51.4	<0.2	0.002	<0.005	0.023	0.01	1.9	0.053	0.12	0.11	0.09	<0.05		
MB97_2	Apr-05	6.36	4180	2300	0.451	607	7.1	33	118	1340	0	136	49.9	<0.2	<0.001	<0.005	0.014	0.01	0.75	0.046	<0.06	0.09	<0.005	<0.05		
MB97_2	Jul-05	6.18	3400	1900	0.315	520	4.4	13.4	48.3	974	0	113	24.7	<0.2	0.002	<0.005	0.008	<0.01	0.17	0.023	0.1	0.05	0.031	<0.05		
MB97_2	Oct-05	6	5440	3280	6.3	835	11.6	62.9	200	1780	0	158	66.5	2.6	0.001	<0.005	0.041	0.03	2.4	0.068	0.18	0.14	0.071	<0.05		
MB97_2	Jan-06	6.67	4450	2580	1.9	691	9	45.1	149	1460	0	152	61.3	<0.2	0.004	<0.005	0.018	0.02	1.3	0.056	0.13	0.13	0.046	<0.05		
MB97_2	Apr-06	6.28	5120	3060	5.1	790	10.9	61.3	211	1820	0	165	64.8	<0.2	0.001	<0.005	0.031	<0.01	2.3	0.07	0.32	0.14	0.047	<0.05		
MB97_2	Jul-06	6.31	4400	2280	0.473	593	7.2	33.1	117	1400	0	155	52.2	<0.2	<0.001	<0.005	0.017	<0.01	0.796	0.046	0.13	0.1	0.026	<0.05		
MB97_2	Oct-06	6.57	4220	2740	0.36	645	9	49	162	1420	0	158	55.5	<0.2	0.002	<0.005	0.01	<0.01	0.89	0.05	0.08	0.12	0.04	<0.05		
MB97_2	Jan-07	6.32	4870	3080	3.1	746	10.9	61.8	216	1820	0	168	61.5	<0.2	0.002	<0.005	0.02	0.09	1.8	0.07	0.16	0.13	0.08	<0.05		
MB97_2	Apr-07	6.24	4860	2860	1.1	724	9.5	49.4	184	1720	0	162	63	<0.2	<0.001	<0.005	0.01	0.01	1.1	0.07	0.13	0.13	0.04	<0.05		
MB97_2	Jul-07	6.21	4760	3120	1.9	754	10.5	54.3	209	1660	0	177	64.2	<0.2	0.003	<0.005	0.02	<0.01	1.4	0.06	<0.06	0.14	0.01	<0.05		
MB97_2	Oct-07	6.37	4760	3100	4.4	731	12.2	62.3	218	1640	0	177	64.7	<0.2	0.004	<0.005	0.04	0.01	2.1	0.06	0.09	0.14	0.07	<0.05		
MB97_2	Jan-08	6.29	4290	2720	0.77	696	10.4	49.9	185	1580	0	164	63	<0.2	0.005	<0.005	0.02	0.01	1.2	0.05	0.13	0.13	0.04	<0.05		
MB97_2	Apr-08	6.17	5420	3540	6.2	802	12.6	74.4	259	1960	0	172	70	<0.2	0.005	<0.005	0.04	0.01	2.5	0.06	0.87	0.15	0.24	<0.05		
MB97_2	Jul-08	6.29	4260	2560	4.7	674	11.9	52.5	167	1520	0	183	63.3	<0.2	0.041	<0.005	0.02	0.01	1.7	0.06	0.22	0.12	0.34	<0.05		
MB97_2	Oct-08	6.49	3940	2520	2.8	686	11	52.5	191	1480	0	182	69.4	<0.2	0.003	<0.005	0.02	0.02	1.5	0.06	1	0.14	0.07	<0.05		
MB97_2	Jan-09	6.42	4050	2260	1.1	632	9.1	37.8	139	1240	0	191	58.4	<0.2	0.001	<0.005	0.02	<0.01	0.95	0.04	0.19	0.12	0.02	<0.05		
MB97_2	Apr-09	6.45	6630	4000	8.6	883	14	77.1	278	2120	0	190	73.8	<0.2	0.002	<0.005	0.06	0.01	3.2	0.08	0.37	0.17	0.04	<0.05		
MB97_2	Jul-09	6.7	4040	2300	1.4	630	8.2	33.5	122	1260	0	202	58.8	<0.2	0.002	<0.005	0.01	<0.01	0.9	0.04	0.22	0.11	0.03	<0.05		
MB97_2	Oct-09	6.71	3460	2160	1.8	621	8.7	34.7	137	1120	0	214	58.1	<0.2	0.001	<0.005	0.02	0.01	1.1	0.04	0.47	0.11	0.02	<0.05		
MB97_2	Jan-10	6.59	6750	4580	19.3	976	16.5	94.4	371	2400	0	220	76.3	<0.2	0.002	<0.005	0.06	<0.01	4.6	0.08	0.28	0.17	0.03	<0.05		
MB97_2	Apr-10	7.02	5430	3700	1.8	843	12.5	64.6	267	1940	0	179	79.7	<0.2	0.001	<0.005	0.02	<0.01	1.9	0.09	0.47	0.16	0.07	<0.05		
MB97_2	Jul-10	6.4	6100	3680	7	898	14.2	76.7	305	2100	0	186	77.3	<0.2	0.002	<0.005	0.05	0.03	3	0.09	1.1	0.17	0.08	<0.05		
MB97_2	Oct-10	6.23	5610	3580	3	851	13.7	70.2	283	2020	0	181	74.4	<0.2	0.002	<0.005	0.03	<0.01	2.4	0.08	<0.06	0.16	0.02	<0.05		
MB97_2	Jan-11	6.32	6740	4400	2.1	957	15.8	89.9	356	2340	0	165	85.4	<0.2	0.002	<0.005	0.03	<0.01	2.8	0.09	0.07	0.2	0.05	<0.05		
MB97_2	Jul-11	6.51	6460	4360	8	1010	13.2	92.6	368	2440	0	166	86	<0.2	<0.001	<0.005	0.05	<0.01	3.6	0.07	<0.06	0.17	0.05	<0.05		
MB97_2	Oct-11	6.5	6860	4040	6.2	968	14.2	88.5	349	2400	0	187	87.2	<0.2	0.003	<0.005	0.05	<0.01	3.3	0.07	<0.06	0.18	0.06	<0.05		
MB97_2	Jan-12	6.38	7210	4680	16.1	1020	15.4	103	344	2680	0	250	77.6	<0.2	0.001	<0.005	0.05	<0.01	4.6	0.07	<0.06	0.19	0.06	<0.05		
MB97_2	Apr-12	6.28	7930	4720	14.1	1010	15.4	109	356	2780	0	176	81.7	<0.2	0.003	<0.005	0.05	<0.01	4.5	0.07	<0.06	0.19	0.07	0.05		
MB97_2	Jul-12	6.07	7330	4140	2.5	932	15.4	91.6	308	2460	0	154	86.5	<0.2	0.001	<0.005	0.04	<0.01	2.8	0.09	0.11	0.21	0.04	<0.05		
MB97_2	Oct-12	6.34	7030	4180	3.2	974	17.8	97.3	300	2440	0	154	87.3	<0.2	0.002	<0.005	0.04	0.02	2.9	0.09	1.3	0.31	0.12	<0.05		
MB97_2	Jan-13	6.36	6980	4440	16	1010	14.9	103	318	2340	0	158	65.4	<0.2	0.002	<0.005	0.04	<0.01	4.2	0.07	<0.06	0.19	0.02	<0.05		
MB97_2	Jul-13	6.27	8150	4420	15	1030	15.8	103	326	2760	0	182	73.6	<0.2	0.003	<0.005	0.04	<0.01	4.4	0.08	<0.06	0.23	0.07	0.06		
MB97_2	Oct-13	6.51	9080	5620	54.6	1210	16.7	125	388	3280	0	228	63.8	<0.2	0.002	<0.005	0.04	<0.01	8.5	0.04	0.23	0.15	0.09	<0.05		
MB97_2	Jan-14	6.38	8880	5300	53.2	1110	17.2	137	378	3120	0	205	64.1	<0.2	<0.001	<0.005	0.04	<0.01	8.1	0.03	<0.06	0.15	0.06	<0.05		
MB97_2	Apr-14	6.46	8960	5440	35.6	1120	16.5	116	372	3140	0	240	77.9	<0.2	0.011	<0.005	0.077	0.02	7.1	0.073	1.2	0.19	0.154	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_2	Jan-15	6.37	9200	4960	23.1	1110	25.4	133	384	2740	0	203	79.1	<0.2	0.005	0.014	0.081	0.05	6.5	0.071	1.7	0.23	0.182	<0.05		
MB97_2	Apr-15	6.27	9200	5100	39.7	1190	18.9	139	411	3320	0	215	70.4	<0.2	0.003	<0.005	0.057	<0.01	7.7	0.04	0.39	0.18	0.048	<0.05		5.95
MB97_2	Jul-15	6.49	9490	5600	37.7	1150	18.3	148	403	3380	0	262	81.4	<0.2	0.008	<0.005	0.064	<0.01	7.6	0.043	0.18	0.18	0.064	<0.05		5.95
MB97_2	Oct-15	6.47	8380	5560	47.4	1180	20.8	146	419	3100	0	279	83.1	<0.2	0.005	0.005	0.054	<0.01	8.2	0.039	0.44	0.19	0.043	<0.05		6.34
MB97_2	Jan-16	6.42	8360	5560	36.8	1150	18.1	133	414	2980	0	278	82.6	<0.2	0.003	<0.005	0.068	<0.01	8.2	0.053	0.29	0.18	0.025	<0.05		6.29
MB97_2	Apr-16	6.32	9710	5520	41.5	1170	18.5	139	425	3200	0	208	89.7	0.24	0.004	<0.005	0.066	<0.01	8.1	0.051	0.27	0.19	<0.005	<0.05		6.14
MB97_2	Jul-16	6.43	11050	5720	31.3	1310	18.4	142	417	3280	0	204	99.1	<0.2	0.005	<0.005	0.062	<0.01	7.2	0.072	0.36	0.21	0.04	<0.05		6.09
MB97_2	Oct-16	6.19	11020	5240	19.8	1180	19.4	145	415	2920	0	181	101	<0.2	0.003	<0.005	0.075	<0.01	6.4	0.09	0.38	0.23	0.046	0.05		5.77
MB97_2	Jan-17	5.94	11160	5820	29.9	1250	19.6	138	418	3280	0	118	61.4	<0.2	0.001	<0.005	0.026	<0.01	6.9	0.064	<0.06	0.21	0.097	<0.05		5.77
MB97_2	Apr-17	6.42	11250	5760	49.4	1150	19.2	137	412	3260	0	336	45.2	<0.2	0.004	<0.005	<0.005	<0.01	7.9	0.022	0.75	0.18	0.036	<0.05		6.43
MB97_2	Jul-17	6.49	8980	5880	49.8	1140	18	137	415	3280	0	309	72.9	<0.2	0.004	<0.005	<0.005	<0.01	8.1	0.024	0.83	0.17	0.012	<0.05		6.25
Mean		**6.39**	**5905.9**	**3494.3**	**10.107**	**860**	**11.7**	**67.8**	**223.5**	**1996**	**0.0**	**161**	**58.2**	**0.1**	**0.004**	**0.000**	**0.030**	**0.01**	**2.735**	**0.062**	**0.25**	**0.14**	**0.068**	**0.004**		
Min		**5.37**	**3400**	**1900**	**0.150**	**520**	**4.2**	**13.4**	**48.3**	**974**	**0.0**	**55**	**14.5**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.008**	**0.000**	**0.00**	**0.05**	**0.000**	**0.000**		
Max		**7.40**	**11250**	**5880**	**54.600**	**1310**	**25.4**	**148.0**	**425.0**	**3380**	**0.0**	**336**	**101**	**2.6**	**0.050**	**0.014**	**0.081**	**0.090**	**8.500**	**0.111**	**1.70**	**0.31**	**0.340**	**0.130**		
MB97_3	Jan-98	6.98	5340	3100	0.093	839	13.8	77	123	1840	0	70	107	<0.2	0.03	<0.005	0.016	<0.01	1.2	0.026	0.13	0.05	0.063	<0.05		
MB97_3	May-98	5.67	5340	3140	0.394	824	13.3	72.1	114.9	1780	0	71	106.5	<0.2	<0.02	<0.005	0.022	<0.01	1.2	0.019	0.08	0.06	0.029	<0.05		
MB97_3	Jul-98	5.72	5360	3080	0.272	818	14.2	73.2	116.2	1820	0	66	104	<0.2	<0.02	<0.005	0.019	<0.01	1.2	0.028	0.08	0.11	0.02	<0.05		
MB97_3	Oct-98	5.97	5130	3000	0.288	905	15.6	81.6	135.3	1820	0	68	116	<0.2	<0.02	<0.005	0.014	<0.01	1.3	0.024	0.16	0.08	0.021	<0.05		
MB97_3	Jan-99	6.2	5170	3120	0.343	866	14	74.3	125.6	1860	0	71	107.4	<0.2	0.04	<0.005	0.018	<0.01	1.2	0.02	0.06	0.04	0.027	<0.05		
MB97_3	Apr-99	5.96	5250	3000	0.352	889	16	83.2	134	1740	0	68	106.6	<0.2	<0.02	<0.005	0.015	<0.01	1.5	0.035	0.11	0.2	0.032	<0.05		
MB97_3	Jul-99	5.87	5260	3240	0.288	845	14.4	78.3	126.3	1840	0	70	108.2	<0.2	<0.02	<0.005	0.013	<0.01	1.3	0.035	0.19	0.05	0.028	0.07		
MB97_3	Jan-00	5.82	5160	3320	0.23	961	16.6	89.2	154	1880	0	65	118.8	<0.2	0.06	<0.005	0.018	<0.01	1.5	0.028	0.11	0.07	0.027	<0.05		
MB97_3	Mar-00	6.09	5190	3180	0.164	900	15.1	78.9	136.3	1620	0	64	110.3	<0.2	0.02	<0.005	0.021	<0.01	1.3	0.023	0.16	0.06	0.015	<0.05		
MB97_3	Sep-00	5.83	5490	3020	0.137	896	15.4	82.6	138.5	1800	0	70	110.3	<0.2	<0.02	<0.005	0.021	<0.01	1.3	0.031	0.16	0.05	0.011	<0.05		
MB97_3	Oct-00	5.83	5410	3120	0.125	852	15.5	75.4	132	1900	0	68	98.3	<0.2	<0.02	0.007	0.014	<0.01	1.2	0.03	0.12	0.05	0.014	<0.05		
MB97_3	Feb-01	5.88	5500	3060	0.141	891	15.3	77.8	135.1	1860	0	64	109.4	<0.2	0.03	<0.005	0.009	<0.01	1.3	0.03	0.13	0.05	0.011	<0.05		
MB97_3	Apr-01	5.84	5660	3100	0.144	898	16	83.1	142.8	1980	0	63	108.8	<0.2	<0.02	<0.005	0.02	<0.01	1.3	0.022	0.08	0.05	0.013	<0.05		
MB97_3	Jul-01	5.86	5390	3080	0.134	917	15.8	83.6	144.9	1920	0	67	110.6	<0.2	<0.02	<0.005	0.02	<0.01	1.3	0.029	0.12	0.05	<0.005	<0.05		
MB97_3	Nov-01	6.05	5540	3200	0.065	894	15.4	81.3	134.8	1880	0	66	108.2	<0.2	<0.02	<0.005	0.015	<0.01	1.3	0.027	0.07	0.05	0.007	<0.05		
MB97_3	Jan-02	6.47	5760	3480	0.125	884	15	81.1	132.1	1860	0	66	105.6	<0.2	<0.02	<0.005	0.016	<0.01	1.3	0.022	0.07	0.05	<0.005	<0.05		
MB97_3	Apr-02	6.12	5370	3360	0.037	884	15.8	84.5	142.9	1920	0	66	107.7	<0.2	<0.02	<0.005	0.019	<0.01	1.4	0.03	0.1	0.05	0.007	<0.05		
MB97_3	Jul-02	5.95	5380	3140	0.188	883	15.9	84.5	143.9	1840	0	65	104.9	<0.2	0.03	<0.005	0.014	<0.01	1.4	0.027	0.12	0.05	0.012	<0.05		
MB97_3	Nov-02	7.12	5530	3400	1.5	871	16.2	86.6	146	1820	0	67	108	<0.2	0.01	<0.005	0.023	<0.01	1.4	0.033	0.29	0.05	0.07	<0.05		
MB97_3	Jan-03	5.77	5740	3320	0.348	882	15.4	80.4	140	1760	0	69	108	<0.2	0.004	<0.005	0.017	<0.01	0.021	<0.005	0.15	0.05	<0.005	<0.05		
MB97_3	Apr-03	5.86	5560	3380	0.511	886	17.1	84.4	147	1840	0	70	113	<0.2	0.008	<0.005	0.032	<0.01	1.3	<0.005	0.16	0.07	0.024	<0.05		
MB97_3	Jul-03	6.07	5350	3360	0.113	953	15.9	90.2	155	1860	0	68	113	<0.2	0.009	<0.005	0.019	<0.01	1.4	0.025	0.14	0.06	0.015	<0.05		
MB97_3	Oct-03	5.73	4800	3260	0.087	896	14.3	87.3	145	2000	0	65	108	<0.2	0.001	<0.005	0.019	<0.01	1.4	0.03	0.09	0.05	<0.005	<0.05		
MB97_3	Jan-04	6.24	5420	3460	0.197	834	13.2	83.1	138	1840	0	85	106	<0.2	0.01	<0.005	0.015	<0.01	1.3	0.032	0.15	0.04	<0.005	<0.05		
MB97_3	Apr-04	5.85	5240	3400	0.155	849	13.5	81.3	136	1820	0	64	103	<0.2	0.012	<0.005	0.019	<0.01	1.4	0.021	<0.06	0.04	<0.005	0.07		
MB97_3	Jul-04	6.24	4680	3540	0.242	968	16.7	88.4	152	1800	0	65	114	<0.2	0.01	<0.005	0.018	<0.01	1.4	0.029	0.12	0.06	0.012	<0.05		
MB97_3	Oct-04	5.88	5330	3400	0.108	847	13.3	91.7	141	1960	0	65	110	<0.2	0.008	<0.005	0.018	<0.01	1.4	0.032	0.13	0.05	0.011	<0.05		
MB97_3	Jan-05	6.32	5920	3480	0.413	954	16.2	87.1	150	1840	0	67	101	<0.2	0.013	<0.005	0.017	<0.01	1.3	0.027	0.16	0.06	0.009	<0.05		
MB97_3	Apr-05	5.97	6120	3500	0.103	884	15.1	88.9	148	1740	0	66	107	<0.2	0.006	<0.005	0.019	<0.01	1.4	0.026	<0.06	0.05	<0.005	<0.05		
MB97_3	Jul-05	6.06	6050	3660	0.015	953	15.6	92.8	153	1860	0	65	109	<0.2	0.006	<0.005	0.007	<0.01	1.4	0.03	0.09	0.05	0.023	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_3	Oct-05	5.71	6190	3800	0.088	996	16.2	93.3	159	2100	0	69	109	<0.2	0.007	<0.005	0.019	<0.01	1.5	0.025	0.15	0.05	0.006	<0.05		
MB97_3	Jan-06	6.04	5730	3340	0.137	944	15.3	87.2	148	2160	0	69	107	<0.2	0.009	<0.005	0.019	<0.01	1.5	0.029	0.15	0.05	0.007	<0.05		
MB97_3	Apr-06	5.84	5530	3480	0.071	946	15.5	89.9	149	1940	0	67	107	<0.2	0.009	<0.005	0.017	<0.01	1.5	0.027	0.24	0.05	0.005	<0.05		
MB97_3	Jul-06	5.9	5660	3160	0.064	950	15.8	90.8	152	1960	0	68	106	<0.2	0.004	<0.005	0.015	<0.01	1.5	0.033	0.13	0.05	<0.005	<0.05		
MB97_3	Oct-06	6.01	5610	3540	0.08	922	15.4	90.1	162	1880	0	71	100	<0.2	0.011	<0.005	0.01	<0.01	1.4	0.03	0.08	0.05	0.05	<0.05		
MB97_3	Jan-07	5.96	5370	3460	0.07	891	14.9	88.3	156	1960	0	70	101	<0.2	0.004	<0.005	0.02	<0.01	1.4	0.03	0.18	0.05	<0.005	<0.05		
MB97_3	Apr-07	5.99	5810	3480	0.11	964	16.4	97.5	171	1980	0	71	103	<0.2	0.004	<0.005	0.02	<0.01	1.6	0.04	0.09	0.06	0.02	<0.05		
MB97_3	Jul-07	5.77	5670	3760	0.12	986	16.5	95.7	175	2020	0	72	111	<0.2	0.007	<0.005	0.02	<0.01	1.5	0.03	0.13	0.06	0.01	<0.05		
MB97_3	Oct-07	5.79	5490	3760	0.11	952	16.2	95.6	173	1960	0	69	108	<0.2	0.009	<0.005	0.02	<0.01	1.5	0.03	0.16	0.05	<0.005	<0.05		
MB97_3	Jan-08	6.03	5570	3540	0.11	982	17.4	99.7	175	2020	0	71	111	<0.2	0.011	<0.005	0.02	<0.01	1.5	0.03	0.14	0.06	0.02	<0.05		
MB97_3	Apr-08	5.79	5440	3380	0.12	967	16.3	99.1	179	1820	0	67	109	<0.2	0.01	<0.005	0.03	<0.01	1.6	0.03	0.71	0.05	0.01	<0.05		
MB97_3	Jul-08	5.81	5480	3480	0.09	991	18.6	103	171	2040	0	67	120	<0.2	0.014	<0.005	0.02	<0.01	1.6	0.03	0.23	0.06	0.01	<0.05		
MB97_3	Oct-08	5.87	5730	3620	0.14	968	16.8	98.6	171	2000	0	69	117	<0.2	0.016	<0.005	0.02	<0.01	1.6	0.03	0.18	0.06	0.01	<0.05		
MB97_3	Jan-09	5.95	6210	3660	0.11	963	17.5	95.5	163	2060	0	72	114	<0.2	0.017	<0.005	0.02	<0.01	1.5	0.03	0.15	0.05	<0.005	<0.05		
MB97_3	Apr-09	6.11	6350	3880	0.24	938	17.1	95.5	161	2080	0	74	108	<0.2	0.012	<0.005	0.03	<0.01	1.6	0.03	0.12	0.06	<0.005	<0.05		
MB97_3	Jul-09	6.03	6310	3580	0.15	946	17.1	98	163	2060	0	74	109	<0.2	0.012	<0.005	0.02	<0.01	1.6	0.02	0.22	0.05	<0.005	<0.05		
MB97_3	Oct-09	6.01	5380	3520	0.12	972	17.4	98	179	1920	0	76	110	<0.2	0.01	<0.005	0.03	<0.01	1.6	0.03	0.19	0.05	<0.005	<0.05		
MB97_3	Jan-10	6.12	5740	3840	0.14	965	17.7	97.7	183	2060	0	73	110	<0.2	0.013	<0.005	0.02	<0.01	1.5	0.03	0.21	0.05	0.02	<0.05		
MB97_3	Apr-10	6.39	5810	3820	0.16	943	17.2	98.1	182	2060	0	81	111	<0.2	0.014	<0.005	0.01	<0.01	1.6	0.04	0.16	0.05	0.01	<0.05		
MB97_3	Jul-10	6.04	6090	3840	0.14	984	17.9	104	190	2060	0	78	112	<0.2	0.011	<0.005	0.02	<0.01	1.6	0.02	0.16	0.05	<0.005	<0.05		
MB97_3	Oct-10	6.02	5790	3780	0.04	971	17.7	101	186	2080	0	74	106	<0.2	0.01	<0.005	0.02	<0.01	1.5	0.03	0.11	0.05	0.01	<0.05		
MB97_3	Jan-11	6.06	6120	3900	0.09	1000	18.5	106	198	2180	0	77	113	<0.2	0.011	<0.005	0.02	<0.01	1.6	0.03	0.17	0.06	0.01	<0.05		
MB97_3	Apr-11	6.03	6240	3720	0.06	953	16.2	104	190	2100	0	78	116	<0.2	0.01	<0.005	0.02	<0.01	1.6	0.03	0.11	0.07	0.02	<0.05		
MB97_3	Jul-11	6.12	5790	4000	0.1	1060	14.8	107	199	2180	0	76	111	<0.2	0.003	<0.005	0.02	<0.01	1.6	0.02	<0.06	0.06	0.03	<0.05		
MB97_3	Oct-11	6.04	6300	3800	0.24	996	15.7	104	195	2200	0	88	111	<0.2	0.011	<0.005	0.02	<0.01	1.5	0.03	<0.06	0.07	0.04	<0.05		
MB97_3	Jan-12	5.88	6090	4100	0.05	1020	15.6	108	172	2260	0	87	109	<0.2	0.01	<0.005	0.02	<0.01	1.6	0.03	<0.06	0.06	0.03	<0.05		
MB97_3	Apr-12	6.06	6740	3800	0.06	998	15.3	106	171	2280	0	73	110	<0.2	0.011	<0.005	0.03	<0.01	1.6	0.02	<0.06	0.06	0.04	<0.05		
MB97_3	Jul-12	5.85	6620	3860	0.09	983	17.3	111	171	2240	0	71	111	<0.2	0.009	<0.005	0.02	<0.01	1.6	0.03	0.08	0.07	0.02	<0.05		
MB97_3	Oct-12	6.1	6720	4080	0.08	1040	16.1	112	167	2340	0	70	115	<0.2	0.01	<0.005	0.02	<0.01	1.6	0.02	0.13	0.15	0.03	<0.05		
MB97_3	Jan-13	6.19	7010	4160	0.1	1020	15	110	164	2320	0	72	112	<0.2	0.01	<0.005	0.02	<0.01	1.7	0.03	<0.06	0.06	<0.005	<0.05		
MB97_3	Apr-13	6.15	6860	4060	0.31	1060	16	116	171	2320	0	74	118	<0.2	0.018	<0.005	0.05	<0.01	2.2	0.04	0.09	0.06	<0.005	<0.05		
MB97_3	Jul-13	6.04	7230	4060	0.19	1060	16.1	114	177	2360	0	73	115	<0.2	0.012	<0.005	0.03	<0.01	1.8	0.03	<0.06	0.06	0.04	<0.05		
MB97_3	Oct-13	6.17	6810	4200	0.14	1030	15.2	112	169	2360	0	70	116	<0.2	0.01	<0.005	0.01	<0.01	1.7	0.03	0.07	0.05	0.05	<0.05		
MB97_3	Jan-14	6.1	6770	4020	0.14	1020	14.9	106	164	2300	0	67	115	<0.2	0.009	<0.005	0.02	<0.01	1.7	0.03	0.07	0.06	<0.005	<0.05		
MB97_3	Apr-14	6.4	7020	4160	0.173	1080	15.4	114	172	2480	0	74	117	<0.2	0.01	<0.005	0.021	<0.01	1.8	0.038	0.27	0.06	<0.005	<0.05		
MB97_3	Jul-14	5.86	6910	4260	0.208	1090	15.6	117	175	2340	0	98	116	<0.2	0.009	<0.005	0.021	<0.01	1.7	0.034	<0.06	0.04	<0.005	<0.05		5.73
MB97_3	Oct-14	5.85	7140	4300	0.099	1070	15.8	118	174	2360	0	83	117	<0.2	0.01	<0.005	0.02	<0.01	1.7	0.036	<0.06	0.06	0.077	<0.05		5.43
MB97_3	Jan-15	6.22	7020	3880	0.139	1050	15.9	120	177	2040	0	72	109	<0.2	0.01	<0.005	0.023	<0.01	1.7	0.024	0.08	0.06	0.054	<0.05		5.71
MB97_3	Apr-15	5.93	7120	4060	0.107	1100	16.3	120	177	2380	0	73	103	<0.2	0.011	<0.005	0.019	<0.01	1.7	0.026	0.19	0.06	<0.005	<0.05		5.57
MB97_3	Jul-15	6.01	7330	4440	0.138	1100	16.3	125	184	2420	0	78	117	<0.2	0.01	<0.005	0.025	<0.01	1.8	0.032	<0.06	0.06	0.011	<0.05		5.71
MB97_3	Oct-15	5.95	6700	3980	0.176	1090	16.5	123	181	2280	0	76	117	<0.2	0.01	<0.005	0.023	<0.01	1.7	0.031	<0.06	0.07	0.009	<0.05		5.46
MB97_3	Jan-16	5.92	6610	4300	0.333	1100	16.6	129	187	2340	0	78	114	<0.2	0.01	<0.005	0.022	<0.01	1.9	0.041	0.2	0.06	<0.005	<0.05		5.66
MB97_3	Apr-16	6.01	7440	4240	0.165	1100	16.6	127	184	2300	0	71	118	<0.2	0.009	<0.005	0.02	<0.01	1.8	0.036	0.06	0.07	<0.005	<0.05		5.7
MB97_3	Jul-16	6.13	7400	4380	0.121	1250	16.4	131	192	2420	0	71	118	<0.2	0.011	<0.005	0.022	<0.01	1.8	0.032	0.23	0.07	<0.005	<0.05		5.63
MB97_3	Oct-16	5.79	8230	4360	0.058	1100	15.9	121	180	2260	0	70	114	<0.2	0.011	<0.005	0.02	<0.01	1.7	0.033	0.25	0.06	<0.005	<0.05		5.73

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	**pH**	**uS/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**Field**	**Field**
MB97_3	Jan-17	5.65	8170	4200	0.052	1140	15.8	120	181	2280	0	39	120	<0.2	0.009	<0.005	<0.005	<0.01	1.7	0.038	<0.06	0.06	0.045	<0.05		5.65
Mean		**6.01**	**5997.2**	**3630.8**	**0.173**	**964**	**15.9**	**97.1**	**160.3**	**2038**	**0.0**	**71**	**110.4**	**0.0**	**0.010**	**0.000**	**0.020**	**0.00**	**1.495**	**0.029**	**0.12**	**0.06**	**0.016**	**0.002**		
Min		**5.65**	**4680**	**3000**	**0.015**	**818**	**13.2**	**72.1**	**114.9**	**1620**	**0.0**	**39**	**98.3**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.021**	**0.000**	**0.00**	**0.04**	**0.000**	**0.000**		
Max		**7.12**	**8230**	**4440**	**1.500**	**1250**	**18.6**	**131.0**	**199.0**	**2480**	**0.0**	**98**	**120**	**0.0**	**0.060**	**0.007**	**0.050**	**0.000**	**2.200**	**0.041**	**0.71**	**0.20**	**0.077**	**0.070**		
MB97_4	Jan-98	6.31	3990	2220	0.453	478	9.1	73.3	173.5	1420	0	52	23	<0.2	<0.02	0.021	0.045	<0.01	0.57	0.056	0.18	0.13	0.206	<0.05		
MB97_4	May-98	5.48	4230	2500	0.589	461	8.2	70.2	168.8	1360	0	51	22.2	<0.2	<0.02	<0.005	0.044	<0.01	0.531	0.048	0.07	0.1	0.067	<0.05		
MB97_4	Jul-98	5.52	4360	2380	0.768	479	9.4	76.1	180	1480	0	47	21.6	<0.2	<0.02	<0.005	0.052	<0.01	0.603	0.062	0.2	0.13	0.065	<0.05		
MB97_4	Oct-98	5.72	4150	2140	0.678	521	9.3	82.5	205	1480	0	50	25.2	<0.2	<0.02	<0.005	0.048	<0.01	0.619	0.062	0.15	0.11	0.067	<0.05		
MB97_4	Jan-99	5.54	4340	2420	0.846	527	9.7	83.5	206.3	1620	0	50	25.5	<0.2	<0.02	<0.005	0.052	<0.01	0.635	0.063	0.13	0.09	0.079	<0.05		
MB97_4	Apr-99	5.79	4460	2400	0.856	562	11.2	95.2	227.3	1500	0	48	24.5	<0.2	<0.02	<0.005	0.062	<0.01	0.823	0.092	0.1	0.16	0.087	<0.05		
MB97_4	Jul-99	5.69	4350	2640	0.405	515	10.1	85	207.6	1560	0	48	25	<0.2	<0.02	<0.005	0.05	<0.01	0.618	0.066	0.19	0.1	0.055	<0.05		
MB97_4	Jan-00	5.6	4240	2680	0.782	592	11.2	91	230.4	1560	0	46	28.6	<0.2	0.06	<0.005	0.064	<0.01	0.712	0.073	0.25	0.12	0.079	<0.05		
MB97_4	Mar-00	5.78	4310	2660	0.471	549	10.3	86.1	218.3	1420	0	45	25.2	<0.2	0.04	<0.005	0.045	<0.01	0.652	0.06	0.07	0.1	0.051	<0.05		
MB97_4	Sep-00	5.66	4470	2400	0.255	550	10.1	85.4	213.8	1540	0	49	25.1	<0.2	<0.02	<0.005	0.05	<0.01	0.633	0.067	0.18	0.09	0.05	<0.05		
MB97_4	Oct-00	5.62	4520	2500	0.316	499	9.7	77.1	200.4	1920	0	46	21.7	<0.2	<0.02	<0.005	0.039	<0.01	0.56	0.069	0.17	0.09	0.053	<0.05		
MB97_4	Feb-01	5.55	4730	2460	0.433	558	10.7	88.8	227.6	1620	0	45	25.3	<0.2	<0.02	<0.005	0.05	<0.01	0.671	0.068	0.15	0.1	0.055	<0.05		
MB97_4	Apr-01	5.58	4750	2640	0.423	553	10.9	91.4	232.6	1880	0	43	23.6	<0.2	<0.02	<0.005	0.056	<0.01	0.668	0.065	0.25	0.1	0.054	<0.05		
MB97_4	Jul-01	5.48	4470	2500	0.321	557	10.5	89.9	232.3	1540	0	44	22.6	<0.2	<0.02	<0.005	0.056	<0.01	0.659	0.074	0.15	0.1	0.045	<0.05		
MB97_4	Nov-01	5.67	4480	2620	0.192	537	10.2	85.5	214.8	1540	0	44	23	<0.2	<0.02	<0.005	0.05	<0.01	0.629	0.068	0.12	0.1	0.06	<0.05		
MB97_4	Jan-02	6.14	4670	3080	0.298	529	10.1	86.4	211.3	1580	0	45	22.1	<0.2	0.04	<0.005	0.051	<0.01	0.651	0.067	0.16	0.09	0.045	<0.05		
MB97_4	Apr-02	5.83	4400	2620	0.137	524	10.5	87.4	223.1	1540	0	44	21.6	<0.2	<0.02	<0.005	0.052	<0.01	0.67	0.072	0.08	0.09	0.047	<0.05		
MB97_4	Jul-02	5.73	4390	2400	0.253	519	10.4	85.6	220.7	1560	0	43	20.8	<0.2	<0.02	<0.005	0.046	<0.01	0.653	0.066	0.15	0.09	0.049	<0.05		
MB97_4	Nov-02	5.76	4500	2900	0.307	500	10.1	85.7	222	1520	0	42	19.1	<0.2	<0.001	<0.005	0.053	<0.01	0.66	0.074	0.18	0.09	0.058	<0.05		
MB97_4	Jan-03	5.5	4800	2660	0.391	518	10.2	85.2	219	1520	0	46	21.7	<0.2	<0.001	<0.005	0.053	<0.01	0.01	<0.005	0.1	0.09	<0.005	<0.05		
MB97_4	Apr-03	5.6	4510	2700	0.481	519	10.7	87	223	1500	0	47	21	<0.2	<0.001	<0.005	0.065	<0.01	0.628	0.043	0.14	0.09	0.045	<0.05		
MB97_4	Jul-03	6.19	4440	2660	0.141	544	10.6	93.4	232	1520	0	46	26	<0.2	0.001	<0.005	0.056	<0.01	0.664	0.069	0.22	0.11	0.067	<0.05		
MB97_4	Oct-03	6.57	3920	2540	0.134	522	9.5	88.6	223	1680	0	255	20.3	<0.2	0.002	<0.005	0.05	<0.01	0.672	0.076	0.16	0.11	0.066	<0.05		
MB97_4	Jan-04	5.88	4480	2920	0.231	466	9.1	92.2	218	1460	0	45	18.6	<0.2	0.002	<0.005	0.049	<0.01	0.664	0.069	0.19	0.13	0.097	<0.05		
MB97_4	Apr-04	5.65	4150	2660	0.32	459	8.8	84.3	208	1500	0	42	16.5	<0.2	0.002	<0.005	0.055	<0.01	0.671	0.065	<0.06	0.1	0.065	0.13		
MB97_4	Jul-04	5.78	4720	2880	0.536	482	9.7	90.6	220.1	1400	0	42	18	<0.2	<0.001	<0.005	0.058	<0.01	0.7	0.072	0.32	0.12	0.089	<0.05		
MB97_4	Oct-04	5.64	4020	2560	0.132	468	8.7	92.5	211	1580	0	42	19.3	<0.2	<0.001	<0.005	0.05	<0.01	0.663	0.065	0.12	0.09	0.052	<0.05		
MB97_4	Jan-05	5.85	4650	2440	0.25	495	10.3	87.8	220	1500	0	46	16.6	<0.2	0.002	<0.005	0.045	<0.01	0.624	0.062	0.16	0.1	0.069	<0.05		
MB97_4	Apr-05	5.92	4620	2720	0.106	448	9.6	87.9	216	1240	0	43	17.6	<0.2	<0.001	<0.005	0.049	<0.01	0.675	0.069	<0.06	0.09	0.034	<0.05		
MB97_4	Jul-05	5.71	4610	2900	0.11	500	10.2	90.4	222	1420	0	43	17.9	<0.2	<0.001	0.054	0.043	<0.01	0.69	0.068	0.18	0.1	0.089	<0.05		
MB97_4	Oct-05	5.49	4720	2680	0.178	541	10.5	90.6	232	1640	0	44	19.3	0.2	<0.001	<0.005	0.057	<0.01	0.711	0.074	0.22	0.11	0.07	<0.05		
MB97_4	Jan-06	5.79	4360	2700	0.227	489	9.9	86.6	215	1500	0	46	16.2	<0.2	0.001	<0.005	0.056	<0.01	0.687	0.067	0.18	0.1	0.062	<0.05		
MB97_4	Apr-06	5.56	4150	2540	0.391	483	10	86.5	214	1440	0	43	15.7	<0.2	<0.001	<0.005	0.051	<0.01	0.695	0.073	0.22	0.1	0.042	<0.05		
MB97_4	Jul-06	5.67	4190	2400	0.103	476	10.1	88.7	220	1480	0	44	13.1	<0.2	<0.001	<0.005	0.048	<0.01	0.7	0.073	0.16	0.1	0.038	<0.05		
MB97_4	Oct-06	5.78	4170	2600	0.16	464	9.9	86.4	233	1460	0	45	13.7	<0.2	0.003	<0.005	0.04	<0.01	0.66	0.06	0.12	0.1	0.04	<0.05		
MB97_4	Jan-07	5.65	4070	2440	0.1	439	9.4	83.7	221	1500	0	44	14.7	<0.2	0.001	<0.005	0.05	<0.01	0.67	0.07	0.15	0.09	0.04	<0.05		
MB97_4	Apr-07	5.74	4260	2580	0.69	456	10.5	94	245	1500	0	45	12.6	<0.2	<0.001	<0.005	0.05	<0.01	0.75	0.08	0.17	0.1	0.05	<0.05		
MB97_4	Jul-07	5.58	4110	2380	0.14	472	10.7	95.9	255	1440	0	44	16	<0.2	<0.001	<0.005	0.05	<0.01	0.66	0.07	0.15	0.11	0.05	<0.05		
MB97_4	Oct-07	5.62	4270	2500	0.07	460	10.2	90.1	242	1400	0	43	15.8	<0.2	0.002	<0.005	0.05	<0.01	0.66	0.08	0.08	0.1	0.04	<0.05		
MB97_4	Jan-08	5.76	3920	2460	0.1	474	11.3	99	255	1500	0	44	14.1	<0.2	0.002	<0.005	0.06	<0.01	0.75	0.07	0.17	0.11	0.06	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	**pH**	**uS/cm**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**Field**	**Field**
MB97_4	Apr-08	5.59	3980	2680	0.23	441	10.1	92.6	245	1480	0	41	15	<0.2	0.003	<0.005	0.06	<0.01	0.73	0.07	0.74	0.1	0.04	<0.05		
MB97_4	Jul-08	5.52	3910	2420	0.11	443	11.3	94.7	234	1480	0	41	16.3	<0.2	0.002	<0.005	0.05	<0.01	0.74	0.08	0.21	0.1	0.04	<0.05		
MB97_4	Oct-08	5.67	4060	2640	0.28	440	10.6	95.7	242	1460	0	45	17.5	<0.2	0.005	<0.005	0.05	<0.01	0.72	0.07	0.15	0.11	0.06	<0.05		
MB97_4	Jan-09	5.68	4440	2620	0.18	452	11.4	97	239	1540	0	45	14.1	<0.2	0.005	<0.005	0.05	<0.01	0.77	0.07	0.17	0.1	0.06	<0.05		
MB97_4	Apr-09	5.72	4310	2580	0.18	442	11.1	95.7	235	1440	0	46	14.5	<0.2	0.001	<0.005	0.06	<0.01	0.8	0.07	0.16	0.11	0.04	<0.05		
MB97_4	Jul-09	5.75	4250	2520	0.13	430	11	98.3	238	1560	0	45	12.5	<0.2	0.001	<0.005	0.05	<0.01	0.8	0.06	0.17	0.09	0.04	<0.05		
MB97_4	Oct-09	5.99	3890	2460	0.14	440	11.6	105	272	1500	0	49	14.1	<0.2	0.001	<0.005	0.06	<0.01	0.85	0.07	0.21	0.1	0.04	<0.05		
MB97_4	Jan-10	5.7	4140	2640	0.13	446	11.5	101	273	1560	0	45	15.3	<0.2	0.003	<0.005	0.06	<0.01	0.78	0.07	0.15	0.1	0.04	<0.05		
MB97_4	Apr-10	5.83	4190	2680	0.15	424	11.2	104	278	1580	0	49	17.3	<0.2	0.003	<0.005	0.04	<0.01	0.85	0.08	0.1	0.1	0.03	<0.05		
MB97_4	Jul-10	5.84	4520	2460	0.19	440	12.1	118	305	1600	0	49	14.9	<0.2	0.002	<0.005	0.07	<0.01	0.96	0.08	0.16	0.1	0.04	<0.05		
MB97_4	Oct-10	5.68	4230	2760	0.02	423	11.2	107	283	1680	0	49	15.6	<0.2	0.001	<0.005	0.06	<0.01	0.87	0.07	0.12	0.09	0.03	<0.05		
MB97_4	Jan-11	5.78	4720	2820	0.15	438	12.7	127	324	1740	0	49	16.1	<0.2	0.002	<0.005	0.06	<0.01	1	0.08	0.14	0.11	0.05	<0.05		
MB97_4	Apr-11	5.68	4700	2720	0.09	438	11.2	120	311	1640	0	47	17	<0.2	0.001	<0.005	0.06	<0.01	0.96	0.07	0.2	0.11	0.06	<0.05		
MB97_4	Jul-11	5.93	4450	2900	0.6	480	10.2	124	330	1740	0	51	14.2	<0.2	<0.001	<0.005	0.06	<0.01	1	0.08	0.1	0.11	0.07	<0.05		
MB97_4	Oct-11	5.91	4910	2980	0.14	479	10.5	118	324	1800	0	58	17.9	<0.2	0.001	<0.005	0.06	<0.01	0.91	0.08	<0.06	0.12	0.09	<0.05		
MB97_4	Jan-12	5.64	4630	3000	0.08	470	11.1	131	296	1840	0	52	15.2	<0.2	<0.001	<0.005	0.06	<0.01	1	0.08	0.08	0.11	0.08	<0.05		
MB97_4	Apr-12	5.68	5140	2960	0.07	456	10.8	131	298	1860	0	44	15.6	<0.2	<0.001	<0.005	0.07	<0.01	1.1	0.08	<0.06	0.11	0.08	<0.05		
MB97_4	Jul-12	5.69	5240	3000	0.18	456	12.7	143	304	1880	0	44	15.5	<0.2	<0.001	<0.005	0.06	<0.01	1.1	0.09	<0.06	0.12	0.06	<0.05		
MB97_4	Oct-12	5.89	5300	3320	0.11	575	11.4	144	296	1980	0	46	16	<0.2	0.001	<0.005	0.06	<0.01	1.1	0.08	<0.06	0.17	0.08	<0.05		
MB97_4	Jan-13	5.94	5590	3260	0.08	472	11	145	299	1980	0	46	15.3	<0.2	<0.001	<0.005	0.06	<0.01	1.2	0.09	<0.06	0.12	0.05	<0.05		
MB97_4	Apr-13	5.82	5520	3140	0.1	473	11.8	159	316	1980	0	46	14.8	<0.2	0.003	<0.005	0.09	<0.01	1.3	0.1	<0.06	0.12	0.02	<0.05		
MB97_4	Jul-13	5.86	5730	3180	0.08	473	11.8	150	320	1940	0	45	16.3	<0.2	0.001	<0.005	0.07	0.01	1.3	0.1	<0.06	0.12	0.1	<0.05		
MB97_4	Oct-13	6.07	5510	3200	0.1	477	11.4	148	310	2060	0	46	16.4	<0.2	0.001	<0.005	0.07	<0.01	1.2	0.1	<0.06	0.11	0.11	<0.05		
MB97_4	Jan-14	6.13	5540	3180	0.09	473	10.9	140	302	2000	0	44	16.2	<0.2	0.002	<0.005	0.07	0.01	1.2	0.1	0.08	0.11	0.05	<0.05		
MB97_4	Apr-14	5.81	5920	3440	0.104	492	11.2	150	316	2080	0	43	17.2	<0.2	0.005	<0.005	0.072	<0.01	1.3	0.103	0.19	0.12	0.047	<0.05		
MB97_4	Jul-14	5.58	5720	3340	0.106	493	11.8	168	336	1980	0	59	14.8	<0.2	0.003	<0.005	0.071	<0.01	1.3	0.101	<0.06	0.11	0.061	<0.05		
MB97_4	Oct-14	5.65	5800	3460	0.111	481	12.7	188	366	2040	0	55	13.9	<0.2	0.002	<0.005	0.075	<0.01	1.5	0.1	0.1	0.13	0.123	<0.05		5.45
MB97_4	Jan-15	5.87	5890	3100	0.178	478	11.7	168	338	1840	0	46	14	<0.2	0.001	<0.005	0.078	<0.01	1.3	0.09	0.11	0.12	0.078	<0.05		5.41
MB97_4	Apr-15	5.73	5980	3300	0.08	499	12.8	174	334	2160	0	46	14.3	<0.2	0.001	<0.005	0.059	<0.01	1.2	0.082	0.12	0.12	0.062	<0.05		5.28
MB97_4	Jul-15	5.77	5920	3560	0.169	482	12	177	354	2120	0	47	15.1	<0.2	0.002	<0.005	0.081	<0.01	1.4	0.097	<0.06	0.13	0.052	<0.05		5.46
MB97_4	Oct-15	5.74	5580	3260	0.158	500	12.3	176	353	2000	0	48	16.3	<0.2	0.002	<0.005	0.081	<0.01	1.4	0.099	0.08	0.13	0.063	<0.05		4.97
MB97_4	Jan-16	5.7	5610	3260	0.208	492	12	174	348	2020	0	48	15.3	<0.2	0.002	<0.005	0.072	<0.01	1.4	0.102	0.3	0.12	0.047	<0.05		5.31
MB97_4	Apr-16	5.82	6370	3200	0.241	486	13.1	198	382	2100	0	45	14.7	<0.2	0.004	<0.005	0.089	<0.01	1.5	0.105	0.1	0.13	<0.005	0.06		5.4
MB97_4	Jul-16	5.89	6370	3620	0.091	492	12.6	197	387	2180	0	45	13.2	<0.2	0.002	<0.005	0.081	<0.01	1.5	0.108	0.39	0.13	0.026	<0.05		5.31
MB97_4	Oct-16	6.09	7050	3860	0.076	516	11.7	170	350	2020	0	162	16.8	<0.2	0.002	<0.005	0.072	<0.01	1.3	0.096	0.2	0.13	0.034	<0.05		5.64
MB97_4	Jan-17	5.61	7030	3640	0.095	479	12.8	198	391	2160	0	34	19.9	<0.2	<0.001	<0.005	0.044	<0.01	1.5	0.115	<0.06	0.13	0.106	<0.05		5.25
MB97_4	Apr-17	5.7	7010	3520	0.133	486	12	179	367	2100	0	50	21.7	<0.2	0.002	<0.005	0.036	<0.01	1.4	0.111	<0.06	0.13	0.04	<0.05		6.31
MB97_4	Jul-17	5.7	6040	3500	0.357	498	11.9	185	373	2200	0	51	21.9	<0.2	0.003	<0.005	0.039	<0.01	1.4	0.107	0.33	0.13	0.107	<0.05		5.32
Mean		**5.76**	**4796.7**	**2811.0**	**0.250**	**488**	**10.8**	**113.8**	**264.5**	**1681**	**0.0**	**50**	**18.1**	**0.0**	**0.003**	**0.001**	**0.057**	**0.00**	**0.878**	**0.077**	**0.14**	**0.11**	**0.060**	**0.002**		
Min		**5.48**	**3890**	**2140**	**0.020**	**423**	**8.2**	**70.2**	**168.8**	**1240**	**0.0**	**34**	**12.5**	**0.0**	**0.000**	**0.000**	**0.036**	**0.00**	**0.010**	**0.000**	**0.00**	**0.09**	**0.000**	**0.000**		
Max		**6.57**	**7050**	**3860**	**0.856**	**592**	**13.1**	**198.0**	**391.0**	**2200**	**0.0**	**255**	**28.6**	**0.2**	**0.060**	**0.054**	**0.090**	**0.010**	**1.500**	**0.115**	**0.74**	**0.17**	**0.206**	**0.130**		
MB97_5	Oct-97	6.58	1613	936	3.6	244	1.9	45.3	46.5	360	0	307	57.9	0.1	<0.02	0.013	0.007	<0.01	0.356	<0.005	<0.06	0.02	0.015	<0.05		
MB97_5	Jan-98	7.32	1570	917	3.2	237	1.9	44	45.3	364	0	298	55.7	0.2	<0.02	<0.005	0.006	<0.01	0.343	<0.005	<0.06	0.03	0.035	<0.05		
MB97_5	May-98	6.54	1680	972	3.4	231	1.7	42.3	43.2	358	0	307	56.8	<0.2	<0.02	<0.005	<0.005	<0.01	0.338	<0.005	<0.06	0.03	0.008	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_5	Jul-98	6.61	1646	939	3.3	227	2	42.5	42.7	343	0	297	54.5	<0.2	<0.02	<0.005	0.009	<0.01	0.352	<0.005	<0.06	0.05	0.007	<0.05		
MB97_5	Oct-98	6.99	1603	899	4.7	245	2	46	48.6	375	0	296	59.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.363	<0.005	0.08	0.03	0.01	<0.05		
MB97_5	Jan-99	6.83	1590	915	4.5	243	1.8	45.1	47.2	372	0	311	56.5	<0.2	<0.02	<0.005	0.01	<0.01	0.37	<0.005	<0.06	0.02	0.014	<0.05		
MB97_5	Apr-99	7.25	1575	891	5.8	252	2.2	46.3	47.9	372	0	286	56.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.485	0.006	<0.06	<0.01	0.031	<0.05		
MB97_5	Jul-99	6.74	1565	910	4.4	235	1.8	43.2	44.3	336	0	299	56.5	<0.2	<0.02	<0.005	0.005	<0.01	0.376	<0.005	0.15	0.03	0.014	<0.05		
MB97_5	Jan-00	6.71	1558	1040	5	260	2.2	48.2	52.2	327	0	294	60.7	0.3	0.03	<0.005	0.006	<0.01	0.394	0.011	0.11	0.03	0.022	<0.05		
MB97_5	Mar-00	6.85	1597	907	4.1	242	1.9	44.1	48.2	349	0	271	56.1	<0.2	<0.02	0.006	<0.005	<0.01	0.361	<0.005	0.09	0.03	<0.005	<0.05		
MB97_5	Sep-00	6.66	1550	962	4	223	1.9	43.7	44.2	360	0	304	51.7	<0.2	<0.02	<0.005	0.005	<0.01	0.34	0.011	<0.06	0.02	<0.005	<0.05		
MB97_5	Oct-00	6.74	1562	916	4	225	1.9	40.9	46.2	363	0	292	49.2	<0.2	<0.02	0.011	<0.005	<0.01	0.332	0.006	0.06	0.02	0.006	<0.05		
MB97_5	Feb-01	6.7	1590	929	4.4	243	2	44.2	48.8	368	0	287	56	<0.2	<0.02	<0.005	<0.005	<0.01	0.373	<0.005	<0.06	0.02	0.005	<0.05		
MB97_5	Apr-01	6.7	1623	920	4.4	237	2	44	48.4	361	0	278	54.7	<0.2	<0.02	<0.005	0.01	<0.01	0.36	<0.005	<0.06	0.02	0.01	<0.05		
MB97_5	Jul-01	6.47	1497	901	4.3	239	1.9	43.2	48.5	359	0	279	55	<0.2	<0.02	<0.005	0.009	<0.01	0.355	<0.005	0.09	0.02	<0.005	<0.05		
MB97_5	Nov-01	6.75	1554	890	4.3	236	2	43	45.2	347	0	272	53.9	<0.2	0.02	<0.005	<0.005	<0.01	0.361	<0.005	<0.06	0.02	<0.005	<0.05		
MB97_5	Nov-02	6.86	1612	960	14.9	233	2.1	42.8	48.6	360	0	265	55.9	<0.2	0.012	<0.005	0.009	<0.01	0.396	0.008	0.3	0.03	0.336	<0.05		
MB97_5	Jul-05	6.96	1573	936	6.5	240	2.1	41.5	45.4	343	0	263	51	0.3	<0.001	<0.005	<0.005	<0.01	0.455	<0.005	0.14	0.02	0.033	<0.05		
MB97_5	Oct-05	6.5	1675	971	4.6	255	2	45.5	51.3	392	0	299	54.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.37	<0.005	0.12	0.02	<0.005	<0.05		
MB97_5	Jan-06	6.89	1582	889	4.5	244	1.9	43.7	48.6	364	0	288	53.2	<0.2	<0.001	<0.005	0.008	<0.01	0.37	<0.005	0.07	0.02	<0.005	<0.05		
MB97_5	Apr-06	6.7	1540	912	4.4	240	1.9	42.4	46.6	375	0	282	49.6	<0.2	<0.001	<0.005	0.008	<0.01	0.378	<0.005	0.14	0.02	<0.005	<0.05		
MB97_5	Jul-06	6.75	1576	908	4.3	239	1.9	42.4	47.2	357	0	282	49.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.386	<0.005	<0.06	0.03	<0.005	<0.05		
MB97_5	Oct-06	7.02	1568	945	3.5	234	1.9	41.3	50.2	351	0	285	47.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.36	0.01	<0.06	0.02	<0.005	<0.05		
MB97_5	Jan-07	6.75	1614	958	4	219	1.8	40.4	47.1	359	0	281	47	<0.2	<0.001	<0.005	0.01	<0.01	0.35	<0.005	0.07	0.02	<0.005	<0.05		
MB97_5	Apr-07	6.84	1584	949	4.8	240	1.9	43.6	50.4	365	0	282	48.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.41	0.01	0.06	0.02	0.01	<0.05		
MB97_5	Jul-07	6.69	1536	985	4.7	245	2	44.5	53.6	345	0	288	53.6	<0.2	<0.001	<0.005	0.01	<0.01	0.39	<0.005	<0.06	0.03	<0.005	<0.05		
MB97_5	Oct-07	6.63	1536	944	4.6	240	1.9	43.1	52.6	353	0	281	52	<0.2	<0.001	<0.005	0.02	<0.01	0.39	0.01	<0.06	0.02	<0.005	<0.05		
MB97_5	Jan-08	6.71	1574	877	4.5	250	2.1	45.2	53.1	372	0	269	52.4	<0.2	0.001	<0.005	0.01	<0.01	0.39	<0.005	0.09	0.03	0.01	<0.05		
MB97_5	Apr-08	6.61	1532	929	4.4	234	2.1	42.7	51.2	364	0	266	50.6	<0.2	0.001	<0.005	0.01	<0.01	0.4	<0.005	0.49	0.02	<0.005	<0.05		
MB97_5	Jul-08	6.65	1510	919	4.4	229	2.1	41	46.1	366	0	271	53.2	<0.2	0.001	<0.005	0.01	<0.01	0.39	<0.005	0.09	0.02	<0.005	<0.05		
MB97_5	Oct-08	6.76	1584	880	4.6	231	1.9	41.7	47.6	364	0	285	53.1	<0.2	0.003	<0.005	0.01	<0.01	0.39	<0.005	<0.06	0.02	<0.005	<0.05		
MB97_5	Jan-09	6.61	1638	987	4.4	239	2.2	42.8	48.9	371	0	289	53.2	<0.2	0.003	<0.005	<0.005	<0.01	0.39	<0.005	0.09	0.02	<0.005	<0.05		
MB97_5	Apr-09	6.84	1600	950	4.4	238	2.1	41.9	47.3	364	0	287	50.9	<0.2	<0.001	<0.005	0.02	<0.01	0.42	<0.005	<0.06	0.03	<0.005	<0.05		
MB97_5	Jul-09	6.8	1565	1040	4.4	235	2	41.9	47	351	0	288	51.1	<0.2	0.001	<0.005	<0.005	<0.01	0.42	<0.005	0.06	0.02	<0.005	<0.05		
MB97_5	Oct-09	7.17	1424	989	4.6	240	2	43.9	54.2	342	0	301	51.6	<0.2	<0.001	<0.005	0.01	<0.01	0.38	<0.005	0.13	0.02	<0.005	<0.05		
MB97_5	Jan-10	6.69	1558	1020	4.5	241	2.3	44	55.4	360	0	294	51.2	<0.2	0.001	<0.005	<0.005	<0.01	0.37	<0.005	<0.06	0.02	<0.005	<0.05		
MB97_5	Apr-10	7.47	1527	1000	4.6	230	2	41.3	51.7	360	0	320	52.1	<0.2	0.002	<0.005	0.01	<0.01	0.38	0.01	<0.06	0.02	<0.005	<0.05		
MB97_5	Jul-10	6.87	1586	993	4.9	242	2.2	43.7	53.6	355	0	302	52.9	<0.2	0.001	<0.005	0.01	<0.01	0.42	0.01	<0.06	0.02	<0.005	<0.05		
MB97_5	Oct-10	6.67	1515	1020	4.5	231	2.1	40.7	51.2	365	0	362	49.7	<0.2	0.001	<0.005	0.01	<0.01	0.39	<0.005	<0.06	0.01	<0.005	<0.05		
MB97_5	Jan-11	6.77	1627	997	4.5	240	2.2	43.4	54.9	369	0	292	52.4	<0.2	0.001	<0.005	<0.005	<0.01	0.4	<0.005	0.09	0.02	<0.005	<0.05		
MB97_5	Jul-11	6.88	1524	999	4.4	259	1.6	41.1	53.8	388	0	286	52.4	<0.2	0.001	<0.005	<0.005	<0.01	0.4	0.01	<0.06	0.02	0.01	<0.05		
MB97_5	Oct-11	6.8	1610	999	4.4	238	1.7	42.4	55.5	357	0	339	53.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.37	0.01	<0.06	0.03	0.02	<0.05		
MB97_5	Jan-12	6.71	1520	1060	4.6	248	1.8	44.1	47.8	370	0	342	53.1	<0.2	<0.001	<0.005	0.01	<0.01	0.4	0.01	<0.06	0.02	0.01	<0.05		
MB97_5	Apr-12	6.67	1617	1000	4.4	236	1.7	41.5	46	370	0	277	52.7	<0.2	<0.001	<0.005	0.01	<0.01	0.4	<0.005	<0.06	0.02	0.02	<0.05		
MB97_5	Jul-12	6.68	1627	1020	4.1	238	2	43.6	46.2	370	0	278	51.5	<0.2	<0.001	<0.005	0.01	<0.01	0.39	<0.005	<0.06	0.02	0.01	<0.05		
MB97_5	Oct-12	7.02	1639	979	4.3	245	1.7	44.2	45.3	379	0	276	55	<0.2	<0.001	<0.005	0.01	<0.01	0.41	<0.005	0.1	0.02	0.02	<0.05		
MB97_5	Jan-13	7.05	1670	1040	4.6	244	1.7	42.4	44.6	371	0	274	54.1	<0.2	<0.001	<0.005	0.01	<0.01	0.42	<0.005	<0.06	0.02	<0.005	<0.05		
MB97_5	Apr-13	6.7	1632	962	5	240	1.8	43.2	43.7	364	0	279	54.1	<0.2	0.004	<0.005	0.01	<0.01	0.43	<0.005	<0.06	0.02	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
MB97_5	Jul-13	6.77	1704	936	4.7	234	1.7	39.7	45.7	371	0	273	53.5	<0.2	0.002	<0.005	<0.005	<0.01	0.41	<0.005	<0.06	0.02	0.02	<0.05		
MB97_5	Oct-13	6.88	1637	960	4.6	234	1.7	42.4	46.3	370	0	273	52.6	<0.2	0.001	<0.005	0.01	<0.01	0.38	<0.005	0.1	0.02	0.02	<0.05		
MB97_5	Jan-14	6.88	1607	949	4.5	233	1.6	39.6	44.2	361	0	259	51.9	<0.2	0.001	<0.005	<0.005	<0.01	0.38	<0.005	<0.06	0.02	<0.005	<0.05		
MB97_5	Apr-14	6.73	1696	969	4.7	244	1.8	41.2	44.6	385	0	259	53.5	<0.2	0.005	<0.005	0.007	<0.01	0.413	<0.005	0.1	0.02	<0.005	<0.05		
MB97_5	Jul-14	6.55	1632	1020	4.7	252	1.8	44.6	45.9	361	0	327	54.2	<0.2	0.002	<0.005	<0.005	<0.01	0.409	0.005	<0.06	<0.01	0.007	<0.05		
MB97_5	Oct-14	6.68	1694	1060	4.5	247	1.9	46.3	46.9	368	0	334	54.4	<0.2	0.003	<0.005	<0.005	<0.01	0.377	<0.005	<0.06	0.03	0.015	<0.05		
MB97_5	Jan-15	6.86	1637	953	4.4	247	1.8	45.4	46.2	370	0	275	52.3	<0.2	0.002	<0.005	0.005	<0.01	0.385	<0.005	<0.06	0.03	0.04	<0.05		6.45
MB97_5	Apr-15	6.88	1662	971	4.4	252	1.9	46.1	46.3	373	0	278	52.8	<0.2	0.001	<0.005	0.006	<0.01	0.382	<0.005	0.1	0.02	<0.005	<0.05		6.80
MB97_5	Jul-15	6.87	1681	982	4.7	247	1.9	45	46.2	365	0	292	54.5	<0.2	0.001	<0.005	0.006	<0.01	0.39	<0.005	0.07	0.02	<0.005	<0.05		7.03
MB97_5	Oct-15	6.94	1674	992	4.5	255	1.9	46.9	47.3	362	0	301	54.8	<0.2	0.002	<0.005	<0.005	<0.01	0.403	<0.005	<0.06	0.03	<0.005	<0.05		6.77
MB97_5	Jan-16	6.94	1643	1000	4.4	248	1.9	45.7	47.1	370	0	297	53.8	<0.2	0.001	<0.005	0.005	<0.01	0.408	0.006	0.17	0.03	<0.005	<0.05		6.39
MB97_5	Apr-16	6.75	1688	932	4.6	247	2.1	46.4	40.5	351	0	268	54.5	<0.2	0.002	<0.005	<0.005	<0.01	0.399	<0.005	0.08	0.03	<0.005	<0.05		6.60
MB97_5	Jul-16	6.94	1690	971	4.6	254	1.8	46	46.8	372	0	265	54.6	<0.2	0.001	<0.005	<0.005	<0.01	0.398	<0.005	0.15	0.03	<0.005	<0.05		6.83
MB97_5	Oct-16	6.66	1762	908	3.7	252	2.5	49.1	45.8	364	0	285	53.2	<0.2	0.002	<0.005	0.005	<0.01	0.337	<0.005	0.18	0.03	<0.005	<0.05		6.16
MB97_5	Jan-17	6.8	1658	975	4.4	247	1.9	44.5	46.6	364	0	298	54.3	<0.2	<0.001	0.005	<0.005	<0.01	0.367	0.015	<0.06	0.02	0.022	<0.05		6.22
MB97_5	Apr-17	6.69	1650	980	4.5	245	1.8	43.7	45.8	363	0	301	55.8	<0.2	0.001	<0.005	<0.005	<0.01	0.38	<0.005	0.3	0.03	<0.005	<0.05		6.1
MB97_5	Jul-17	6.74	1622	996	4.3	243	2	44.7	44.9	371	0	299	55.6	<0.2	0.001	<0.005	<0.005	<0.01	0.386	0.006	0.24	0.03	0.01	<0.05		6.27
Mean		**6.80**	**1602.8**	**960.23**	**4.598**	**241**	**1.9**	**43.6**	**47.9**	**363**	**0.0**	**290**	**53.4**	**0.0**	**0.002**	**0.001**	**0.005**	**0.00**	**0.386**	**0.002**	**0.06**	**0.02**	**0.012**	**0.000**		
Min		**6.47**	**1424**	**877**	**3.200**	**219**	**1.6**	**39.6**	**40.5**	**327**	**0.0**	**259**	**47.0**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.332**	**0.000**	**0.00**	**<0.01**	**0.000**	**0.000**		
Max		**7.47**	**1762**	**1060**	**14.900**	**260**	**2.5**	**49.1**	**55.5**	**392**	**0.0**	**362**	**60.7**	**0.3**	**0.030**	**0.013**	**0.020**	**0.000**	**0.485**	**0.015**	**0.49**	**0.05**	**0.336**	**0.000**		
NORILUP	Jul-98	7.74	1691	924	0.062	231	3.8	23.2	39.5	550	0	59	27.2	1.2	<0.02	<0.005	<0.005	<0.01	0.024	<0.005	<0.06	0.06	<0.005	<0.05		
NORILUP	Jan-99	8.09	1246	680	0.085	193	3.2	17.5	30.7	385	0	61	24.6	0.2	<0.02	<0.005	<0.005	<0.01	0.069	<0.005	<0.06	0.08	<0.005	<0.05		
NORILUP	Jul-99	7.37	922	431	0.239	139	2.8	12.7	22.5	246	0	38	22.6	2.8	0.06	<0.005	0.006	<0.01	0.051	<0.005	<0.06	0.08	0.018	<0.05		
NORILUP	Aug-99	7.54	1081	563	0.213	147	2.9	13.4	22.9	264	0	43	35.7	0.9	<0.02	<0.005	<0.005	<0.01	0.034	<0.005	<0.06	0.38	<0.005	<0.05		
NORILUP	Nov-99	8.27	858	455	0.198	134	3.3	13.6	20.9	224	0	49	42.2	<0.2	0.04	<0.005	<0.005	<0.01	0.034	0.007	<0.06	0.9	<0.005	<0.05		
NORILUP	Dec-99	8.37	1068	613	0.145	167	4	16.4	25.5	277	1.37	56	50.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.068	<0.005	0.07	1.3	0.015	<0.05		
NORILUP	Jan-00	8.45	1231	709	0.077	189	4.4	17.5	28.4	305	2.69	61	48.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.068	0.007	0.12	1.2	0.011	<0.05		
NORILUP	Feb-00	7.88	1210	673	0.075	197	4.6	17.9	30.1	346	0	72	48.6	<0.2	0.06	<0.005	<0.005	<0.01	0.061	<0.005	0.12	1.1	<0.005	<0.05		
NORILUP	Mar-00	8.6	1347	717	0.059	213	4.8	18.8	32.1	356	4.11	70	48.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.053	<0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Apr-00	8.5	1393	816	0.029	227	5	19	34.2	392	2.77	72	46	<0.2	<0.02	<0.005	<0.005	<0.01	0.041	<0.005	0.11	1.1	<0.005	<0.05		
NORILUP	May-00	8.06	1436	807	0.035	224	4.5	18.6	34.2	412	0	78	42.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.018	<0.005	0.07	0.97	0.007	<0.05		
NORILUP	Jun-00	8.04	1430	747	0.04	221	4.7	18.8	33.8	366	0	71	52.5	<0.2	0.03	<0.005	<0.005	<0.01	0.006	0.01	<0.06	1.1	<0.005	<0.05		
NORILUP	Jul-00	7.73	1287	774	0.216	184	4.3	19.3	30.4	334	0	65	55.6	0.9	<0.02	<0.005	<0.005	<0.01	0.039	<0.005	0.15	1.1	<0.005	<0.05		
NORILUP	Aug-00	7.71	955	582	0.24	134	2.9	13.6	22.5	232	0	49	34	0.4	0.03	0.007	<0.005	<0.01	0.037	<0.005	<0.06	0.53	0.007	<0.05		
NORILUP	Sep-00	7.73	903	507	0.196	139	3.4	13.9	22.1	226	0	52	45.2	<0.2	0.05	<0.005	<0.005	<0.01	0.03	<0.005	0.08	0.9	0.008	<0.05		
NORILUP	Oct-00	8.61	950	560	0.156	159	4.5	17	25.4	239	5.36	48	53	<0.2	0.03	<0.005	<0.005	<0.01	0.034	<0.005	<0.06	1.2	0.006	<0.05		
NORILUP	Nov-00	8.87	1050	583	0.126	149	4.2	15.3	23.9	279	11.5	43	50.3	<0.2	0.04	0.016	<0.005	<0.01	0.041	<0.005	<0.06	1.1	0.005	<0.05		
NORILUP	Dec-00	9.13	1165	675	0.141	166	4.6	18.2	25.9	309	12	46	47.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.07	<0.005	0.1	1.2	<0.005	<0.05		
NORILUP	Jan-01	8.64	1290	722	0.121	206	5	19.7	31.7	343	4.75	70	47.1	<0.2	<0.02	<0.005	0.009	<0.01	0.083	<0.005	<0.06	1.2	0.019	<0.05		
NORILUP	Feb-01	8.34	1389	704	0.068	217	5.2	20.3	33.4	381	1.71	85	46.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.062	<0.005	<0.06	1.2	<0.005	<0.05		
NORILUP	Mar-01	8.19	1494	833	0.088	235	5.8	21.6	36.4	387	0	95	47.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.086	<0.005	<0.06	1.2	0.02	<0.05		
NORILUP	Apr-01	8.25	1511	853	0.062	247	5.8	22.1	38.6	427	0	101	47.3	<0.2	<0.02	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	1.1	0.011	<0.05		
NORILUP	May-01	8.17	1570	873	0.043	250	6	22.5	39.1	417	0	97	45.9	0.2	0.03	<0.005	<0.005	<0.01	0.025	<0.005	<0.06	1.2	0.02	<0.05		
NORILUP	Jun-01	7.92	1526	855	0.07	243	6.1	23.4	40.6	444	0	87	44.1	<0.2	<0.02	<0.005	0.005	<0.01	0.023	<0.005	<0.06	0.95	0.024	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
NORILUP	Jul-01	7.89	1625	884	0.072	254	5.8	25.2	43.7	463	0	82	45.1	<0.2	<0.02	0.011	<0.005	<0.01	0.031	<0.005	<0.06	0.81	<0.005	<0.05		
NORILUP	Aug-01	8.04	1680	954	0.072	263	5.1	26.2	42.8	460	0	77	45.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	0.69	<0.005	<0.05		
NORILUP	Sep-01	7.98	1523	911	0.083	244	4.2	26.1	45.8	465	0	61	36.7	<0.2	<0.02	<0.005	<0.005	<0.01	0.025	<0.005	<0.06	0.33	0.015	<0.05		
NORILUP	Oct-01	8.4	1425	827	0.084	225	3.6	24.6	41.7	445	2.23	53	31.1	<0.2	<0.02	<0.005	<0.005	<0.01	0.019	<0.005	<0.06	0.2	0.017	<0.05		
NORILUP	Nov-01	8.78	1575	864	0.068	238	3.7	25.3	43.6	473	7.19	47	30	<0.2	0.02	<0.005	<0.005	<0.01	0.042	<0.005	<0.06	0.18	0.005	<0.05		
NORILUP	Dec-01	8.03	1527	890	0.155	239	4	25.2	43.7	503	0	64	25.9	<0.2	<0.02	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	0.18	0.01	<0.05		
NORILUP	Jan-02	8.29	1736	911	0.286	253	4.3	25.7	44.7	471	0	68	27	<0.2	<0.02	<0.005	<0.005	<0.01	0.085	0.005	<0.06	0.17	<0.005	<0.05		
NORILUP	Feb-02	8.89	1672	981	0.035	276	4.5	27.4	48.5	498	9.43	55	25.2	<0.2	<0.02	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	0.18	<0.005	<0.05		
NORILUP	Mar-02	8.12	1892	1040	0.192	282	4.8	28	50.8	550	0	86	22.9	<0.2	0.03	<0.005	<0.005	<0.01	0.13	<0.005	<0.06	0.16	<0.005	<0.05		
NORILUP	Apr-02	8.29	1986	1000	0.021	303	5.4	30.6	55.9	590	0	92	24.4	<0.2	0.03	<0.005	<0.005	<0.01	0.036	<0.005	0.07	0.19	<0.005	<0.05		
NORILUP	May-02	8.06	2010	1080	0.065	284	5.4	29.6	55	580	0	90	23.1	<0.2	<0.02	<0.005	0.005	<0.01	0.049	<0.005	<0.06	0.18	<0.005	<0.05		
NORILUP	Jun-02	7.85	1888	970	0.055	264	5.1	29.2	54.6	534	0	78	25.2	0.4	0.06	<0.005	<0.005	<0.01	0.03	0.006	0.07	0.13	<0.005	<0.05		
NORILUP	Jul-02	7.71	1764	983	0.115	250	4.5	28.9	52.7	510	0	72	26.6	2	0.02	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	0.08	0.011	<0.05		
NORILUP	Aug-02	7.4	1026	560	0.15	145	3	16.5	29.5	290	0	42	20.8	1.7	<0.02	<0.005	<0.005	<0.01	0.031	<0.005	<0.06	0.02	0.005	<0.05		
NORILUP	Sep-02	7.65	783	440	0.176	123	2.6	12.7	23.4	230	0	41	18.2	0.2	0.06	<0.005	<0.005	<0.01	0.024	<0.005	<0.06	0.02	0.012	<0.05		
NORILUP	Oct-02	7.78	857	508	0.132	123	2.4	12.4	23.5	234	0	42	18.1	<0.2	<0.02	<0.005	<0.005	0.03	0.013	<0.005	<0.06	0.02	0.024	<0.05		
NORILUP	Nov-02	8.45	948	510	0.094	137	2.5	13.3	25	258	5.1	41	18	<0.2	<0.001	<0.005	<0.005	<0.01	0.045	<0.005	<0.06	0.02	<0.005	<0.05		
NORILUP	Dec-02	7.86	1103	589	0.137	148	2.7	14.7	27.3	318	0	55	17.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.071	<0.005	<0.06	0.03	<0.005	<0.05		
NORILUP	Jan-03	8.42	1168	628	0.105	163	3.2	15.9	29	347	2.82	59	16.4	<0.2	<0.001	<0.005	0.006	<0.01	0.035	<0.005	<0.06	0.03	0.007	<0.05		
NORILUP	Feb-03	7.99	1346	698	<0.005	181	3.7	17.1	32.7	362	0	77	16.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.062	<0.005	<0.06	0.04	0.026	<0.05		
NORILUP	Mar-03	7.97	1411	701	0.059	208	4	19.2	35	387	0	84	16.4	<0.2	0.001	<0.005	<0.005	<0.01	0.085	<0.005	<0.06	0.05	<0.005	<0.05		
NORILUP	Apr-03	7.96	1458	755	0.165	223	4.6	20.6	39.6	416	0	87	18.4	<0.2	0.003	<0.005	<0.005	<0.01	0.079	<0.005	0.1	0.05	<0.005	<0.05		
NORILUP	May-03	8	1497	742	0.056	215	4.2	19.9	36.9	403	0	86	19.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.041	<0.005	0.11	0.05	0.005	<0.05		
NORILUP	Jun-03	7.7	1451	747	0.061	222	4.9	22	40	400	0	73	23.7	3	<0.001	<0.005	<0.005	<0.01	0.032	<0.005	<0.06	0.04	<0.005	<0.05		
NORILUP	Jul-03	7.53	1376	794	0.195	205	4.3	22.2	41.1	428	0	53	24.3	1.8	<0.001	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	0.02	<0.005	<0.05		
NORILUP	Aug-03	7.49	836	442	0.226	126	2.7	12.6	23.4	237	0	37	18.3	0.6	<0.001	<0.005	<0.005	<0.01	0.067	<0.005	<0.06	0.03	<0.005	<0.05		
NORILUP	Sep-03	7.58	774	470	0.112	120	2.1	11.1	21.4	215	0	37	18.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.035	<0.005	<0.06	<0.01	<0.005	<0.05		
NORILUP	Oct-03	7.59	837	426	0.141	124	3.2	13	21	214	0	47	35.9	<0.2	0.002	<0.005	<0.005	<0.01	0.033	<0.005	0.06	0.66	<0.005	<0.05		
NORILUP	Nov-03	8.12	964	563	0.061	155	3.7	8.3	19.9	275	0	60	49.5	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Jan-04	8.52	1268	758	0.012	181	4.5	18.5	29.5	361	4.58	72	43.7	<0.2	0.01	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	1	<0.005	<0.05		
NORILUP	Feb-04	8.24	1471	798	0.005	205	4.9	19.8	31.9	463	0	89	43.5	<0.2	0.001	<0.005	<0.005	<0.01	0.078	<0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Mar-04	8.51	1460	838	0.008	210	5.1	20.5	33.3	370	3.6	89	41.6	<0.2	0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Apr-04	8.47	1600	884	0.022	220	5.3	21	34.9	443	4.46	93	41.7	<0.2	0.003	<0.005	0.005	<0.01	0.036	<0.005	0.13	1.1	<0.005	<0.05		
NORILUP	May-04	8.29	1560	855	0.039	223	5.4	22.7	36.7	406	0	117	42.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.021	<0.005	<0.06	1	<0.005	<0.05		
NORILUP	Jun-04	7.97	1601	930	0.039	233	5.1	22.8	38.4	391	0	96	42.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	0.01	<0.06	0.94	0.02	<0.05		
NORILUP	Jul-04	7.53	1498	894	0.028	218	4.6	25.1	42.1	445	0	67	35.6	3	<0.001	<0.005	<0.005	<0.01	0.024	<0.005	<0.06	0.49	0.016	<0.05		
NORILUP	Aug-04	7.77	1367	745	0.094	189	3.2	20.7	36.7	422	0	51	29	1.8	<0.001	<0.005	<0.005	<0.01	0.016	<0.005	<0.06	0.2	<0.005	<0.05		
NORILUP	Sep-04	7.76	865	482	0.169	126	2.1	12.6	23.2	231	0	41	19	<0.2	<0.001	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	0.03	<0.005	<0.05		
NORILUP	Nov-04	8.06	1063	587	0.075	163	2.9	15.6	29.3	297	0	54	20.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.028	<0.005	<0.06	0.04	0.013	<0.05		
NORILUP	Dec-04	8.2	1151	645	0.093	175	3	17.3	30.8	308	0	59	20.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.045	<0.005	<0.06	0.05	0.006	<0.05		
NORILUP	Jan-05	8.48	1289	630	0.038	201	3.4	19.8	34.3	361	4.7	59	18.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	0.06	<0.005	<0.05		
NORILUP	Mar-05	7.91	1494	786	0.083	218	4	20.1	37.1	397	0	74	17.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.098	<0.005	<0.06	0.08	<0.005	<0.05		
NORILUP	Apr-05	7.92	1515	869	0.139	223	5.1	23.7	40.5	410	0	80	26.3	0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.07	<0.005	<0.05		
NORILUP	May-05	7.86	1430	751	0.069	201	5	22	39.3	401	0	74	26.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	0.07	<0.005	<0.05		
NORILUP	Jun-05	7.07	1415	719	0.18	205	4.8	23.5	40.8	401	0	54	25.6	1.3	0.002	<0.005	<0.005	<0.01	0.082	<0.005	<0.06	0.04	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
NORILUP	Jul-05	7.47	1050	646	0.227	169	3.3	17.9	31.9	314	0	44	22.8	1	<0.001	<0.005	0.005	<0.01	0.047	<0.005	<0.06	0.02	<0.005	<0.05		
NORILUP	Aug-05	7.58	1040	547	0.207	166	3	17.3	31	286	0	42	25.5	0.2	<0.001	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	0.02	<0.005	<0.05		
NORILUP	Sep-05	7.17	656	432	0.361	98	2.2	9.2	16.7	178	0	36	18.1	0.2	<0.001	<0.005	<0.005	<0.01	0.076	<0.005	0.12	0.02	<0.005	<0.05		
NORILUP	Oct-05	7.28	580	309	0.313	96	2.1	9.4	16.9	163	0	40	19.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.057	<0.005	0.22	0.08	<0.005	<0.05		
NORILUP	Nov-05	7.49	855	438	0.198	134	3.7	14.4	22.2	219	0	50	45.9	0.3	<0.001	<0.005	<0.005	<0.01	0.052	<0.005	<0.06	0.91	<0.005	<0.05		
NORILUP	Dec-05	7.98	925	565	0.099	147	4	16	24.9	247	0	60	42.9	<0.2	<0.001	<0.005	0.006	<0.01	0.061	<0.005	<0.06	0.84	<0.005	<0.05		
NORILUP	Jan-06	7.76	1053	627	0.097	165	4.3	17.4	27.3	266	0	70	38.3	<0.2	0.009	<0.005	<0.005	<0.01	0.096	0.009	<0.06	0.76	<0.005	<0.05		
NORILUP	Feb-06	7.86	1070	585	0.125	174	4.5	17.8	29.2	300	0	78	35.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.105	<0.005	<0.06	0.75	<0.005	<0.05		
NORILUP	Mar-06	7.91	1230	605	0.115	189	4.8	18.3	30.5	328	0	81	35.3	<0.2	0.003	<0.005	<0.005	<0.01	0.083	<0.005	<0.06	0.76	<0.005	<0.05		
NORILUP	Apr-06	7.89	1164	719	0.095	198	4.8	19	32	355	0	85	37	<0.2	0.011	<0.005	<0.005	<0.01	0.053	<0.005	<0.06	0.72	<0.005	<0.05		
NORILUP	May-06	8.12	1237	675	0.072	200	4.4	17.8	31.5	361	0	80	38.4	<0.2	0.001	<0.005	<0.005	<0.01	0.018	<0.005	<0.06	0.68	<0.005	<0.05		
NORILUP	Jun-06	8.49	1299	749	0.036	201	4.3	16.7	32.2	367	6.53	65	37.3	<0.2	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.64	<0.005	<0.05		
NORILUP	Jul-06	8.59	1312	716	0.068	199	4.1	16.5	32.3	355	7.25	59	38.7	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	0.59	<0.005	<0.05		
NORILUP	Aug-06	8.02	1354	684	0.231	204	3.9	19.1	37.7	375	0	65	36.8	0.49	0.004	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	0.44	<0.005	<0.05		
NORILUP	Sep-06	7.89	1302	775	0.168	192	3.2	22.4	41.2	378	0	53	27.2	1.69	0.001	<0.005	<0.005	<0.01	0.021	<0.005	0.1	0.14	<0.005	<0.05		
NORILUP	Oct-06	9	1300	865	0.11	191	3	21	40.3	371	13.2	33	26	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	0.1	<0.005	<0.05		
NORILUP	Nov-06	9.14	1394	728	0.12	199	3.2	20.2	41.4	380	32	20	25.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	0.09	<0.005	<0.05		
NORILUP	Dec-06	8.19	1439	722	0.1	206	3.4	20.1	41.7	405	0	66	24.3	<0.2	0.001	<0.005	<0.005	<0.01	0.08	<0.005	0.09	0.1	<0.005	<0.05		
NORILUP	Jan-07	7.85	1426	846	0.12	221	4	22.4	44.4	435	0	79	24.2	<0.2	0.001	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	0.11	<0.005	<0.05		
NORILUP	Feb-07	8.05	1638	926	0.3	237	4.4	26.2	47.8	468	0	90	25	<0.2	<0.001	<0.005	0.01	<0.01	0.13	<0.005	<0.06	0.12	<0.005	<0.05		
NORILUP	Mar-07	8.17	1574	851	0.1	259	4.8	27.1	50.9	493	0	97	25.2	<0.2	<0.001	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	0.12	<0.005	<0.05		
NORILUP	Apr-07	8.09	1708	880	0.1	272	5.1	27.6	52	505	0	101	27.5	<0.2	0.004	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	0.13	<0.005	<0.05		
NORILUP	May-07	8.06	1800	901	0.08	258	5.4	27.2	51.2	466	0	92	31	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	0.11	<0.005	<0.05		
NORILUP	Jun-07	7.51	1734	1020	0.05	251	5.1	26.7	51.3	518	0	92	33.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.1	<0.005	<0.05		
NORILUP	Jul-07	7.47	1510	942	0.28	228	4.6	26	50.4	483	0	68	31.6	1.62	0.015	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	0.07	<0.005	<0.05		
NORILUP	Aug-07	7.68	1156	577	0.27	176	4.7	22.1	35.3	290	0	60	60.7	0.21	0.008	<0.005	0.01	<0.01	0.06	<0.005	<0.06	1.7	<0.005	<0.05		
NORILUP	Sep-07	7.53	922	463	0.23	127	3.9	15.8	23.7	243	0	62	51.4	<0.2	0.002	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	1.5	<0.005	<0.05		
NORILUP	Oct-07	7.78	927	555	0.26	135	4.3	17.5	26.9	221	0	54	52.1	<0.2	0.006	<0.005	<0.005	<0.01	0.03	<0.005	0.09	1.6	<0.005	<0.05		
NORILUP	Nov-07	8.84	1131	631	0.14	160	5	19.9	28.7	276	5.14	50	69.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	2.3	<0.005	<0.05		
NORILUP	Dec-07	8.86	1194	662	0.17	187	5.5	21.3	32	303	11	50	69.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	2.4	<0.005	<0.05		
NORILUP	Feb-08	8.98	1389	705	0.12	211	6.1	24.6	36.9	367	9.24	69	63.7	<0.2	<0.001	<0.005	0.01	<0.01	0.05	<0.005	0.06	2.3	0.04	<0.05		
NORILUP	Mar-08	8.47	1538	815	0.08	229	6.8	25.8	40.4	386	10.4	99	63.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	2.3	<0.005	<0.05		
NORILUP	Apr-08	7.9	1593	885	0.11	235	6.8	26.4	41.7	293	0	106	64.7	<0.2	0.002	<0.005	<0.005	<0.01	0.03	<0.005	0.16	2.3	0.01	<0.05		
NORILUP	May-08	8.1	1530	809	0.09	251	8	27.9	43.6	395	0.52	104	67.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	0.06	2.2	<0.005	<0.05		
NORILUP	Jun-08	7.54	1410	713	0.21	227	6.7	27.1	43.5	402	0	80	54.5	1.68	0.002	<0.005	0.01	<0.01	0.04	<0.005	<0.06	1.4	0.01	<0.05		
NORILUP	Jul-08	7.69	1366	757	0.12	205	4.6	24.9	42.5	404	0	57	38.8	1.68	0.001	<0.005	<0.005	<0.01	0.01	0.01	<0.06	0.57	<0.005	<0.05		
NORILUP	Aug-08	7.8	967	459	0.16	150	5.1	19.4	26.1	251	0	61	64.6	0.28	0.002	<0.005	<0.005	<0.01	0.02	0.01	<0.06	2	<0.005	<0.05		
NORILUP	Sep-08	8.36	1154	636	0.1	173	5.3	21.2	28.8	281	1.91	63	71.8	<0.2	0.003	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	2.2	<0.005	<0.05		
NORILUP	Oct-08	7.89	1117	654	0.11	166	6	21.9	29.8	290	0	67	79.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	2.6	<0.005	<0.05		
NORILUP	Nov-08	8.76	1295	775	0.08	167	5.8	23.1	30.5	320	4.67	64	82.8	<0.2	<0.001	<0.005	<0.005	<0.01	<0.005	<0.005	<0.06	2.8	0.02	<0.05		
NORILUP	Dec-08	8.94	1340	723	0.09	182	6.4	23.9	31.4	336	7.39	64	91.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	0.01	0.07	2.9	<0.005	<0.05		
NORILUP	Jan-09	8.64	1386	787	0.04	214	7.6	25.1	36.7	361	10.5	67	86.7	<0.2	<0.001	<0.005	0.01	<0.01	0.03	<0.005	<0.06	3.2	<0.005	<0.05		
NORILUP	Feb-09	8.53	1505	843	0.06	240	8.3	27.1	38.5	388	6.72	88	91	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	3.4	<0.005	<0.05		
NORILUP	Mar-09	8.27	1548	897	0.08	231	8.3	27.8	40.7	415	0	117	83.2	<0.2	0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	2.9	<0.005	<0.05		
NORILUP	Apr-09	8.12	1597	959	0.09	242	8.3	29	40.4	432	0	120	77.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	2.8	<0.005	<0.05		

Greenbushes Laboratory Data

Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
NORILUP	May-09	8.09	1585	989	0.08	257	9	29.9	42.4	430	0	128	81	<0.2	0.001	<0.005	<0.005	<0.01	0.03	<0.005	0.08	3	<0.005	<0.05		
NORILUP	Jun-09	7.6	1420	921	0.13	231	9	28.7	40.7	396	0	112	72.5	1.09	<0.001	<0.005	<0.005	<0.01	0.06	0.01	<0.06	2.2	<0.005	<0.05		
NORILUP	Jul-09	7.39	1488	772	0.29	197	6.5	24	38.2	358	0	76	45.9	5.35	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	0.07	1.1	0.02	<0.05		
NORILUP	Aug-09	7.56	1051	620	0.15	155	5.3	20.9	29.9	269	0	62	72.1	0.66	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	0.12	2.2	<0.005	<0.05		
NORILUP	Sep-09	7.63	1055	548	0.19	141	5.2	20.1	27.5	255	0	60	77.4	0.21	<0.001	<0.005	<0.005	<0.01	0.06	0.01	<0.06	2.3	<0.005	<0.05		
NORILUP	Oct-09	7.89	1007	607	0.18	147	5.8	23	28	238	0	58	92	<0.2	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	2.8	<0.005	<0.05		
NORILUP	Nov-09	8.49	1086	608	0.09	152	5.4	21.2	30	252	6.33	57	81.2	<0.2	0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	2.4	<0.005	<0.05		
NORILUP	Dec-09	8.86	1175	655	0.11	169	5.5	22	31.7	278	12.1	51	80.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	0.07	2.4	<0.005	<0.05		
NORILUP	Jan-10	9	1343	730	0.03	195	6.2	23.4	35.6	338	14.9	64	78.9	<0.2	<0.001	<0.005	0.01	<0.01	0.04	<0.005	0.16	2.6	<0.005	<0.05		
NORILUP	Feb-10	8.78	1231	783	0.05	206	6.6	24.6	38.1	339	14.9	81	82.5	<0.2	0.001	<0.005	<0.005	<0.01	0.05	<0.005	<0.06	2.7	<0.005	<0.05		
NORILUP	Mar-10	8.81	1474	863	0.07	213	7.3	25.7	39.3	378	14.7	97	87.8	<0.2	0.001	<0.005	<0.005	<0.01	0.04	0.01	<0.06	2.9	<0.005	<0.05		
NORILUP	Apr-10	8.15	1518	904	0.05	232	7.9	28.6	43.5	393	0	130	82.4	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	0.06	2.8	<0.005	<0.05		
NORILUP	May-10	8.24	1521	956	0.04	241	7.9	28.7	44.5	401	0	135	83.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	2.8	<0.005	<0.05		
NORILUP	Jun-10	8.24	1572	899	0.04	244	7.5	27.9	44.8	404	0	123	81.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	2.4	<0.005	<0.05		
NORILUP	Jul-10	8.32	1565	845	0.24	233	6.8	26.3	44.4	404	3.79	112	76.5	<0.2	0.005	<0.005	<0.005	<0.01	0.01	<0.005	0.08	2.2	<0.005	<0.05		
NORILUP	Aug-10	8.25	1645	883	0.09	242	6.1	28.2	48.8	451	0	101	71.8	<0.2	<0.001	<0.005	0.01	<0.01	0.02	<0.005	<0.06	1.6	<0.005	<0.05		
NORILUP	Sep-10	8.51	1739	965	0.07	254	5.9	30.2	54.7	474	8.38	78	67.4	<0.2	<0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	1.4	<0.005	<0.05		
NORILUP	Oct-10	9.18	1752	946	0.03	255	5.4	28.3	53.8	486	25	45	60.7	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	1.2	<0.005	<0.05		
NORILUP	Nov-10	9.46	1684	965	0.02	261	5.5	27.6	55.2	480	27	29	58.9	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	1.3	<0.005	<0.05		
NORILUP	Dec-10	9.49	1860	1060	0.15	281	5.8	28.2	58.3	524	38	25	55.5	<0.2	<0.001	<0.005	0.01	<0.01	0.09	<0.005	<0.06	1.3	<0.005	<0.05		
NORILUP	Jan-11	7.99	2200	1160	0.19	298	7.1	32.7	61.5	533	0	121	59.2	<0.2	0.003	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	1.3	<0.005	<0.05		
NORILUP	Feb-11	7.94	2290	1180	0.4	324	7.7	40.4	67	634	0	142	63.7	<0.2	0.001	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	1.4	<0.005	<0.05		
NORILUP	Mar-11	7.94	2450	1340	0.21	349	8	43.8	72.3	689	0	157	68.1	<0.2	0.001	<0.005	<0.005	<0.01	0.11	<0.005	<0.06	1.5	<0.005	<0.05		
NORILUP	Apr-11	8.08	2630	1360	0.09	363	8.7	44.5	74.3	749	0	158	80.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	1.5	<0.005	<0.05		
NORILUP	May-11	7.36	1927	1100	0.48	306	10.1	42.7	67.5	560	0	104	105	4.32	0.001	<0.005	0.01	<0.01	0.11	<0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Jun-11	7.45	1928	1100	0.32	292	9.1	43	65.6	546	0	94	105	5.84	0.002	<0.005	<0.005	<0.01	0.05	<0.005	0.14	0.96	<0.005	<0.05		
NORILUP	Jul-11	7.32	1779	1000	0.19	265	7.8	38.1	61.7	495	0	76	93.7	2.97	<0.001	<0.005	<0.005	<0.01	0.05	0.01	<0.06	0.79	0.01	<0.05		
NORILUP	Aug-11	7.28	1345	770	0.32	210	4.7	28.6	49.7	400	0	57	54.3	5.71	<0.001	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	0.29	0.01	<0.05		
NORILUP	Sep-11	7.35	1139	623	0.38	159	3.2	20	36.4	307	0	52	38.3	2.1	<0.001	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	0.14	0.02	<0.05		
NORILUP	Oct-11	7.74	1031	553	0.44	139	2.6	14.7	30.3	253	0	56	31.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.08	<0.005	0.11	0.1	0.01	<0.05		
NORILUP	Nov-11	7.71	1028	637	0.31	155	2.9	17.5	33.2	287	0	65	35.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	0.16	<0.005	<0.05		
NORILUP	Dec-11	7.4	1198	655	0.17	174	3.6	19.6	36.5	310	0	76	42.1	<0.2	0.001	<0.005	0.01	<0.01	0.06	<0.005	0.19	0.41	0.01	<0.05		
NORILUP	Jan-12	7.95	1231	737	0.17	189	4	19.8	33.3	346	0	87	39.9	<0.2	0.001	<0.005	<0.005	<0.01	0.07	<0.005	<0.06	0.42	0.01	<0.05		
NORILUP	Feb-12	7.62	1432	751	0.15	205	4.6	21.6	36.4	363	0	79	41.4	<0.2	0.002	<0.005	<0.005	<0.01	0.12	0.01	<0.06	0.45	<0.005	<0.05		
NORILUP	Mar-12	7.62	1452	845	0.19	216	4.8	21.1	38.4	396	0	76	44.3	<0.2	0.001	<0.005	<0.005	<0.01	0.13	<0.005	<0.06	0.46	0.01	<0.05		
NORILUP	Apr-12	8.07	1534	804	0.09	230	5.2	21.8	40	408	0	85	45.5	<0.2	0.001	<0.005	0.01	<0.01	0.07	<0.005	<0.06	0.5	0.01	<0.05		
NORILUP	May-12	7.88	1568	820	0.08	229	5.1	20.4	38.7	424	0	88	47.1	<0.2	0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	0.49	0.02	<0.05		
NORILUP	Jun-12	7.92	1536	813	0.06	219	5.1	21.3	42.2	407	0	76	53.7	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	0.01	<0.06	0.49	0.01	<0.05		
NORILUP	Jul-12	7.6	1633	854	0.07	243	5	27.4	46.7	441	0	60	48.1	6.12	0.002	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.32	<0.005	<0.05		
NORILUP	Aug-12	7.99	1584	844	0.07	232	4.1	25	45.5	458	0	57	47.3	6.56	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.24	0.01	<0.05		
NORILUP	Sep-12	8.24	1550	862	0.11	222	3.1	24.8	41.3	437	0	57	41.5	3.64	0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.23	0.01	<0.05		
NORILUP	Oct-12	8.66	1454	810	0.09	211	2.7	23.4	39.4	422	6.54	46	38.7	1.22	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	<0.06	0.14	0.01	<0.05		
NORILUP	Nov-12	8.88	1523	791	0.1	217	2.9	23.8	40.7	430	10.6	43	40.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	0.19	0.01	<0.05		
NORILUP	Dec-12	7.95	1611	950	0.12	235	3.4	23.7	43.5	451	0	70	40.3	<0.2	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	0.23	0.02	<0.05		
NORILUP	Jan-13	7.69	1646	886	0.14	255	4.3	27.1	45.3	456	0	82	40	<0.2	<0.001	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	0.26	0.01	<0.05		

Greenbushes Laboratory Data

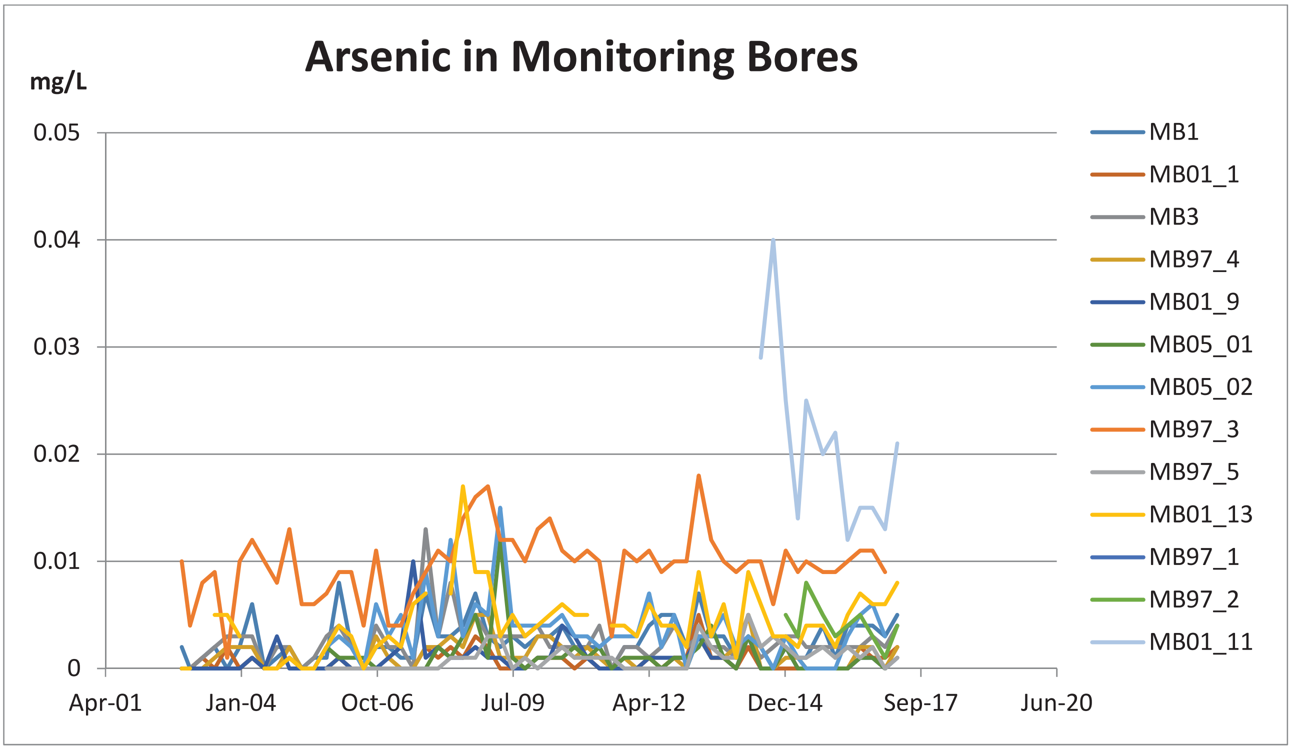
Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
NORILUP	Feb-13	7.87	1843	962	0.09	267	4.8	29.3	50	487	0	101	36.6	<0.2	<0.001	<0.005	<0.005	<0.01	0.08	<0.005	<0.06	0.2	<0.005	<0.05		
NORILUP	Mar-13	7.82	2052	1080	0.14	285	4.9	30.8	49.1	527	0	111	33	<0.2	0.001	<0.005	<0.005	<0.01	0.1	<0.005	<0.06	0.27	<0.005	<0.05		
NORILUP	Apr-13	7.95	1932	1000	0.13	292	5.5	31.5	50.4	525	0	110	37.7	<0.2	0.001	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	0.31	<0.005	<0.05		
NORILUP	May-13	7.76	1924	1060	0.13	273	5.4	29.7	48.6	528	0	104	40.5	0.34	<0.001	<0.005	<0.005	<0.01	0.09	<0.005	<0.06	0.29	0.03	<0.05		
NORILUP	Jun-13	7.62	1924	979	0.11	249	4.9	27.3	46.9	499	0	88	43	0.58	0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	0.27	0.02	<0.05		
NORILUP	Jul-13	7.56	1788	1040	0.12	266	5.3	27.2	51.7	488	0	73	44.8	0.84	0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	0.25	0.01	<0.05		
NORILUP	Aug-13	7.67	1542	809	0.21	215	3.3	24.1	41.1	421	0	57	37.2	2.22	0.001	<0.005	0.01	<0.01	0.04	<0.005	<0.06	0.13	0.02	<0.05		
NORILUP	Sep-13	7.81	1280	678	0.31	174	4.6	21.7	29.9	306	0	83	79	0.2	0.002	<0.005	<0.005	<0.01	0.06	<0.005	<0.06	2.8	0.01	<0.05		
NORILUP	Oct-13	7.94	1281	699	0.17	190	5.8	26	27.3	292	0	96	98.5	<0.2	<0.001	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	4.2	0.02	<0.05		
NORILUP	Nov-13	8.16	1378	751	0.11	196	5.8	25.5	30.7	319	0	113	107	<0.2	0.002	<0.005	<0.005	<0.01	0.03	<0.005	<0.06	4.5	0.01	<0.05		
NORILUP	Dec-13	8.64	1527	818	0.1	213	6.1	24.9	32	356	4.44	103	101	<0.2	0.001	<0.005	0.01	<0.01	0.02	<0.005	<0.06	4.7	0.02	<0.05		
NORILUP	Jan-14	8.68	1619	855	0.08	227	6.5	24.2	34.1	378	5.28	119	96	<0.2	0.004	<0.005	<0.005	<0.01	0.04	0.01	<0.06	4.5	0.01	<0.05		
NORILUP	Feb-14	8.39	1776	1060	0.045	259	7.1	26.7	36.5	411	1.57	146	100	<0.2	0.001	<0.005	<0.005	<0.01	0.041	<0.005	0.1	4.9	<0.005	<0.05		
NORILUP	Mar-14	8.35	1906	1020	0.092	279	8	29.4	39.7	451	1.22	191	102	<0.2	<0.001	<0.005	<0.005	<0.01	0.072	<0.005	<0.06	5.3	<0.005	<0.05		
NORILUP	Apr-14	8.02	1943	1080	0.06	282	8.5	29.5	42	465	0	191	99	<0.2	0.004	<0.005	<0.005	<0.01	0.087	<0.005	<0.06	5.2	<0.005	<0.05		
NORILUP	May-14	8.11	1998	1180	0.054	296	8.4	32.5	42.7	469	0	224	103	<0.2	<0.001	<0.005	<0.005	<0.01	0.025	0.007	0.13	5	<0.005	<0.05		
NORILUP	Jun-14	7.86	1975	1140	0.051	277	8.1	31.8	42	455	0	208	95.2	<0.2	<0.001	<0.005	0.005	<0.01	0.013	<0.005	<0.06	4.3	<0.005	<0.05		
NORILUP	Jul-14	7.3	1419	804	0.174	206	4.3	24.9	35.6	374	0	103	50.4	2.97	<0.001	<0.005	<0.005	<0.01	0.04	<0.005	<0.06	1.4	<0.005	<0.05		
NORILUP	Aug-14	7.27	1322	772	0.155	195	3.4	22.8	33.9	354	0	112	41.1	1.96	0.001	<0.005	<0.005	<0.01	0.027	<0.005	<0.06	0.73	<0.005	<0.05		
NORILUP	Sep-14	7.54	1075	601	0.228	155	4.3	18	23.3	238	0	115	66	0.21	0.002	<0.005	<0.005	<0.01	0.052	<0.005	<0.06	2.7	<0.005	<0.05		
NORILUP	Oct-14	7.83	1255	699	0.17	180	4.9	21.1	25.9	264	0	155	79.8	<0.2	0.005	<0.005	<0.005	<0.01	0.028	<0.005	<0.06	3.6	<0.005	<0.05		
NORILUP	Nov-14	8.72	1334	725	0.068	200	5	23.2	29	308	5.52	92	81	<0.2	0.001	<0.005	<0.005	<0.01	0.023	<0.005	<0.06	3.6	<0.005	<0.05		
NORILUP	Dec-14	8.8	1392	790	0.067	213	5.2	22.7	30.3	338	6.26	92	81.8	<0.2	0.002	<0.005	<0.005	<0.01	0.038	<0.005	<0.06	3.5	<0.005	<0.05		
NORILUP	Jan-15	8.85	1529	848	0.075	238	5.8	24.7	33.9	374	7.52	100	82.1	<0.2	0.001	<0.005	<0.005	<0.01	0.048	<0.005	<0.06	3.7	0.022	<0.05		
NORILUP	Feb-15	8.61	1696	907	0.049	253	6.3	24.6	36.4	393	4.34	124	85	<0.2	0.001	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	4	<0.005	<0.05		
NORILUP	Mar-15	8.22	1844	1000	0.056	279	7	27.9	39.9	436	0	158	88	<0.2	0.003	<0.005	<0.005	<0.01	0.108	<0.005	<0.06	4.1	<0.005	<0.05		
NORILUP	Apr-15	8.08	1882	1020	0.045	293	7.4	30.8	41.4	482	0	167	78.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.102	<0.005	<0.06	4.1	<0.005	<0.05		
NORILUP	May-15	8.06	1804	1040	0.059	282	7	30.4	40.6	454	0	159	87.7	<0.2	0.001	<0.005	<0.005	<0.01	0.06	<0.005	0.12	3.5	<0.005	<0.05		
NORILUP	Jun-15	8.05	1815	980	0.083	272	6.7	30.2	40	463	0	147	84.9	<0.2	<0.001	<0.005	<0.005	<0.01	0.019	<0.005	<0.06	3.2	<0.005	<0.05		
NORILUP	Jul-15	8.03	1857	989	0.082	278	6.2	31	42.9	465	0	135	80.5	<0.2	0.001	<0.005	<0.005	<0.01	0.023	<0.005	0.1	2.8	<0.005	<0.05		
NORILUP	Aug-15	7.59	1369	733	0.429	202	4.6	23.3	33.6	359	0	87	49.2	<0.2	0.001	<0.005	<0.005	<0.01	0.075	0.005	<0.06	1.5	<0.005	<0.05		
NORILUP	Sep-15	7.77	1558	881	0.158	225	4.1	26.7	40	411	0	89	47.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.048	0.005	<0.06	1.1	<0.005	<0.05		
NORILUP	Oct-15	7.84	1528	828	0.14	224	3.9	25.9	40.5	413	0	84	42.8	<0.2	<0.001	<0.005	<0.005	<0.01	0.031	<0.005	<0.06	0.81	<0.005	<0.05		
NORILUP	Nov-15	8.21	1588	873	0.191	233	4.1	27.1	41.2	426	0	90	42	<0.2	0.001	<0.005	<0.005	<0.01	0.068	<0.005	0.06	0.81	<0.005	<0.05		
NORILUP	Dec-15	8.81	1720	875	0.069	252	4.6	28.3	44.1	458	6.23	78	43.7	<0.2	0.001	<0.005	<0.005	<0.01	0.043	<0.005	0.1	0.92	<0.005	<0.05		
NORILUP	Jan-16	8.3	1930	1060	0.07	279	4.2	29.3	47.1	500	0	104	44.6	<0.2	0.001	<0.005	<0.005	<0.01	0.065	<0.005	<0.06	1	<0.005	<0.05		
NORILUP	Feb-16	8.01	1673	858	0.076	241	5.2	27.2	41.6	435	0	94	40.6	<0.2	0.001	<0.005	<0.005	<0.01	0.072	<0.005	<0.06	0.86	<0.005	<0.05		
NORILUP	Mar-16	8.17	1753	932	0.074	256	5.8	27.6	43.4	448	0	98	41.7	<0.2	0.003	<0.005	<0.005	<0.01	0.043	<0.005	0.12	0.9	<0.005	<0.05		
NORILUP	Apr-16	8.45	1779	931	0.091	262	5.6	28	44.2	452	2.48	93	42.7	<0.2	0.001	<0.005	<0.005	<0.01	0.046	<0.005	<0.06	0.9	<0.005	<0.05	8.52	
NORILUP	May-16	8.11	1882	982	0.074	272	5.5	29.2	47	485	0	93	44.9	<0.2	0.002	<0.005	<0.005	<0.01	0.015	<0.005	0.11	0.83	<0.005	<0.05	8.85	
NORILUP	Jun-16	7.6	1854	1040	0.187	266	4.8	30.2	48.8	480	0	75	40.3	0.62	0.001	<0.005	<0.005	<0.01	0.029	<0.005	<0.06	0.59	<0.005	<0.05	8.29	
NORILUP	Jul-16	7.81	1693	873	0.121	249	4.9	26.4	42.5	446	0	91	62	<0.2	0.001	<0.005	<0.005	<0.01	0.009	<0.005	<0.06	2.2	<0.005	<0.05	8.4	
NORILUP	Aug-16	7.75	1163	603	0.218	179	3.4	18.6	29.8	308	0	70	40.2	0.34	<0.001	<0.005	<0.005	<0.01	0.022	<0.005	0.11	1.1	<0.005	<0.05	8.35	
NORILUP	Sep-16	7.88	1039	547	0.292	154	4	14.7	22.4	242	0	77	53.5	0.23	<0.001	<0.005	<0.005	<0.01	0.024	<0.005	<0.06	2.3	<0.005	<0.05	7.69	
NORILUP	Oct-16	7.83	857	430	0.245	120	2.4	11.9	19.7	202	0	60	27.1	<0.2	<0.001	<0.005	<0.005	<0.01	0.021	<0.005	<0.06	0.67	<0.005	<0.05	8.21	

Greenbushes Laboratory Data

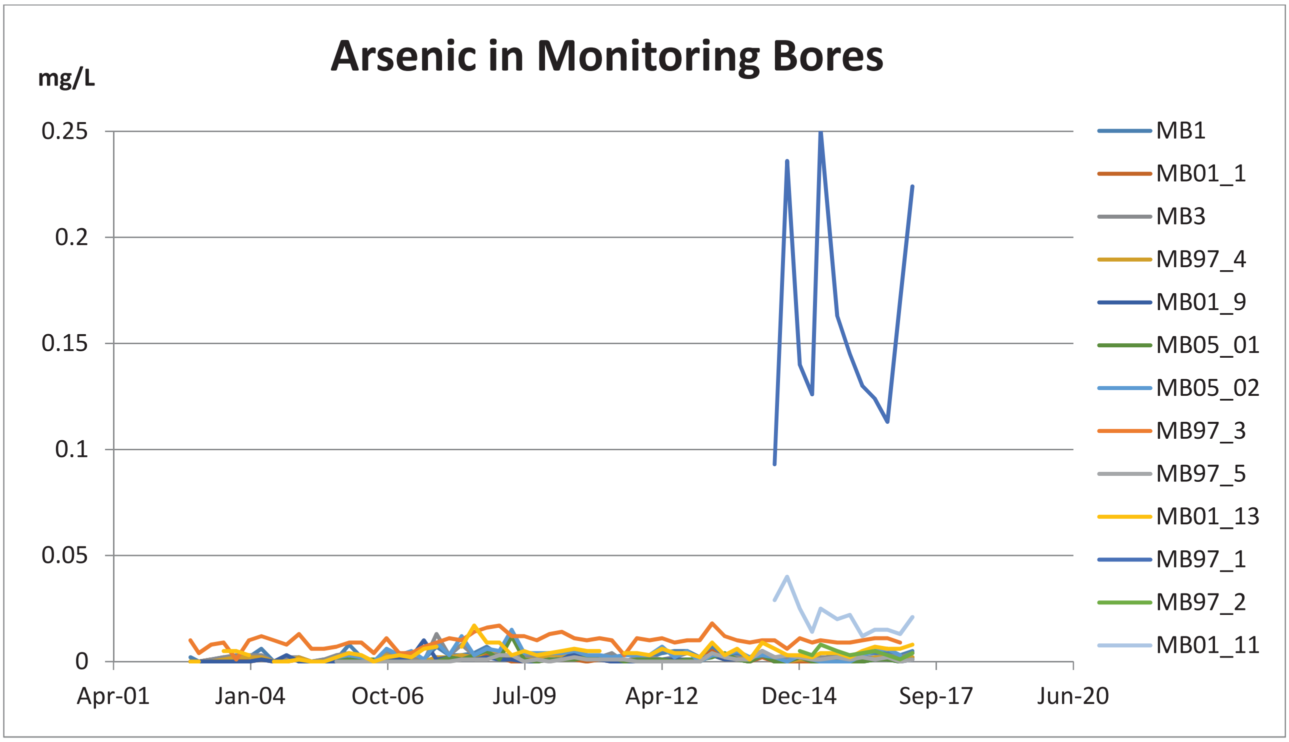
Location	Date	pH	Cond	TDS	Fe	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	NO3	As	Cd	Co	Cu	Mn	Ni	PO4	Li	Zn	Pb	pH	pH
	Units	pH	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Field	Field
NORILUP	Nov-16	8.61	788	406	0.186	116	2.2	11.5	19.4	202	3.71	51	20.3	<0.2	0.001	<0.005	<0.005	<0.01	0.033	<0.005	<0.06	0.24	<0.005	<0.05	8.8	
NORILUP	Dec-16	9.15	821	460	0.219	135	2.4	13.7	22.7	233	11.4	38	24.2	0.69	0.001	<0.005	<0.005	<0.01	0.046	<0.005	<0.06	0.3	<0.005	<0.05	7.58	
NORILUP	Jan-17	9.1	1030	551	0.177	157	2.7	15.4	25.3	251	9.55	51	27.1	<0.2	0.001	<0.005	<0.005	<0.01	0.043	<0.005	<0.06	0.38	<0.005	<0.05	8.8	
NORILUP	Feb-17	8.58	1190	704	0.119	170	3	17	27.2	322	3.52	79	27.4	<0.2	0.001	<0.005	<0.005	<0.01	0.047	<0.005	<0.06	0.43	<0.005	<0.05	7.73	
NORILUP	Mar-17	8.83	1209	637	0.125	183	3.2	18.3	29.3	301	6.43	77	30.4	<0.2	0.002	<0.005	<0.005	<0.01	0.037	<0.005	<0.06	0.46	<0.005	<0.05	8.79	
NORILUP	Apr-17	8.54	1300	729	0.108	193	3.5	19.1	30.3	331	4.12	91	31.8	<0.2	0.001	<0.005	<0.005	<0.01	0.025	<0.005	0.06	0.5	<0.005	<0.05	8.9	
NORILUP	May-17	N.A.	1358	694	0.074	197	3.2	19	30.8	368	0	67	35.9	<0.2	0.001	<0.005	<0.005	<0.01	0.02	<0.005	<0.06	0.51	<0.005	<0.05	7.75	
NORILUP	Jun-17	7.67	1370	710	0.061	207	3.8	20.3	32.8	363	0	94	38.4	<0.2	0.001	<0.005	<0.005	<0.01	0.008	<0.005	<0.06	0.52	<0.005	<0.05	8.00	
NORILUP	Jul-17	7.77	1397	733	0.064	207	3.6	20.7	33	362	0	95	41	<0.2	<0.001	<0.005	<0.005	<0.01	0.01	<0.005	0.11	0.51	<0.005	<0.05	8.16	
Mean		**8.05**	**1423.2**	**783.91**	**0.128**	**212**	**4.9**	**22.9**	**37.5**	**382**	**2.3**	**80**	**49.1**	**0.4**	**0.004**	**0.000**	**0.001**	**0.00**	**0.045**	**0.001**	**0.02**	**1.20**	**0.004**	**0.000**		
Min		**0.00**	**580**	**309**	**0.000**	**96**	**2.1**	**8.3**	**16.7**	**163**	**0.0**	**20**	**16.4**	**0.0**	**0.000**	**0.000**	**0.000**	**0.00**	**0.000**	**0.000**	**0.00**	**<0.01**	**0.000**	**0.000**		
Max		**9.49**	**2630**	**1360**	**0.480**	**363**	**10.1**	**44.5**	**74.3**	**749**	**38.0**	**224**	**107**	**6.6**	**0.060**	**0.016**	**0.010**	**0.030**	**0.130**	**0.010**	**0.22**	**5.30**	**0.040**	**0.000**		

APPENDIX 6

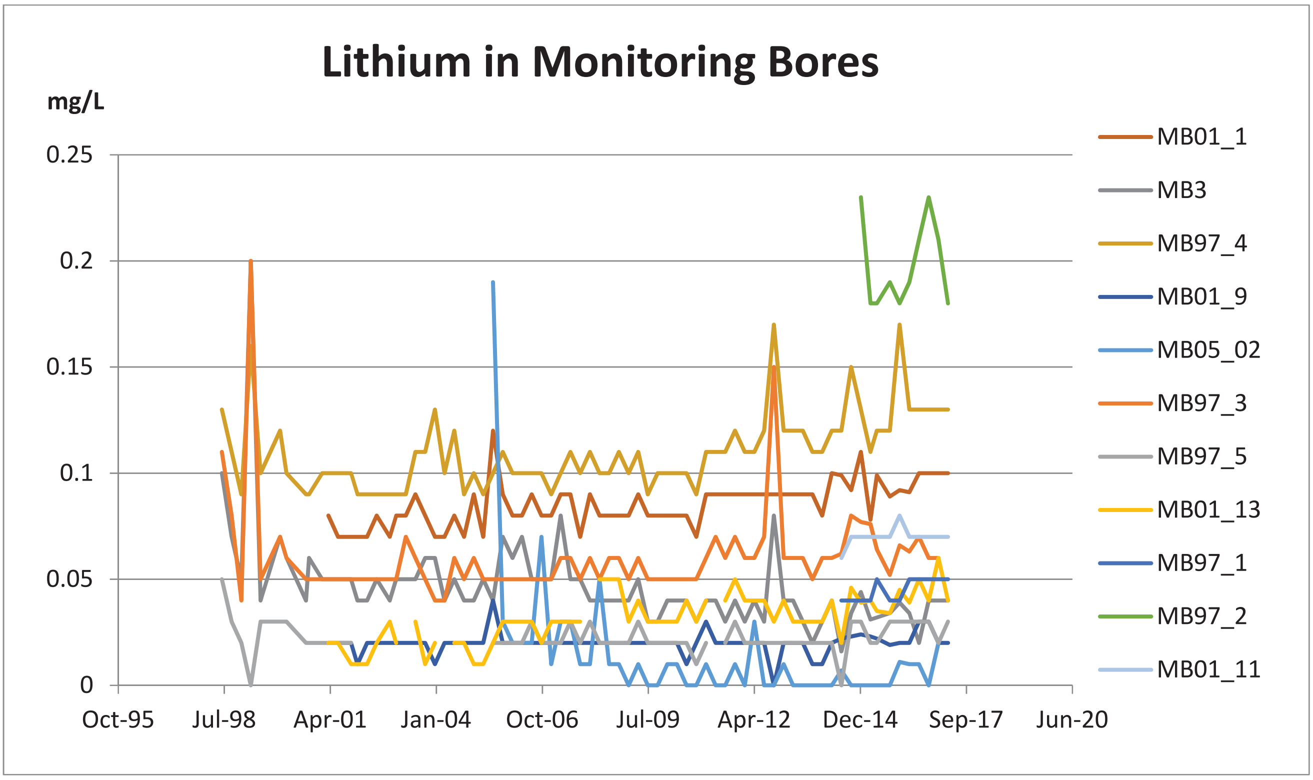
Historical Arsenic & Lithium Monitoring Trends



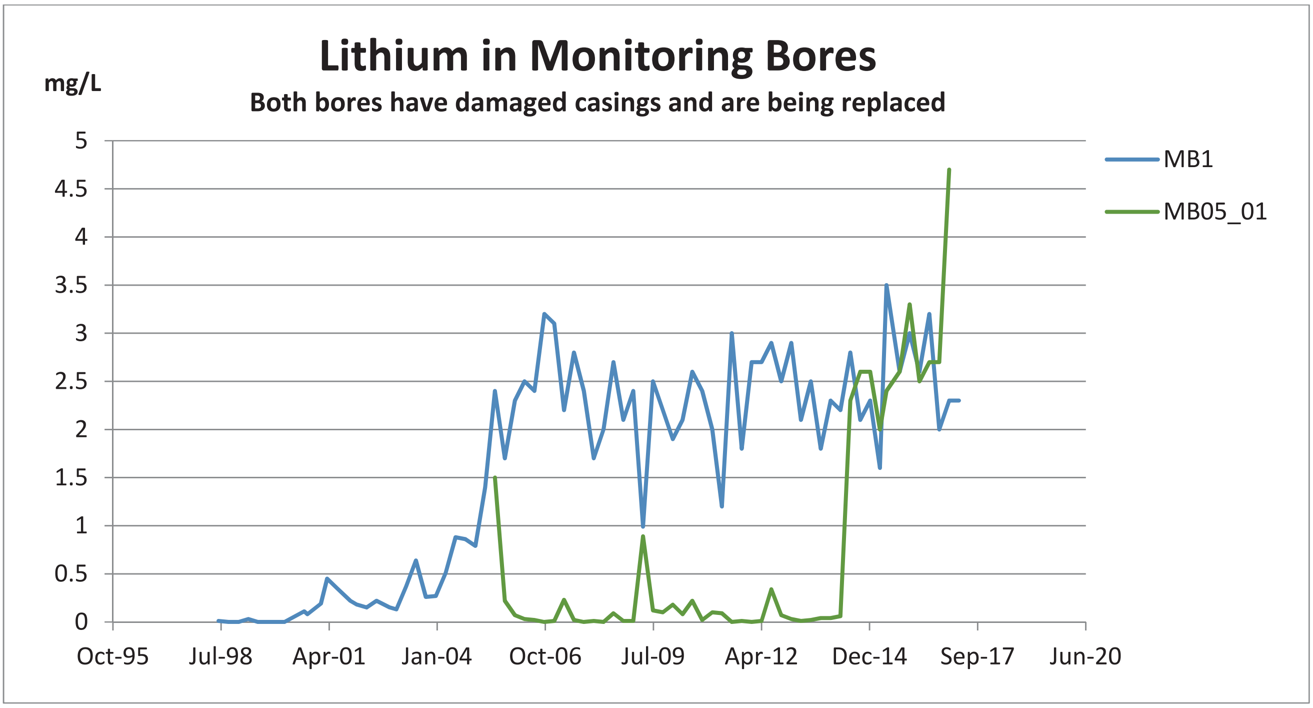
Arsenic in Monitoring Bores
mg/L
0.05
0.04
0.03
0.02
0.01
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
MB1
MB01_1
MB3
MB97_4
MB01_9
MB05_01
MB05_02
MB97_3
MB97_5
MB01_13
MB97_1
MB97_2
MB01_11



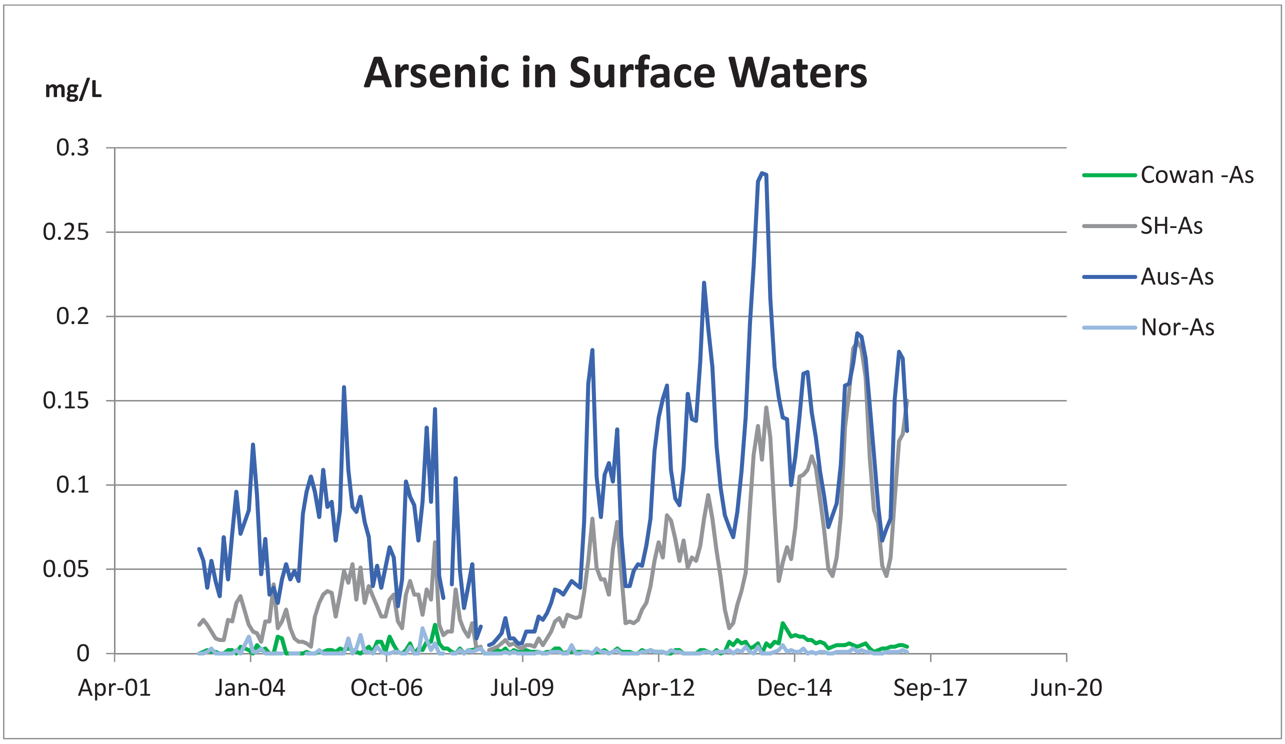
Arsenic in Monitoring Bores
mg/L
0.25
0.2
0.15
0.1
0.05
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
MB1
MB01_1
MB3
MB97_4
MB01_9
MB05_01
MB05_02
MB97_3
MB97_5
MB01_13
MB97_1
MB97_2
MB01_11



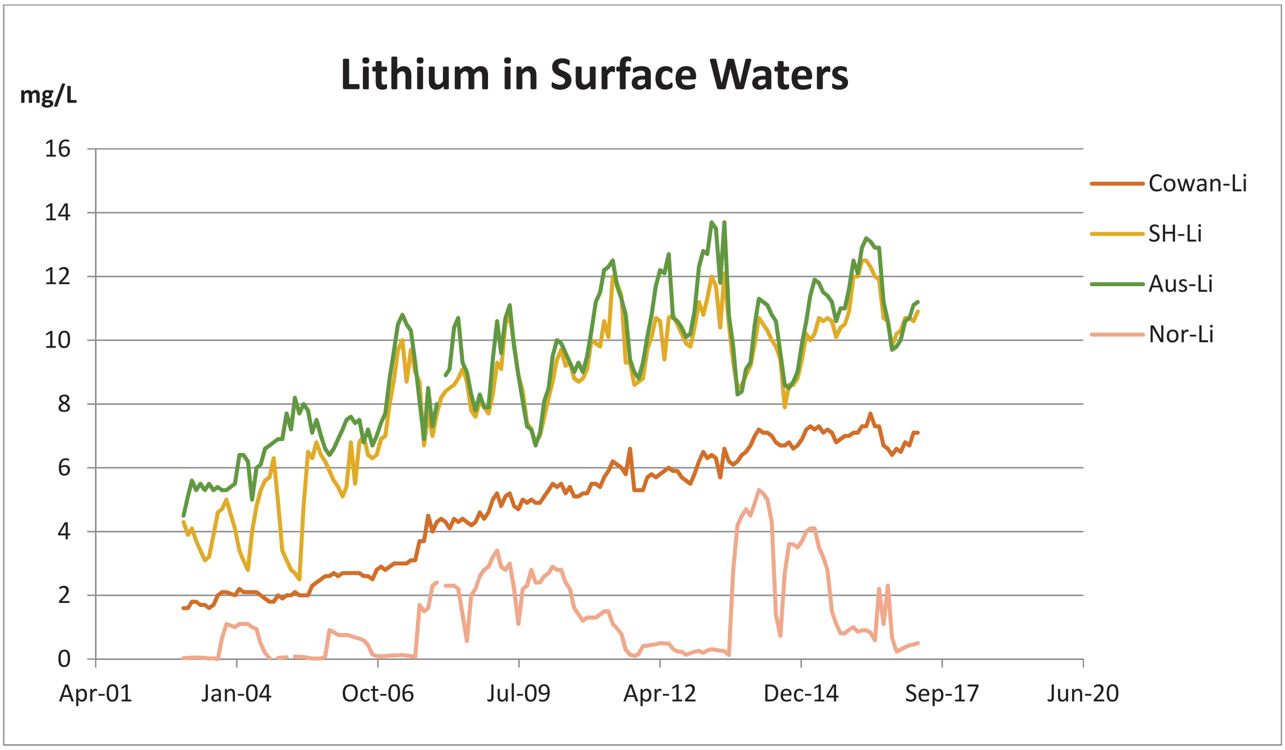
Lithium in Monitoring Bores
mg/L
0.25
0.2
0.15
0.1
0.05
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
MB01_1
MB3
MB97_4
MB01_9
MB05_02
MB97_3
MB97_5
MB01_13
MB97_1
MB97_2
MB01_11



Lithium in Monitoring Bores
mg/L
Both bores have damaged casings and are being replaced
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
MB1
MB05_01



Arsenic in Surface Waters
mg/L
0.3
0.25
0.2
0.15
0.1
0.05
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Cowan -As
SH-As
Aus-As
Nor-As



Lithium in Surface Waters
mg/L
16
14
12
10
8
6
4
2
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Cowan-Li
SH-Li
Aus-Li
Nor-Li

APPENDIX 7

Investigation of Soil & Aquifers – 1998 report

EXECUTIVE SUMMARY

General

Discharges of water from Gwalia Consolidated Limited (GCL) mining and mineral processing operations at Greenbushes are subject to conditions of Licence 4247 issued by the Department of Environmental Protection. Anomalous concentrations of arsenic have been recorded recently in 2 monitor bores near GCL's Greenbushes mine.

This investigation included an examination of existing hydrological and hydrochemical monitor data and previous reports. Six new bores were drilled, and new monitor bores constructed. Water and strata samples from the bores, and water samples from streams and drains were subjected to detailed analyses and reports on these results were prepared by a geochemist.

Geology and Lithology

The orebody at Greenbushes consists of a series of pegmatite dykes that are crosscut by dolerite dykes. Greenstones form the regional bedrock to the west of the complex of mine pits, processing plants and tailings dams. These rocks have been deeply weathered and alluvium has filled valleys and streamlines of a prior landscape that has been subsequently lateritised. The alluvium has been mined over the last 100 years with waste material returned to the voids.

Arsenopyrite and other arsenic bearing minerals have been revealed by the mining operation, and it must be expected that the alluvial deposits will include variable but significant concentrations of these minerals.

Arsenic enriched solids have been encountered in borehole 97/1 (a duplicate of earlier bore B4) at a depth of 8 to 10 m below ground level. These are probably natural sediments, but this has not been determined.

Aquifers

There is little or no hydraulic connection between aquifers intersected by bores in the area of the Evaporation Pond. However, there is a continuous body of groundwater in deeply weathered basement rocks, alluvium and dredge tailings to the west of the Tailings Dams and the Processing Plants.

Gradients of groundwater level to the west of Maranup Ford Road are about 0.03 in the area of the 3C's reservoir, and 0.01 between the Lithium Tailings Dam and bores B4 and 97/1. High groundwater levels in 3 bores along Maranup Ford Road show a potential for groundwater discharge in areas close to the 3C's reservoir and the Tailings Dams. Groundwater levels indicate that flow from the area of the Processing Plants and the Lithium Tailings Dam discharges to a swamp on the east side of Austins Dam, and the drain from the Tailings Dams to Austins Dam.

There are indications that the hydraulic conductivity of the deeply weathered basement rocks is low, but the alluvial strata encountered in bores B4 and 97/1 are more sandy with an estimated conductivity in the range 0.1 to 1 m/d.

Fractures and shear zones in the basement rocks may play an important role in local water movement, but there is no evidence of large-scale water movement in fractured rocks at Greenbushes.

The period of record of water levels in monitor bores is too short to confidently define any trend, but there may be a falling trend in bore B8 near the Evaporation Pond.

Rates of Transport within the Aquifers

The rates of transport of arsenic, lithium and other chemicals in strata west of the Greenbushes Tailings Dams and Processing Plants are not known. An inert ion such as chloride is estimated to be transported at a rate of 10^{-3} to 10^{-2} m/d in the weathered basement rocks, and 10^{-2} to 10^{-1} m/d in the sandy alluvium at bores B4 and 97/1. The time for transport of such an ion from the Lithium Tailings Dam to the area of bores B4 and 97/1 is estimated to be 150 to 1500 years.

Dissolved arsenic will be retarded by adsorption, or chemically bound in the deeply weathered strata, resulting in transport at a very much lower rate than an inert ion.

Water Quality

There are relatively high concentrations of arsenic and lithium at some sampling points within the processing water circuit, and arsenic concentrations of more than 0.007 mg/L have been detected in monitor bores B4 and B8. However, the chemical quality of overflow from the Cowan Brook reservoir meets guidelines for drinking water quality. (The salinity of water at this point lies between the lower and upper guidelines.)

Iron precipitated in a drain along Maranup Ford Road (at the foot of the Lithium Tailings Dam) was scavenging dissolved arsenic, and concentrations in the DA drain (0.02 mg/L) were less than in the Decant Pond. However, the lithium concentration in the DA drain was 14 mg/L, the same as that in the Decant Pond.

Surface water downstream of the DA drain had arsenic concentrations less than the detection limit (0.005 mg/L), and lithium concentrations less than in the drain.

The chemistry of groundwater in the area of bores B4 and 97/1 is characteristically different from that in the other regional monitor bores. It includes high iron and nickel and low pH.

The chemistry of groundwater encountered in new bores immediately to the west of Maranup Ford Road shows no evidence of contamination by seepage from the Processing Plant, the Tailings Dams or the DA drain.

The chemistry of water from bore B8 differs significantly from the nearby Evaporation Pond.

Reasons for High Arsenic Concentrations

Bores B4 and 97/1

These investigations have not conclusively determined the reason for high arsenic concentrations recorded in bores B4 and 97/1. However, there is no evidence to support the hypothesis that arsenic-rich groundwater is moving to the west and southwest from the area of the Processing Plants and Tailings Dams.

It is considered to be most likely that the high arsenic concentrations result from one or both of the following.

- Arsenic has been mobilised from natural strata encountered in the bores by a local activity. Recent changes that have taken place are rehabilitation of the area immediately to the north and east of the bore, and clearing of the area around the bores to enable access by vehicles.

- Natural arsenic-rich water has moved from a local shear zone in the basement rocks. The rehabilitation activities or storage of water in the more distant reservoirs and tailings could have changed the pattern of local groundwater flow dams.

Bore B8

It is concluded that increases of concentration of arsenic observed in bore B8 are the result of movement of naturally arsenic rich water, or local solution of arsenic rich rocks. There is no evidence of what change could have caused the change of water movement, but an indication of hydrologic change is provided by the falling water level in this bore.

Recommendations

1. *All monitor bores immediately to the west of Maranup Ford Road should be used to indicate any leakage of water or contaminants from the Processing Plants and the Tailings Dams. Bore 97/2 should be used as an indication or natural groundwater quality in the deeply weathered rocks.*

2. *The nsk of contaminant migration to the east of the Tailings Dams should be assessed, and if necessary additional monitor bores installed to determine groundwater conditions and quality in that area.*

3. *Water levels in the monitor bores should be recorded every month. The results should be assessed promptly by GCL staff. If there are indications of increasing water levels in any bore (beyond those due to normal seasonal variations), then expert advice should be sought on the implications of the change.*

4. *Every 3 months a water sample pumped from each bore should be subjected to a NATA registered laboratory for chemical analyses including pH, EC, TDS, major ions, dissolved iron, As, Li and a range of other metals. Results of the chemical analyses should be assessed promptly by GCL staff. If a significant change is detected, then the bore should be re-sampled and duplicate samples submitted for analysis. If re-analysis confirms the change, then the sampling frequency should be increased to every month, and expert advice should be sought on the implications of the change.*

5. *To determine whether sediments encountered in bores B4 and 97/1 are natural strata or wastes from earlier mining activity, a continuous core should be obtained and examined by an expert sedimentologist.*

BACKGROUND

General

Gwalia Consolidated Limited (GCL) mines tantalum, tin and lithium products from two pits at their Greenbushes WA operation. Water supplies for mineral processing are obtained from reservoirs on creeks. Discharges of wastewater are subject to conditions of Licence 4247 issued by the Department of Environmental Protection.

Beginning in mid-1996, several samples from a monitor bore were found to have arsenic concentrations of more than 0.007 mg/L, which is the guideline for drinking water.

It is important to recognise that the Greenbushes mine is developed in a mineralised area and consequently concentrations of various metals are likely to be higher than normal levels in the natural environment.

Mining at Greenbushes began in 1888 and there are numerous abandoned pits and small workings in the area. Some alluvial deposits of tin were mined by dredge with tailings deposited in the rear of the dredge pond. These areas have since been rehabilitated.

A.J. Peck and Associates Pty Ltd (AJP) was engaged by GCL to:

- Assess groundwater and surface water monitoring results from the mine area;
- Recommend locations and supervise the installation of additional monitor bores;
- Infer groundwater flow conditions and possible rates of transport of dissolved chemicals;
- Comment on sources of arsenic and the variable concentrations that have been recorded in some recent water samples; and
- Recommend a future mine water monitoring program.

Graeme Campbell & Associates (GCA) was also engaged by Gwalia to provide expert advice on the chemistry of the strata and groundwater, and factors that could contribute to the abnormal arsenic levels. GCA has liased with AJP in this study, and copies of their reports are appended herewith.

Physical Environment

Rainfall and Evaporation

Average rainfall at Greenbushes is about 950 mm/year, but in common with other centres in the southwest of WA, the average of records from about 1960 on is less than that of the full data set. More than 50% of the yearly total normally falls in the period June to August, and about 80% of the total in the period May to October.

The Bureau of Meteorology records evaporation from a standard pan at Pemberton. Average monthly rates vary from 174 mm in January to 45 mm in June. Maps prepared by the Bureau indicate that pan evaporation at Greenbushes should be close to that at Pemberton.

Topography and Surface Drainage

Figure 1 shows relevant features of the area.

The Greenbushes mine generally follows a local topographic divide with drainage on the west to Cowan Brook, which is a tributary of the Blackwood River. There is no reason to expect any groundwater flow across the divide. This report is focussed on conditions in the western drainage catchment.

Surface water is impounded in constructed reservoirs and tailings dams and there are swamps along Maranup Ford Road in the area of the mine.

There is a large Tantalum Tailings Dam on the divide and south of the mine pits. A smaller Lithium Tailings Dam is close to Maranup Ford Road.

As the tailings dams and reservoirs are not natural features, they will lose water by seepage to underlying strata creating a groundwater mound. As a result groundwater will move away from these water bodies. Seepage from the tailings dams will not cease when they are decommissioned, because of continuing recharge by rainfall. Before revegetation, recharge to sandy tailings may be 30 to 50% of rainfall, falling to 5 to 10% of rainfall after rehabilitation with a dense cover of vegetation.

Drains have been constructed to depths of about 2 m along Maranup Ford Road, and between the Tantalum Tailings Dam decant pond and Austins Reservoir (referred to here as the DA drain). The latter drain forms part of the mine water circuit.

Streamflow

There are no records of flow in the creeks and drains close to the Greenbushes mine.

Geology

The Archaean orebody is made up of a series of pegmatite dykes trending north-northwest over a strike length of 7 km. Dolerite dykes crosscut these, and there are local faults and shear zones within the rocks.

The underlying bedrock geology of the area has been inferred from borehole cuttings, creek-bed exposures and occasional minor outcrop. These rocks are principally greenstones (greyish black to greenish black granofelsic and amphibolitic rocks). The granofelsic rocks are finely banded granular, and gneissic to schistose containing (in the fresh state) biotite, hornblende, quartz and minor plagioclase. The amphibolitic rocks are massive to schistose and contain hornblende, quartz and plagioclase.

All of these rocks incorporate pods, lenses and bands of granite and granitic pegmatite sub-parallel to the foliation.

Mining operations have revealed the presence of the arsenic bearing minerals arsenopyrite, lollingite and arsenolamprite in varying concentrations in both the granofels and amphibolite. In addition, occasional zones of arsenopyrite etc. enrichment occur in the major pegmatite bodies.

To the west of the main group of pegmatites, the Archaean basement rocks are either extensively lateritised or underlie Greenbushes Formation (the so-called Old Alluvials). This formation has been extensively worked for tin (cassiterite) in the past.

Since the alluvial deposits are derived from arsenopyrite etc. bearing rocks, they may contain significant, but variable concentrations of arsenic bearing minerals. Residual materials from mining and processing might also be high in arsenic minerals in some locations. Oxidation and dissolution of these could increase the arsenic concentration in groundwater in the immediate vicinity.

Hydrogeology

There has been no previous investigation of the hydrogeology of the Greenbushes mine area. Extensive studies of the hydrogeology of sites in the Darling Range (Peck and Williamson, 1987) show that the regolith is weathered to depths of up to 40 m, and the hydraulic conductivity of the deeper strata is typically of order 0.001 m/d.

Whilst the permanent aquifer in the deeper strata is capable of yielding only small quantities of water, it has an important environmental role in the development of salinity that is common throughout southwest WA. This aquifer is locally confined in some areas, and water levels in some bores stand above ground level.

There is abundant evidence that clearing of native forest for other land uses in the southwest of WA has resulted in an increase of recharge to the permanent aquifer, and increasing groundwater levels.

A perched aquifer system often develops during the winter in lateritic material at a depth of less than 5 m, but disappears during summer as a result of losses by lateral flow, downward seepage and evapotranspiration. The perched aquifers are typically of low salinity, whilst the permanent deeper aquifers are brackish to saline.

The presence of large paper-bark trees along Maranup Ford Road suggests that these have been swampy areas for many decades. The swamps are at the break of slope below the tailings dams, which is consistent with groundwater discharge, but any discharge is evidently at a low rate. Similar swamps occur in undisturbed areas of the jarrah forest due to the development of perched groundwater systems in the winter.

Small drains and creeks, such as the DA drain may gain flow from underlying groundwater throughflow, or lose water to the underlying strata. A detailed investigation of groundwater levels would be necessary to determine conclusively the direction of movement of groundwater and dissolved substances in the vicinity of this drain.

There is a large swampy area straddling the DA drain between Maranup Ford Road and Austin's reservoir. The size of this swamp suggests that it is probably a groundwater discharge area. It is understood that the area was previously mined.

PREVIOUS HYDROLOGICAL INVESTIGATIONS

D.E Cooper & Associates (1994) reviewed water management at the Greenbushes mine. They presented an initial water balance for the site as a whole, and for individual parts of the system, including seepage from water reservoirs and tailings dams. It is likely that the rate of seepage from these storage elements has changed in the interim, but seepage from the tailings dams is expected to be continuing.

In order to monitor any changes of water quality that may result from mining and mineral processing operations, GCL regularly samples water at a number of sites (reservoirs, streams, drains and bores) for analysis of a range of inorganic chemicals including major ions, heavy metals and nutrients. Figure 1 shows the location of the major water bodies and monitor bores.

Fluor Daniel GTI (FDGTI, 1998) evaluated waste disposal practice at Greenbushes to define any sources of surface or groundwater contamination. Their analysis was based on GWL's monitoring data and reports by other consultants and CSIRO.

FDGTI note the range of chemical types of water at the various GCL sampling points at Greenbushes. In particular, monitor bore B4 is an outlier with abnormal concentrations of arsenic and radionuclides. They consider that the groundwater sampled at this point has been impacted by contamination from an adjacent source. They also note increasing sulphate concentration at 2 sites, one of them being downstream of a waste rock dump to the east of the local drainage divide.

ANALYSIS OF EXISTING DATA

General

A preliminary analysis of hydrology and water quality at the Greenbushes mine site was developed on the basis of a site visit on 19 May 1997, and monitor data to that time provided by GCL. Subsequently Graeme Campbell & Associates (GCA) prepared an interim report for GCL on arsenic and lithium concentrations in surface water samples from the Greenbushes mine site.

GCL regularly monitors groundwater levels in several bores, and takes water samples from the bores, water reservoirs and tailings dams. These samples are subjected to a range of analyses for inorganic chemicals including major ions, heavy metals and nutrients.

Records provided by drilling companies provide a general description of the strata encountered in the monitor bores, and of bore construction, but the strata were not subjected to any analyses. The bores were generally drilled into hard rock and reflect conditions in the permanent aquifer system.

Groundwater Levels and Quality

Figures 2, 3 and 4 are hydrographs of water levels recorded in the GCL monitor bores to mid-1997. Common scale ranges are used for the 3 figures. The high water level on one date in 1996 is probably a measurement or recording error.

These hydrographs show a seasonal response to winter rainfall that is common for aquifers in the southwest of WA. However, the amplitude of change of water levels from summer to winter conditions in some of the bores (notably B1 and B8) is greater than normal. This could be a result of enhanced local recharge due to runon of surface water (bore B1), impacts of nearby mining activity (bore B8) or the low water storage characteristics of fractured rocks. There is possibly a falling trend of water levels in bore B8, but the record is too short to be certain. Records from other bores nearby (bores B5, B6 and B7) do not show any trend, but the significant difference of water levels between this group of bores and bore B8 suggests that they may be open to different fracture systems.

Groundwater levels are highest in the area of the evaporation pond. There are differences of water level in bores B5 to B8 in this area, which could indicate some leakage from the pond. However, there is very little difference of salinity in these bores, and they have low levels of lithium and no detectable arsenic. On the basis of these data, there is no evidence of significant leakage from the evaporation pond.

There is a steep gradient of groundwater levels from the area of the evaporation pond to bores B9 to B12. Bore B9 has high salinity, but as there is no evidence of abnormal chemistry it is probably natural. There is detectable arsenic in bore B10, but no other abnormal water chemistry in these bores.

The regional monitor bores (B1 to B4) indicate a potential for groundwater to flow towards Cowan Brook. There is a relatively steep (2.5%) gradient driving groundwater flow from the area of bore B12 towards B4, but a lack of other local water levels to indicate flow directions near B4. Groundwater flow from this area is probably discharged in the large swampy area that straddles the DA drain.

Groundwater in bore B3 stands above ground level indicating a potential for groundwater discharge in this area that is about 200 m from Cowan Brook reservoir.

Water Quality in the Regional Monitor Bores

GCA reported an assessment of water quality in regional monitor bores B1 to B4 to GCL in August 1997. That report is copied here as Appendix 1. It was concluded that:

- Groundwater at bores B1 and B2 is fresh, and that in bores B3 and B4 is brackish.
- The concentration of soluble iron in groundwater at bore B4 is 18 to 28 mg/L.
- Soluble arsenic concentrations in bores B1, B2 and B3 are typically less than 15 μg/L, but in bore B4 they are typically in the range 42 to 80 μg/L.
- Results of analyses for bore B4 are believed to reflect natural reducing conditions in groundwater at this site.
- The variability of soluble arsenic concentrations is likely to reflect partial oxidation of Fe(II) forms before filtering and acidification of samples, ensuring scavenging of arsenic.
- Bore B4 is also characterised by concentrations of soluble Ni of 50 to 100 μg/L, which probably reflects the mildly acidic state of the groundwater.

Bore B4 is in an area that appears to be natural forest. However, it is understood that areas immediately to the north and east of this bore comprise treated tailings from historic mining and milling activities. This area has been contoured and revegetated.

Surface Water Quality

Mineralisation in the Greenbushes area is expected to result in water chemistry that differs from that in non-mineralised areas of southwest Australia. Moreover, streams in the immediate area of the mine drain to reservoirs that form part of the process water circuit.

The monitoring data show relatively high concentrations of lithium at several sites in the mine water circuit (South Hampton, Austins, Tin Shed, 3C's and the Tantalum Tailings Decant Pond - TTDP), and of arsenic at some sites (Tin Shed, 3C's and the TTDP). Ratios of SO_4/Cl at several sites (South Hampton, Tin Shed and the TTDP) are higher than those normally found in southwest Australia. The major source of sulphate is expected to be weathering of sulphide ores, but sulphate is also added in mineral processing. Weathering of sulphide ores is a natural process that will have been accelerated in some areas by mining activities.

Monitoring of overflow from the process water circuit to Cowan Brook shows that the chemistry of this discharge is acceptable for drinking water, although TDS exceeds the guideline for good-quality (500 mg/L).

The salinity of water at monitor bore B4 is not unusual for natural groundwater in southwest Australia.

Conclusions from Preliminary Investigations

Monitoring data show that the only significant water quality problem outside the mine water circuit at Greenbushes is the elevated concentration of arsenic detected in monitor bore B4 after mid-1996.

Seepage from the Tailings Dams is not considered to be a likely source of high arsenic in the area of bore B4 because of the distance and local hydrogeological conditions. Sampling techniques and analytic errors having been eliminated, there are several possible explanations for the increased concentrations:

- Arsenic-rich water may be seeping from the drain that flows from the Tantalum Tailings Decant Pond to Austins Dam (the DA drain). This would shorten the path length for contamination to reach the area of bore B4 through the groundwater system.
- Arsenic-rich strata close to bore B4 may have been disturbed by local activity such as rehabilitation of the area immediately to the north of the bore. It is understood that the area was rehabilitated only a short time before the arsenic concentrations increased.
- Natural arsenic-rich water may be moving out of a local shear zone in the basement rocks. The increased concentration that has been observed would require changes in the pattern of local groundwater flow. Such changes could have been induced by trends in rainfall, the rehabilitation activities, or the regional impacts of water storage in reservoirs and tailings dams.
- Arsenic-rich strata close to or intersected by bore B4 may have been oxidised as a result of local hydrologic changes, such as increased infiltration of oxygen-rich water in the area immediately around the bore, which has been cleared for vehicle access.

On the basis of the analysis of existing data and the preliminary investigations, it was considered that additional regional monitor bores were needed, and that strata samples from these bores should be subjected to analysis, to better define the reason for the increased arsenic concentrations in bore B4.

Special Investigation of Surface Water Quality

To investigate the possibility that surface water from the Tantalum Tailings Decant Pond could be a source of elevated arsenic concentrations in groundwater at monitor bore B4, GCA was engaged for sampling and analysis of surface water at the Greenbushes mine. Their report is attached as Appendix 2. It was concluded that:

- Surface waters downslope of the Decant-Return/Austins Drain (the DA drain) had arsenic concentrations below the detection limit of 5 µg/L.
- Water in the DA drain had an arsenic concentration less than that in the decant water within the Tantalum Tailings storage.
- Iron precipitates within the drain along Maranup Ford Road scavenge dissolved arsenic.
- Water in the DA drain had a lithium concentration identical to that in the decant water within the Tantalum Tailings storage.
- Surface waters downslope of the DA drain had variable lithium concentrations less than that in the drain.

DRILLING AND CONSTRUCTION OF THE NEW BORES

Basis of Selection of New Bore Locations

Locations for drilling new monitor holes were selected by AJP in consultation with GCL.

The original basis for location of monitor bore B4 is not known, but it is likely to have been considered to be at such a distance from GCL's Greenbushes mining and mineral processing activities that results would reflect natural groundwater quality. In view of the recorded arsenic concentration in this bore, and the lack of information on strata at the site, it was considered that a duplicate bore (number 97/1) should be drilled close to bore B4.

Another new bore site (97/2) was selected in minimally disturbed forest about 600 m southwest of bore B4. This site is believed to be remote from present and past mining and mineral processing activities so that it is expected to provide a record of natural groundwater quality. However, it is noted that the site remains within a mineralised area, so that it is possible that the water chemistry will be significantly different from that normally encountered in southwest WA.

Four additional drilling sites (97/3 to 97/6) were selected along Maranup Road, close to the tailings dams where any changes of water quality would be evident at a relatively early time. Two of the drilling sites (97/5 and 97/6) were selected on either side of the DA drain to gain evidence of any influence of the drain on groundwater levels and quality.

The locations of the new bores are shown in Figure 1.

Drilling

A protocol for drilling the new monitor bores was prepared by AJP. It is copied as Appendix 4.

GCL engaged Brandrill for drilling using the rotary air-blast method. AJP was on site to supervise drilling operations on the first day.

Several holes were drilled by this method, but difficulties were encountered with air losses in unconsolidated material. Drilling additives were used to reduce air losses, but when the problem persisted, a temporary casing was run and an Odex bit was used to allow drilling through the temporary casing. Subsequently problems were encountered with the Odex bit jamming inside the casing, and this drilling contract was terminated.

Air losses into the strata during drilling may have resulted in oxidation of dissolved iron and precipitation of arsenic. Whilst this could affect concentrations in the short-term, it is not expected to have any long-term effect.

Oliver Drilling was engaged to complete the drilling program using the cable tool method. AJP was on site to supervise drilling operations on one day. The cable tool drilling method does not introduce air into the strata.

Drilling contractors developed the bores by airlift pumping. When properly used, the airlift pumping method does not introduce air into the strata. However, water within the bore casing at the completion of airlifting will be aerated resulting in precipitation of iron and possibly arsenic. Subsequently the bores drilled by Brandrill were further developed by GCL, using a Grundfos pump. Final development by pumping, and subsequent sampling by pumping is designed to ensure that samples reflect conditions in the aquifer outside the bore casing.

Details of drilling and bore construction are provided in Appendix 5, and summarised in Table 1. At some sites a duplicate bore was constructed to monitor groundwater levels and quality in shallow strata.

Table 1: Summary of Bore Construction

Bore No	Depth Drilled (m bgl)	RL of Top of Casing (m AHD)	Top of Slots (m bgl)	Bottom of Slots (m bgl)
97/1	23.8	249.1	17.8	23.8
97/2	20.0	250.6	14.0	20.0
97/3	19.6	237.6	13.6	19.6
97/4	21.8	246.7	15.8	21.8
97/5	28	260.7	22.0	28.0
97/6	NA	262.0	NA	NA

NA – data not recorded by drillers.

DRILLING RESULTS

Water Levels

The elevations of reference points (top of casing) of the new bores have been surveyed to the nearest 0.1 m. These data were used together with measurements of water depths below the top of casing on 10 April 1998 to calculate groundwater levels relative to a common datum (AHD). Table 2 presents results.

Table 2: Water Levels (m AHD) Recorded in the New Bores

Bore Number	10 Apr 98
97/1D	242.1
97/2D	236.4
97/3D	237.0*
97/4D	240.2
97/5D	260.3*
97/6D	259.1

* Water level at or above ground level.

On the measurement date, the water levels in bores 97/3 and 97/5 were at or above ground level indicating a potential for groundwater discharge.

Figure 5 shows these water levels together with those of several surface water bodies in the area and groundwater levels measured in the earlier series of monitor bores in April 1997. The interpreted contours show a potential for groundwater movement to the west from the areas of the Evaporation Pond, the Tailings Dam and the 3C's reservoir. Actual rates of water movement will depend on the thickness and nature of the strata.

Water levels in bores 97/5 and 97/6 differed by 1.2 m although these bores are only a short distance apart. Moreover, the water level was lower in the latter bore, which is not consistent with the regional gradient. It is possible that this anomaly is not real, being the result of an error in the surveyed reference level for one or both of these bores.

The level of the DA drain adjacent to bores 97/5 and 97/6 is not known, but it must be less than that in the Decant Pond about 1000 m upstream, which is 259 m AHD. Therefore there is a potential for groundwater discharge to the DA drain in the area of these bores. It follows that solutes in the DA drain will not enter the underlying aquifer in this area.

With the sole exception of Bore 97/6 (in which the water level was doubtful), all bores to the northeast of the DA drain had water levels in excess of 260 m AHD. These data strongly suggest that groundwater flow from the tantalum and lithium plant areas and the area of the evaporation pond to the northeast discharges to the swampy area on the east of Austins Dam, and the DA drain.

The water level in Austins Dam is about 14 m higher than that in monitor bore 97/1 (and bore B4), which is in turn about 6 m higher than that in bore 97/2. Therefore there appears to be a potential for groundwater and dissolved substances to flow to the south from the area of Austins Dam towards bore 97/1. However, local directions of groundwater flow may vary due to local features. For example, in June 1998 the water level in bore 97/1 was 0.25 m above that in bore B4 indicating a gradient of about 2.5% directing flow to the north towards Battler's Gully.

The water level in the 3C's reservoir is about 14 m higher than that in bores 97/3 and B3, which are only a short distance to the west. Therefore there is a high potential gradient driving groundwater flow from the 3C's reservoir to the west. This is almost certainly the reason for groundwater levels at or above the ground surface in these monitor bores.

Hydraulic Conductivity of the Strata

The hydraulic conductivity (usual symbol, K) of a soil or aquifer relates the rate of flow through unit area of the material (q) to the difference of water levels (ΔH) per unit length of the flow path (L) according to Darcy's Law:

$$q = -K^*\Delta H/L$$

The minus sign is algebraically necessary to account for the fact that water flows from areas of higher to areas of lower hydraulic head. It may be seen that hydraulic conductivity is an analogue of electrical resistivity.

Hydraulic conductivity can be measured in a laboratory using (undisturbed) core samples, computed from the results of various borehole tests, or estimated from the grain size and sorting of the material.

The hydraulic conductivity of strata encountered in GCL's boreholes at Greenbushes has not been measured. However, the magnitude of values can be inferred from notes by GCL staff on bores that were constructed to October 1997 (summarised in Table 3), the stratigraphic logs (Appendix 5) and measurements in similar materials.

Table 3: Notes on Bore Development in October 1997

Bore Number	Depth to Water (m brp)	Pumped	Comments
97/2D	14.06	~20 L; very brown; oily film.	Pumped dry and did not recover quickly.
97/3S	0.46	~2 L; white silt.	Pumped dry and did not recover quickly.
97/5S	1.48	~20 L in 2.5 minutes and ~30 L total; red/brown; slightly turbid.	Pumped dry and did not recover quickly.
97/5D	0 (artesian)	~20 L in 2.5 minutes; clear water after 15 minutes.	Water samples collected after 1.25 hours.
97/6S	1.12	Dry after ~2 minutes.	Pumped dry and did not recover quickly.
97/6D	2.31	~30 L; dark grey; very silty.	Pumped dry and did not recover quickly.

As noted in Table 3, the rate of recovery of water level in the bores is generally low, indicating low hydraulic conductivity of the strata. These observations are consistent with the stratigraphic logs that show generally fine-textured materials in all bores but 97/1, and observations elsewhere in the Darling Range (Peck and Williamson, 1987) showing hydraulic conductivities generally in the range 0.001 to 0.01 m/d.

The saturated sands encountered in bore 97/1 from 14 to 20 m below ground level range from fine to medium with minor amounts of clay. Samples such as this are expected to have a hydraulic conductivity of 0.1 to 1 m/d (Kruseman and de Ridder, 1983).

Analyses of Water and Strata Samples

GCA prepared a report on results of analyses of water and strata samples from the new bores, which is attached as Appendix 3. It was concluded that:

- There is little variation in the chemistry of groundwater intersected by bores 97/2 to 97/6, apart from minor variation of salinity.
- The chemistry of groundwater in the area of bore 97/1 (duplicate of bore B4) is characteristically different from that in the other bores, reflecting both reducing conditions within the aquifer, and arsenic enriched aquifer solids at a depth of 8 to 10 m below ground level.
- It has not been determined whether the arsenic enriched solids at site 97/1 are natural materials *in situ*, or reworked materials from historic mining activities.
- Bores 97/2 to 97/6 should be used for detecting any adverse impacts on groundwater quality arising from mineral processing operations and process-tailings management at the Greenbushes mine.
- Bores 97/1 and B4 provide evidence of the quality of groundwater in the particular area, but the chemistry of this water is biased by local ground conditions.

Analyses of water samples from bores 97/5 and 97/6 show only minor differences of concentration of various chemicals, including arsenic and lithium. There is no evidence of higher concentrations in bores 97/5 and 97/6 that would be expected if there was any significant leakage of water with abnormal chemistry from the DA drain.

THEORY OF TRANSPORT OF SUBSTANCES DISSOLVED IN GROUNDWATER

General

It is a fundamental characteristic of aquifers and other porous materials that changes of water pressure are always propagated more rapidly than a change of concentration of any chemical. It follows that any leakage from a tailings dam would be evident as increased water level in a monitor bore before there was any change of dissolved chemical concentrations due to the leakage.

Chloride and some other ions are transported through inert soils and aquifers (such as clean sands) at the velocity of flow of water (v). This velocity differs from the rate of flow expressed in Darcy's Law (q), because the flow is confined to the water-filled pore space (θ_e). Therefore,

$$v = q/\theta_e$$

The porosity of sands and similar granular material is usually about 0.4. However, in materials such as fractured rocks the porosity may be only 0.001 or less. Even in apparently simple sands, it has been shown that most of the flow is often through only part of the water-filled pore space and an effective porosity θ_e is defined with values that may be in the range 0.01 to 0.1.

Most inorganic contaminants are transported in aquifers at a rate that is less than the water velocity v. The ratio of v to solute transport velocity is called a retardation coefficient. Retardation is a result of physical, geochemical and biochemical processes. The geochemical processes include complexation and ionic strength, pH, oxidation/reduction, precipitation-dissolution and adsorption-desorption. UNESCO (1980) provides a detailed discussion of these processes.

Natural strata such as those in the vicinity of the GCL operations at Greenbushes are expected to significantly retard the movement of heavy metals and many other contaminants. An important component of the strata is the clay fraction with its high specific surface and surface charges that provide a large capacity for adsorption and ion exchange.

Arsenic is strongly adsorbed or precipitated in most soils, but little is known about the mobility of lithium. There is no information on the retardation of these potential contaminants in strata surrounding the GCL Greenbushes mine.

A useful conceptual model is to break up the area around a possible source of groundwater contamination, such as a tailings dam, into a number of zones. Close to the source the capacity of the strata to further attenuate contaminant migration is fully saturated. This core zone expands slowly over time. Outside this core zone there is a second zone in which sorption, precipitation and reaction are active so that contaminant concentrations decrease significantly with distance from the facilities. Beyond this active zone, concentrations of the reactive chemicals are at background levels although there may be changes of groundwater level.

The extent of the core and active zones west of the Tailings Dams and Processing Plants at Greenbushes are not known.

Estimated Transport Velocity for Inert Solutes at Greenbushes

On the basis of measured water levels in bores and reservoirs, gradients of groundwater level in the area of the Greenbushes mine range between about 0.02 (between bores 97/5 and 97/2) and 0.1 (between 3C's and bores B3 and 97/3). Gradients near the reservoirs are likely to be atypical and gradients to the west of Maranup Ford Road are probably in the range 0.01 to 0.03.

On the basis of these observations and the estimated hydraulic conductivity of the strata (0.001 to 0.01 m/d; see above), groundwater flow rates in the most common strata are expected to be in the range 10^{-5} to 10^{-4} m/d. The rate of flow in the sands at bore 97/1 (hydraulic conductivity estimated to be 0.1 to 1 m/d) will be higher and may be in the range 10^{-3} to 10^{-2} m/d.

The effective porosity of the strata is probably in the range 0.01 to a maximum 0.1 in the clean sands at bores B4 and 97/1. Therefore the velocity of transport of an inert solute in the most common strata west of the Tailings Dams at Greenbushes is likely to be in the range 10^{-3} to 10^{-2} m/d. In the sands at bores B4 and 97/1 the transport velocity is expected to be in the range 10^{-2} to 10^{-1} m/d.

The distance from the Lithium Tailings Dam to monitor bores B4 and 97/1 is about 600 m and transport velocities over most of this route are expected to be 10^{-3} to 10^{-}

^{2} m/d at most. Therefore the time taken for transport of any solute in groundwater from the nearest tailings dam to bores B4 and 97/1 is expected to be at least 150 years and possibly more than 1500 years.

Transport of a reactive solute such as arsenic will take a much longer time. It may not move over such a distance in tens or hundreds of thousands of years due to strong adsorption or precipitation.

The Tailings Dams have been operated for 20 to 40 years, so it is considered to be most unlikely that arsenic concentrations measured in bore B4 are a result of leakage from the Tailings Dams.

WATER QUALITY IN MONITOR BORE B8

During 1998, GCL have recorded increases of arsenic concentration in bore B8, one of 4 monitor bores near the evaporation pond (see Figure 1). There has been a minor increase in TDS, little change in concentrations of other analytes and pH, and possibly a minor decrease in SO_4 concentration. An explanation for the changes has been requested by GCL.

The hydrograph of bore B8 is presented in Figure 2. The seasonal variation of water levels is greater than normal for bores in the lateritic profiles of southwest WA and the water level may be falling.

The water level in bore B8 is higher than that in any other bore monitored by GCL at Greenbushes, but 10 to 15 m below that in the lined Evaporation Pond. The water level in Bore B7 is about 10 m lower than that in bore B8 although these bores are only 150 m apart.

The groundwater levels show that there is little of no hydraulic connection between the bores or between bore B8 and the Evaporation Pond. There appears to be better hydraulic connection between bores B5, B6 and B7. Arsenic concentrations in these bores are below the analytic detection limit.

GCL has provided results of recent analyses of water from bore B8 and the Evaporation Pond. These data are reproduced in Table 4 (next page).

There are major differences between the chemistry of water in the Evaporation Pond and bore B8. These are most evident in the ratios Li/Cl and SO_4/Cl.

Both lithium and chloride are normally mobile ions in aquifers so that the ratio of concentrations is not expected to change during transport. The Li/Cl ratio in the Evaporation Pond is 1.94, but in bore B8 it ranges from 3.3×10^{-7} to a maximum 7.8×10^{-5}. The most recent analyses return the lowest value of this ratio.

Sulphate can be an indicator of industrial processing, although as noted above, it is also generated naturally by oxidation of sulphide rocks. The SO_4/Cl ratio in the Evaporation Pond is 5.0, but in bore B8 it ranges from 0.14 (the most recent value) to 0.22 without apparent trend.

The results of the chemical analysis support the interpretation of groundwater levels in the area in showing no indication of leakage from the Evaporation Pond to the aquifer intersected by bore B8. As there is no evidence of leakage, it is concluded that increases of concentration of arsenic observed in bore B8 are the result of movement of naturally arsenic rich water, or oxidation and solution of arsenic rich rocks.

Table 4: Results of Water Analyses

	Bore B8				Evap. Pond
	Q3/97	Q4/97	Q1/98	Q2/98	
pH	6.9	6.3	7.0	6.0	9.89
EC	700	690	710	810	8610
TDS	450	420	440	470	5640
Fe (sol)	11	5.7	13	9.1	<0.005
Mn		0.55	0.55	0.65	<0.005
Mg	17	17	18	23	4.2
Cl	170	140	180	150	144
SO_4	29	31	27	21	721
NO_3	<0.5	<0.1	<0.1	0.2	<0.2
As	0.025	0.017	0.066	0.095	0.66
Co	<0.05	<0.05	0.01	<0.01	<0.005
Cu	<0.002	<0.05	0.01	0.005	<0.01
Ni	<0.005	<0.05	<0.005	<0.005	0.006
Th	<0.0002	<0.00005	<0.00005	<0.00005	<0.05
Li		0.0092	0.014	0.00005	279
U	<0.0002	<0.00005	<0.00005	0.0067	<0.1

Units are mg/L except for EC (µS/cm) and pH.

SUMMARY AND CONCLUSIONS

General

Anomalous concentrations of arsenic in groundwater near GCL's Greenbushes mine have been investigated. The investigation included an examination of existing hydrological and hydrochemical monitor data and previous reports.

Six new bores were drilled, and new monitor bores constructed. Water and strata samples from the bores, and water samples from streams and drains were subjected to detailed analyses and reports on these results were prepared by a geochemist.

Geology and Lithology

The orebody at Greenbushes consists of a series of pegmatite dykes that are crosscut by dolerite dykes. Greenstones form the regional bedrock to the west of the complex of mine pits, processing plants and tailings dams. These rocks have been deeply weathered and alluvium has filled valleys and streamlines of a prior landscape that has been subsequently lateritised. The alluvium has been mined over the last 100 years with waste material returned to the voids.

Arsenopyrite and other arsenic bearing minerals have been revealed by the mining operation, and it must be expected that the alluvial deposits will include variable but significant concentrations of these minerals.

Arsenic enriched solids have been encountered in borehole 97/1 (a duplicate of earlier bore B4) at a depth of 8 to 10 m below ground level. These are probably natural sediments, but this has not been determined.

Aquifers

There is little or no hydraulic connection between aquifers intersected by bores in the area of the Evaporation Pond. However, there is a continuous body of groundwater in deeply weathered basement rocks, alluvium and dredge tailings to the west of the Tailings Dams and the Processing Plants.

Gradients of groundwater level to the west of Maranup Ford Road are about 0.1 in the area of the 3C's reservoir, and 0.01 between the Lithium Tailings Dam and bores B4 and 97/1. High groundwater levels in 3 bores along Maranup Ford Road show a potential for groundwater discharge in areas close to the 3C's reservoir and the Tailings Dams. Groundwater contours indicate that flow from the area of the Processing Plants and the Lithium Tailings Dam discharges to the drain from the Tailings Dams to Austins Dam.

There are indications that the hydraulic conductivity of the deeply weathered basement rocks is low, but the sands encountered in bores B4 and 97/1 are expected to have conductivity in the range 0.1 to 1 m/d.

Fractures and shear zones in the basement rocks may play an important role in local water movement, but there is no evidence of large-scale water movement in fractured rocks at Greenbushes.

The period of record of water levels in monitor bores is too short to confidently define sytematic trends, but there may be a falling trend in bore B8 near the Evaporation Pond.

Rates of Transport within the Aquifers

The rates of transport of arsenic, lithium and other solutes in strata west of the Greenbushes Tailings Dams and Processing Plants are not known. An inert ion such as chloride is estimated to be transported at a rate of 10^{-3} to 10^{-2} m/d in the weathered basement rocks, and 10^{-2} to 10^{-1} m/d in the coarser-textured alluvium. The time for transport of such an ion from the Lithium Tailings Dam to the area of bores B4 and 97/1 is estimated to be 150 to 1500 years.

Dissolved arsenic would be retarded by adsorption, or chemically bound in the deeply weathered strata, resulting in transport at a slower rate than an inert ion.

Water Quality

There are relatively high concentrations of arsenic and lithium at some sampling points within the processing water circuit, and arsenic concentrations of more than 0.007 mg/L (the drinking water guideline) have been detected in monitor bores B4 and B8. However, the chemical quality of overflow from the Cowan Brook reservoir meets guidelines for drinking water quality. (The salinity of water at this point lies between the lower and upper guidelines.)

Iron precipitated in a drain along Maranup Ford Road (at the foot of the Lithium Tailings Dam) was scavenging arsenic, and arsenic concentrations in the DA drain (0.02 mg/L) were less than in the Decant Pond. However, the lithium concentration in this drain was 14 mg/L, the same as that in the pond.

Surface water downstream of the DA drain had arsenic concentrations less than the detection limit (0.005 mg/L), and lithium concentrations less than in the drain.

The chemistry of groundwater in the area of bores B4 and 97/1 is characteristically different from that in the other regional monitor bores. It includes high iron and low pH.

The chemistry of groundwater encountered in new bores immediately to the west of Maranup Ford Road shows no evidence of contamination by seepage from the Processing Plant, the Tailings Dams or the DA drain.

The chemistry of water from bore B8 and the nearby Evaporation Pond differs significantly.

Reasons for High Arsenic Concentrations

Bores B4 and 97/1

These investigations have not conclusively determined the reason for high arsenic concentrations recorded in bores B4 and 97/1. However, there is no evidence to support the view that arsenic-rich groundwater is moving to the southwest from the area of the Processing Plants and Tailings Dams.

It is considered to be most likely that the high arsenic concentrations result from one or both of the following.

- Arsenic has been mobilised from natural strata encountered in the bores by a local activity. Changes that have taken place are rehabilitation of the area immediately to the north of the bore, and clearing of the area around the bores to enable access by vehicles.
- Natural arsenic-rich water has moved from a local shear zone in the basement rocks. The rehabilitation activities or storage of water in reservoirs and tailings dams could have changed the pattern of local groundwater flow.

Bore B8

It is concluded that increases of concentration of arsenic observed in bore B8 are the result of movement of naturally arsenic rich water, or solution of arsenic rich rocks. There is no evidence of what change could have caused the change of water movement, but an indication of change is provided by the falling water level in this bore.

RECOMMENDATIONS

1. *All monitor bores immediately to the west of Maranup Ford Road should be used to indicate any leakage of water or contaminants from the Processing Plants and*

the Tailings Dams. Bore 97/2 should be used as an indication or natural groundwater quality in the deeply weathered rocks.

2. The risk of contaminant migration to the east of the Tailings Dams should be assessed, and if necessary additional monitor bores installed to determine groundwater conditions and quality in that area.

3. Water levels in the monitor bores should be recorded every month. The results should be assessed promptly by GCL staff. If there are indications of increasing water levels in any bore (beyond those due to normal seasonal variations), then expert advice should be sought on the implications of the change.

4. Every 3 months a water sample pumped from each bore should be subjected to a NATA registered laboratory for chemical analyses including pH, EC, TDS, major ions, dissolved iron, As, Li and a range of other metals. Results of the chemical analyses should be assessed promptly by GCL staff. If a significant change is detected, then the bore should be re-sampled and duplicate samples submitted for analysis. If re-analysis confirms the change, then the sampling frequency should be increased to every month, and expert advice should be sought on the implications of the change.

5. To determine whether sediments encountered in bores B4 and 97/1 are natural strata or wastes from earlier mining activity, a continuous core should be obtained and examined by an expert sedimentologist.

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D.E. Cooper & Associates Pty Ltd (1994). Greenbushes Mine Water Management: Initial Review and Recommendations. Unpub. Rpt. To Gwalia Consolidated Limited, May 1994.

Graeme Campbell & Associates (1997). Program of Water Quality Monitoring. Unpub. Rpt. to Gwalia Consolidated, Greenbushes, August 1997.

Kruseman and de Ridder (1983). Analysis and Evaluation of Pumping Test Data. Int. Inst. For Land Reclamation and Improvement, Wageningen, The Netherlands.

Peck and Williamson (1987). Hydrology and Salinity in the Collie River Basin, Western Australia. Special Issue, *J. Hydrol.* 94(1/2), 1-198.

UNESCO (1980). Aquifer Contamination and Protection. (R.E. Jackson, ed.), UNESCO, Paris.

Bore Name/Number: 97/1

Location:	Close to bore B4
Grid Reference:	412 008 mE, 6 252 380 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	249.1 m AHD
Status:	Monitor bore
Drilled by:	Oliver Drilling
Drilling Method:	Cable tool
Drilling Date:	December 1997
Total Depth:	23.8 m bgl
Casing:	50 mm Class 9 PVC
Slotted Section:	17.8 to 23.8 m bgl
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	5.04 m btoc (23/12/97)

Stratigraphic Log Of Bore 97/1

0 to 2 m	SAND; light grey; fine to medium; trace gravel; Fe stained quartz.
2 to 4 m	SAND; grey; medium to coarse; slightly rounded; quartz and hard, dark grey mineral.
4 to 5 m	SANDY CLAY; light brown/grey; grains to 6 mm; Fe cemented quartz.
5 to 7 m	CLAY; light grey/brown; minor fine sand.
7 to 9 m	GRAVELLY CLAY; light brown; abundant stones to 15 mm; Fe cemented quartz.
9 to 12 m	CLAY; yellow/brown; minor sand and some Fe stained quartz to 10 mm; some dark minerals.
12 to 14 m	CLAY; grey/brown; minor sand.
14 to 18 m	SAND; dark green/black; fine; minor clay.
18 to 19 m	SAND; green/black; fine to medium; sharp; minor gravel.
19 to 20 m	SAND; brown; poorly sorted Fe stained quartz to 10 mm; sub-angular; minor clay.
20 to 22 m	CLAY; green/grey; minor sand.
22 to 23 m	CLAY; grey/green; medium sub-angular quartz gravel.
23 to 23.8 m	SAND; grey; fine to medium and gravel to 25 mm; quartz and gneissic(?) pebble.
23.8 m	EOH

Bore Name/Number: 97/2

Location:	Along track south of bore 97/1
Grid Reference:	411 704 mE, 6 251 896 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	250.6 m AHD
Status:	Monitor bore
Drilled by:	Brandrill
Drilling Method:	Rotary Air
Drilling Date:	August 1997
Total Depth:	20 m bgl
Casing:	50 mm Class 9 PVC
Slotted Section:	14 to 20 m bgl
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	13.48 m btoc (23/12/97)

Stratigraphic Log of Bore 97/2

0 to 2 m	GRAVELLY CLAY; orange/brown; pisolites; dry.
2 to 4 m	CLAY; orange/brown with light grey clay; minor pisolites.
4 to 6 m	CLAY; dark red/brown with light grey clay; minor pisolites; moist.
6 to 8 m	CLAY; light red/brown; minor pisolites; moist.
8 to 10 m	CLAY; yellow/brown; minor pisolites; moist.
10 to 12 m	CLAY; red/brown; minor pisolites; moist.
12 to 17 m	SILTY CLAY; red/brown and grey; more grey with depth; moisture decreasing with depth.
17 to 18 m	GRAVELLY SILTY CLAY; red/brown; pisolitic; wet.
18 to 20 m	GRAVELLY SILT; mid-grey; slightly rounded pebbles of dark mineral to 20 mm.
20 m	EOH

Bore Name/Number: 97/3

Location:	Off Maranup Ford Road
Grid Reference:	412 058 mE, 6 251 443 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	237.6 m AHD
Status:	Monitor bore
Drilled by:	Oliver Drilling
Drilling Method:	Cable tool
Drilling Date:	December 1997
Total Depth:	19.6 m bgl
Casing:	50 mm Class 9 PVC
Slotted Section:	13.6 to 19.6 m bgl
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	0.12 m btoc (23/12/97)

Stratigraphic Log of Bore 97/3

0 to 2 m	GRAVELLY CLAY; orange/brown.
2 to 8 m	SANDY CLAY; light brown/white to yellow/white; minor sand; sharp quartz pebbles to 8 mm; stiff clay.
8 to 9 m	SANDY CLAY; light red/brown; minor sharp sand to 2 mm.
9 to 10 m	SANDY CLAY; light brown and white clay; minor sharp sand to 8 mm.
10 to 12 m	SANDY CLAY; light yellow and red/brown; minor sand to 3 mm.
12 to 13 m	CLAY; khaki/yellow; trace fine sand.
13 to 15 m	CLAY; khaki and medium grey trending more green with depth; sand content increasing with depth; sand to 2 mm; soft white mineral; trace mica.
15 to 16 m	SAND; grey/green; minor clay; poorly sorted; sub-rounded; medium grain size; soft white mineral to 5 mm.
16 to 17 m	SANDY CLAY; khaki/green; minor fine sand.
17 to 19 m	CLAYEY SAND; grey/green; fine sand.
19 to 19.6 m	SAND; grey/green; fine to medium and rock chips to 20 mm; rock is soft quartz sandstone with Fe staining; soft yellow/white minerals to 5 mm.
19.6 m	EOH

Bore Name/Number: 97/4

Location:	Along Maranup Ford Road
Grid Reference:	412 168 mE, 6 251 610 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	246.7 m AHD
Status:	Monitor bore
Drilled by:	Oliver Drilling
Drilling Method:	Cable tool
Drilling Date:	December 1997
Total Depth:	21.8 m bgl
Casing:	50 mm Class 9 PVC
Slotted Section:	15.8 to 21.8 m bgl
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	5.26 m btoc (23/12/97)

Stratigraphic Log of Bore 97/4

0 to 2 m	GRAVELLY SANDY CLAY; orange/brown.
2 to 4 m	CLAY; orange/brown; minor sharp sand to 2 mm.
4 to 5 m	CLAY; light pink/brown and white; minor sand to 5 mm; hard dark mineral.
5 to 6 m	SANDY CLAY; light pink/brown; minor sand to 3 mm.
6 to 7 m	SANDY CLAY; yellow/brown; minor sand to 5 mm; slightly rounded hard dark mineral.
7 to 8 m	GRAVELLY CLAY; yellow/brown; many quartz, weathered granite and laterite particles to 10 mm.
8 to 9 m	GRAVELLY CLAY; yellow/brown; sub-angular gravel particles to 20 mm; dark red Fe sandstone (?).
9 to 10 m	GRAVELLY CLAY; yellow/brown; minor sub-angular gravel particles to 10 mm; dark red Fe sandstone (?).
10 to 11 m	CLAY; yellow/brown; minor sub-angular gravel to 10 mm; dark red Fe sandstone (?).
11 to 15 m	CLAY; yellow/brown; minor sub-angular gravel to 5 mm decreasing with depth to 1 mm; soft (brittle) white mineral.
15 to 17 m	CLAY; yellow/brown and green; minor very fine sand; quartz and brittle white mineral particles.
17 to 19 m	CLAYEY SAND; yellow/brown; poorly sorted quartz and brittle white mineral particles to 8 mm increasing with depth to 10 mm; clay decreases with depth.

Stratigraphic Log of Bore 97/4 (cont.)

19 to 21 m	SANDY CLAY; yellow/green/brown; minor angular quartz to 10 mm decreasing with depth to 5 mm.
21 to 21.8 m	GRAVEL; yellow/brown poorly sorted fine to 8 mm.
21.8 m	EOH

Bore Name/Number:	***97/5***
Location:	Along Maranup Road close to peg "Gwalia A58" and about 35 m south of the DA drain
Grid Reference:	412 456 mE, 6 252 271 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	260.7 m AHD
Status:	Monitor bore
Drilled by:	Brandrill
Drilling Method:	Rotary Air
Drilling Date:	August 1997
Total Depth:	28 m bgl
Casing:	50 mm Class 9 PVC
Slotted Section:	22 to 28 m bgl
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	0.24 m btoc (23/12/97)
	1.77 m btoc (23/12/97)

Stratigraphic Log of Bore 97/5

0 to 10 m	SANDY CLAY; yellow/brown trending white and then grey with depth; pisolites; moisture increasing with depth.
10 to 12 m	CLAY; red/orange/brown; pisolites to 40 mm.
12 to 16 m	CLAY; red/orange/brown; slightly rounded quartz to 5 mm; dry lumps of dark green clay.
16 to 20 m	CLAY; khaki/brown with orange/yellow lumps; little sand and no gravel.
20 to 22 m	CLAY; yellow/brown; black mineral particles to 2 mm.
22 to 24 m	CLAY; yellow/brown; soft aggregates.
24 to 26 m	CLAY; red/brown; soft aggregates.
26 to 28 m	CLAYEY SAND; yellow/green/black; poorly sorted quartz to 1 mm; some black minerals; minor clay.
28 m	EOH

Bore Name/Number: ***97/6***

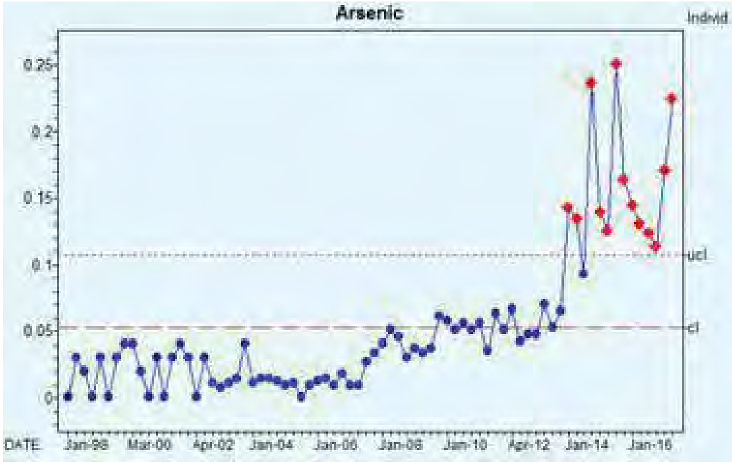
Location:	Along Maranup Road about 50 m east of tantalum tailings dam and about 60 m north of the DA drain
Grid Reference:	412 513 mE, 6 252 448 mN (GPS)
Elevation of Natural Surface:	NA
Elevation of Top of Casing:	262.0 m AHD
Status:	Monitor bore
Drilled by:	Brandrill
Drilling Method:	Rotary Air
Drilling Date:	August 1997
Total Depth:	Not recorded
Casing:	50 mm Class 9 PVC
Slotted Section:	Not recorded
Slot Size and Method:	Machine slotted and covered with Filtersock
Water Level:	1.83 m btoc (23/12/97)
	2.45 m btoc (23/12/97)

Stratigraphic Log of Bore 97/6

0 to 2 m	GRAVEL; orange/brown; pisolites; little clay.
2 to 4 m	GRAVEL; pink/brown; pisolites; little clay.
4 to 6 m	GRAVELLY CLAY; orange/red and light grey clay.
6 to 8 m	SANDY CLAY; yellow/brown (poor sample).
8 to ? m	depths not marked on samples.
? m	EOH

APPENDIX 8

MB97/1 Historical Water Quality Trends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Mar-00
Apr-02
Jan-04
Jan-06
Jan-08
Jan-10
Apr-12
Jan-14
Jan-16


Total Dissolved Solids
Individ
4000
3000
2000
1000
ucl
cl
lcl
DATE
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Mar-00
Apr-02
Jan-04
Jan-06
Jan-08
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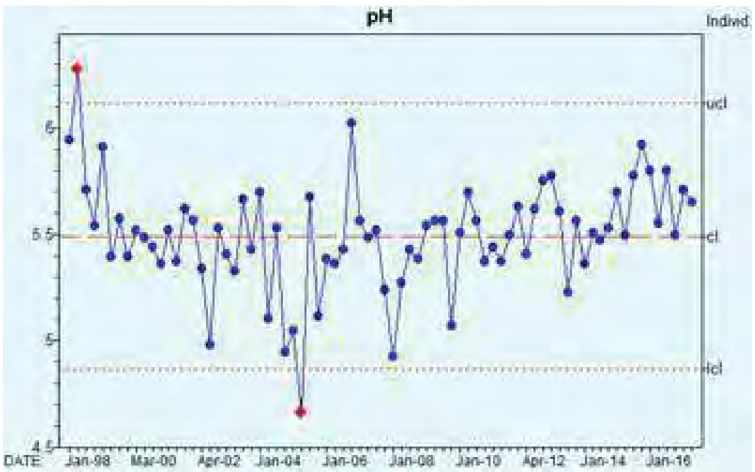
Apr-12
Jan-14
Jan-16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5
4.5
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cl
lcl
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Mar-00
Apr-02
Jan-04
Jan-06
Jan-08
Jan-10
Apr-12
Jan-14
Jan-16


Lithium
Individ
0.3
0.25
0.2
0.15
0.1
0.05
cl
DATE
Jan-98
Mar-00
Apr-02
Jan-04
Jan-06
Jan-08
Jan-10
Apr-12
Jan-14
Jan-16