Pilbara Manganese Pty Ltd

ACN: 074 106 577

Woodie Woodie Annual Environmental Report

Annual Period: 1st October 2024 – 30th September 2025

Licence Number: L6131/1990/13

File Number: DER2013/001337-1

Premises: Woodie Woodie Manganese Project

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Licence Expiry: 30/09/2028

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ACRONYMS

Term	Definition
AACR	Annual Audit Compliance Report
AER	Annual Environmental Report
CoC	Chain of Custody
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DWER	Department of Water and Environmental Regulation
HPTSF	Homestead Pit TSF
IBC	Intermediate Bulk Container
LC	Licence Condition
mbgl	Metres Below Ground Level
NATA	National Analytical Testing Association
NPI	Non-Processing Infrastructure
OWS	Oily Water Separator
PMPL	Pilbara Manganese Pty Ltd
SWL	Standing Water Level
TDS	Total Dissolved Solids
TN	Total Nitrogen
TP	Total Phosphorus
TRH	Total Recoverable Hydrocarbons
TSF	Tailings Storage Facility
TSS	Total Suspended Solids

1 INTRODUCTION

Pilbara Manganese Pty Ltd (PMPL) (ABN 074 106 577), a wholly owned subsidiary of Consolidated Minerals Pty Ltd (ABN 127 662 275), owns and operates the Woodie Woodie Manganese mining operation (Woodie). Woodie is located approximately 400 kilometres (km) southeast of Port Hedland, within the Pilbara region of Western Australia.

The Woodie operations consist of the following:

- Open pit mining
- One Processing facility for the beneficiation of manganese ore
- One active in pit tailing storage facility (TSF) - Homestead
- Five inactive TSFs
- An accommodation village and other supporting infrastructure

Major site infrastructure is presented in Figure 2 of Appendix A .

During the reporting period, Woodie produced 1,343,782 tonnes of manganese ore and supports over 440 personnel.

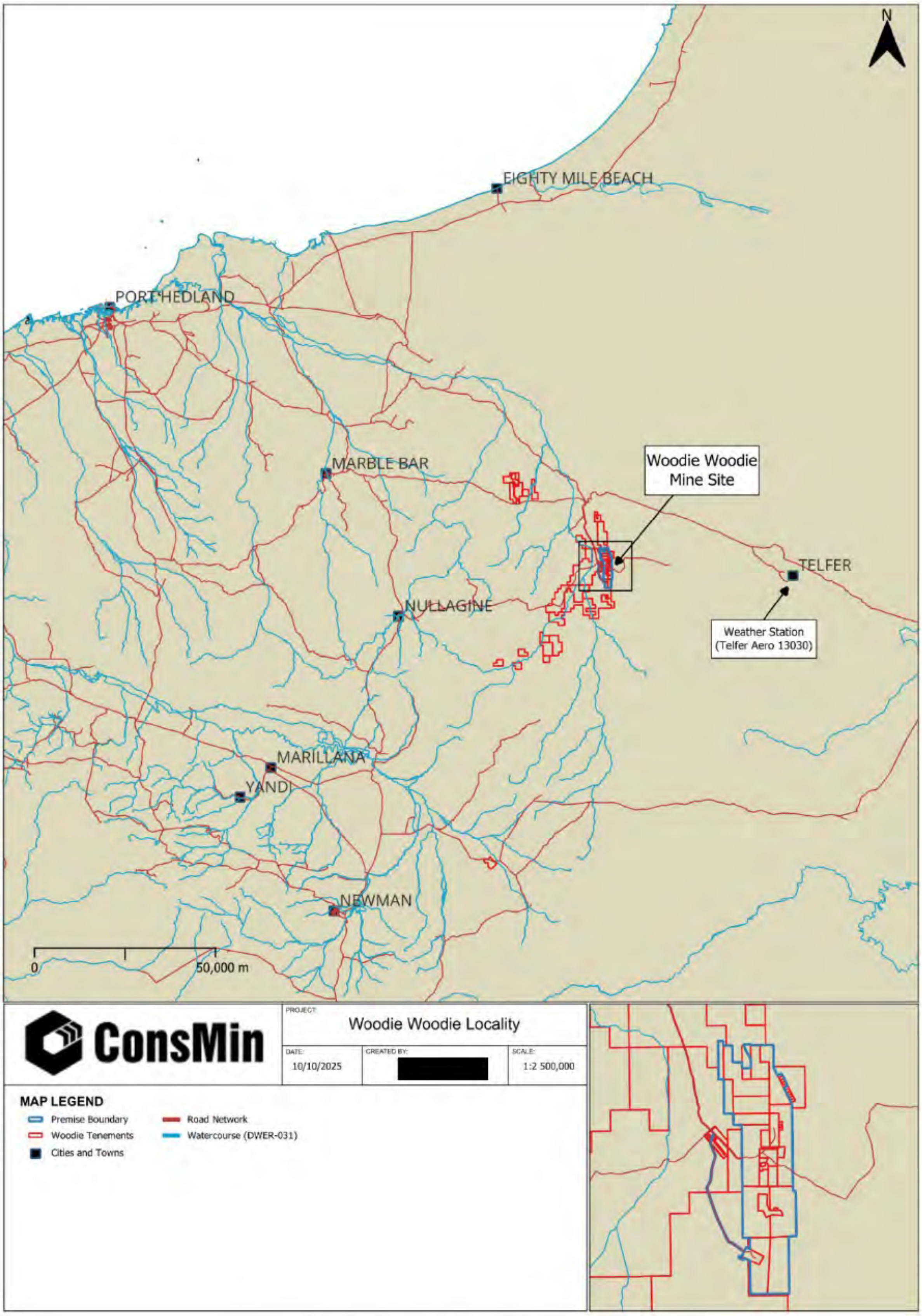


Figure 1. Woodie Woodie Locality Map

2 ANNUAL REPORT

Woodie operates as per the Department of Water and Environment Regulation (DWER) Environmental Licence L6131/1990/13 (L6131), issued under the *Environmental Protection Act 1986*.

A copy of the licence is included within Appendix B .

This Annual Environmental Report (AER) has been prepared to address the requirements outlined in Licence Condition (LC) 34 of L6131 and in Table 1 for the 24-25 reporting period (1st October 2024 to the 30th September 2025).

All monitoring data has been included in Appendix C .

Laboratory reports and chain of custodies (CoCs) can be provided upon request.

Table 1: DWER Licence L6131/1990/13 conditions

Licence Condition	Licence Table	Parameter	AER Section	Compliant / Provided
-	-	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.	3.1	Yes
5 6	Table 2	TSF water balance.	3.2.3 and Appendix E	Yes
7	Table 3	Groundwater level controls	3.3.1	Yes
9	Table 4	Management of waste	3.4.2 and 3.4.3	Yes
17	Table 8	Monitoring of point source emissions to surface water results – Total Suspended Solids (Limit).	3.4.2	Yes
20	Table 10	Total Recoverable Hydrocarbon.	3.4.2	Yes
		Loading of Total Nitrogen and Total Phosphorus.		Yes
		Total Dissolved Solids (TDS) - Limit 2,000 mg/L		Yes
25	Table 11	Monitoring of point source emissions to surface water results.	3.4.1	No
26	Table 12	Monitoring of emissions to land.	3.4.2	Yes
27	Table 13	Treated Wastewater Volume (cumulative) recycled for on-site irrigation	3.4.3	Yes
27	Table 13	Inert Waste Type 1, Inert Waste Type 2, Putrescible Waste and Clean Fill	3.4.3	Yes
28	Table 14	Process Monitoring: volume of tailings deposited, and volume of water recovered.	3.2.2	Yes
29	Table 15	Ambient monitoring of surface water quality at downstream sites.	3.3.2	Yes
29	Table 15 Table 16	Ambient monitoring of surface water quality at background sites. Ambient monitoring of sediment quality at background sites.	3.3.3	Yes
29	Table 17	Ambient monitoring of groundwater quality.	3.3.1	Yes
	Table 18	Average foliage, health score and general environmental description Identical photographs of foliage density and shadow areas beneath trees	3.3.4 and Appendix D	Yes
30	Table 19	Management actions EA1 and EA2	3.3.4	Yes
32		Compliance	4.1 and Appendix F	Yes
33		Complaints summary	4.2	Yes

3 WOODIE WOODIE MANGANESE PROJECT

3.1 Pollution Control, Equipment Failures and Environmental Incidents

A total of 23 minor environmental incidents were recorded throughout the reporting period across the Woodie operations. All were considered low to medium risk and reported internally through Woodie's incident management system, INX. No licence reportable environmental incidents occurred during the reporting period. A summary of the incidents is provided below:

- 7 hydrocarbon spill related incidents within operational areas;
- 16 fauna deaths reported within operational areas.

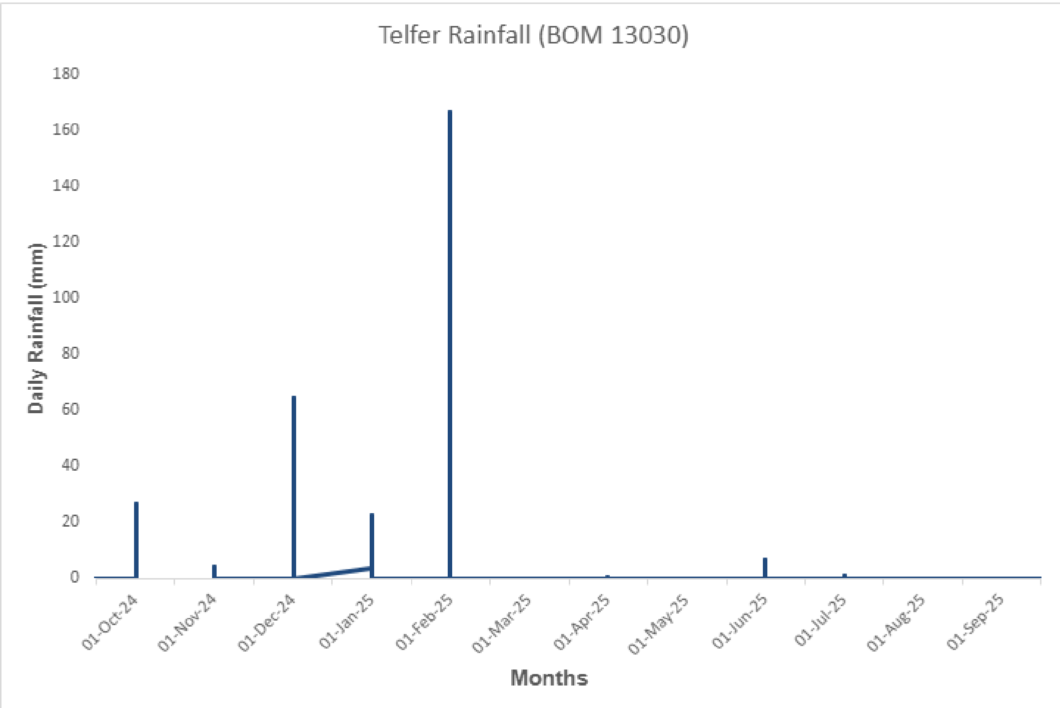
The Annual Compliance Audit Report (AACR) has been completed and can be found in Appendix F

3.2 Water Balance

3.2.1 Rainfall

Rainfall was monitored at the Woodie administration building and Telfer weather station. These are within three km of the active TSFs and a representative source of inflow for water balance. The Woodie Woodie weather station was offline from 6 November 2024 to 13 February 2025, due to this inconsistency, rainfall data was sourced from the Telfer Weather Station. Rainfall data from the Telfer Weather station recorded a total of 554.4mm rain over 41 days.

Chart 1. Telfer Weather Station Data



3.2.2 Tailings Storage Facililties

As per LC 5 and 6, PMPL commissioned external consultant Tetra Tech Coffey to undertake the annual tailings audit and water balance for each TSF (Appendix E TSF Audit). The tailings audit addressed all TSFs at Woodie displayed in Figure 2 of Appendix A and listed below:

- Camp East Pit TSF (CEPTSF) – not active
- Homestead Pit TSF (HPTSF) – active
- Area 1 Pit TSF (A1PTSF) – not active
- Malta Pit TSF (MPTSF) – not active
- Dartmoor Pit TSF (DaPTSF) - not active
- Demon Pit TSF (DePTSF) – not active

During the reporting period Woodie deposited 3,680,216 tonnes of slurry with an average tails density of 23% solids, resulting in 602,342 tonnes of solids and 2,718,639 kL of water deposited.

3.2.3 Annual TSF Water Balance

Water balances for inactive TSFs and the active Homestead TSF for this reporting period and years prior are provided in Appendix D of the Tailings Audit report (Appendix E) and summarised below.

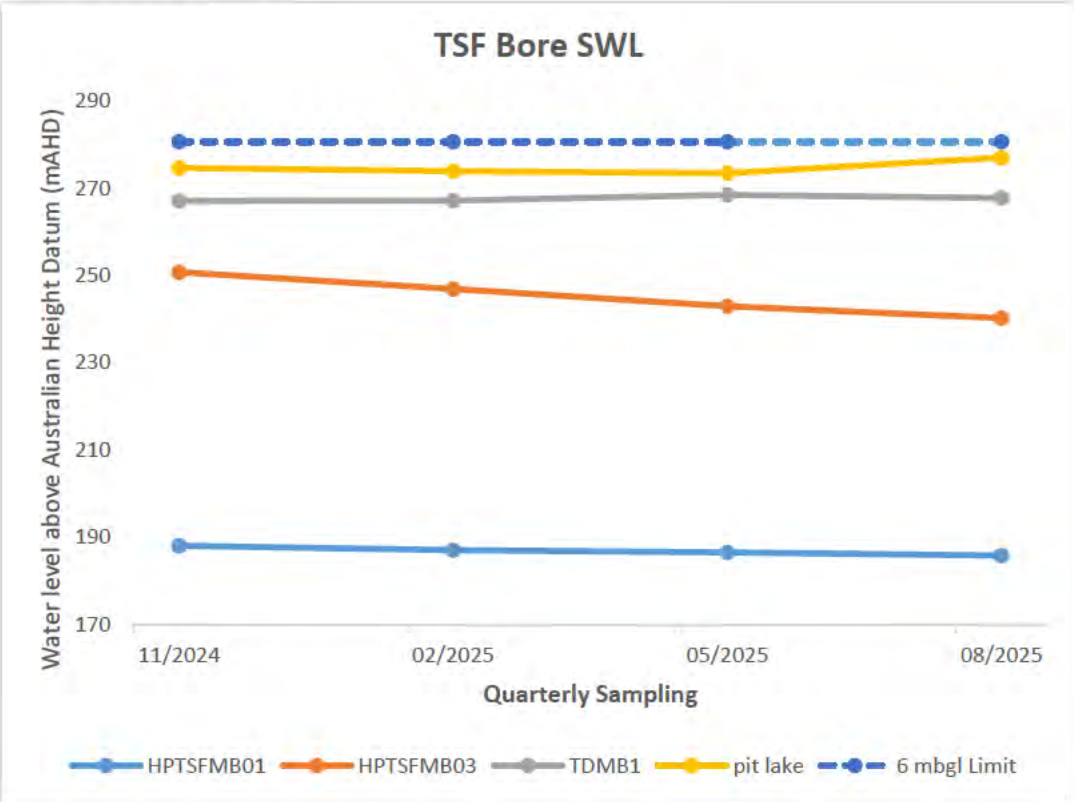
Inflows for the water balance consider contributions from rainfall, slurry water and dewatering activities. Outflows for the water balance consider return water, evaporation from TSF ponds, evapo-transpiration from drying tailings, retention, and seepage potential.

In December 2019 a supernatant return line was installed, facilitating the return of excess supernatant back to the Process Water Dam where it is recycled back through the Processing Plant. Additional water is sourced from the Topvar ex-pit production bores (THDW01 – THDW05) to supplement processing requirements. During the reporting period homestead experienced 2,808,312 m^3 of water inflow and an outflow of 2,808,312 m^3 in return water for processing, resulting in an annual average water return of 63.5%.

Ground water levels are monitored quarterly via three monitoring bores located around the edge of the Homestead TSF. Monitoring bore HPTSFMB01 located on the northern pit edge remained stable with an average annual standing water level (SWL) of 100.115 metres below ground level (mbgl), and monitoring bore HPTSFMB03 located on the southern pit wall also remained stable and recorded an annual average SWL of 37.99 mbgl. Monitoring bore HPTSFMB02 was dry throughout the reporting period, and has been since February 2023.

Form GR1 in Appendix C and Chart 1 detail the TSF and monitoring bore water levels through the reporting period; SWL was maintained below 6 mbgl as per LC 8.

Chart 1. TSF Bore SWL



Groundwater quality analysis has identified all monitoring analytes remained stable and within previously recorded limits. The available in-pit freeboard at the end of the reporting period was 1.95m, in compliance with LC 3 (Table 1).

3.3 Monitoring of Ambient Environmental Quality

PMPL monitored ambient environmental quality during the reporting period in compliance with the following licence conditions and tables:

- LC 29 and Table 15: Monitoring of ambient surface water quality
- LC 29 and Table 16: Monitoring of sediment quality
- LC 29 and Table 17: Monitoring of ambient groundwater quality
- LC 29 and Table 18: Monitoring of vegetation health
- LC 30 and Table 19: Management action

3.3.1 Groundwater Quality

PMPL monitors groundwater quality and conditions through quarterly sampling events at monitoring bores surrounding five existing TSFs, as per LC 29 (Table 17), and presented in Figure 3 of Appendix A . Water samples are collected in accordance with Australian water quality sampling standards, using passive sampling hydrasleeves, and sent for analysis to a National Association of Testing Authorities (NATA) accredited lab.

During the reporting period, no exceedances of LC 7 and 8 were reported, which mandates that standing water levels (SWL) must not rise higher than 6 meters below ground level (mbgl). Recorded SWL ranged between 13.48 and 101.17 mbgl, Quarterly monitoring results for SWL and groundwater quality are displayed in Form GR1 of Appendix C .

Demon Pit TSF

Demon TSF has not been in use since 2016 and all surrounding monitoring bores have been impacted by nearby dewatering activities. Due to the SWL being lower than the base of each bore, no SWL or water samples could be measured from the three monitoring bores around Demon TSF during the reporting period:

- DEPTSFMB01 and DEPTSFMB02 do not have safe access.
- DEPTSFMB01 – Dry since 2018
- DEPTSFMB02 – Dry since 2018
- DEPTSFMB04 – Dry since 2022

It is anticipated that measurable SWL will return at these bores once dewatering activities cease.

TSF2

TSF2 was a former above-ground TSF (Rhodes Pit) with TDMB01 situated on the first lift of the Rhodes waste dump. As per the PMPL correspondence dated 10 March 2016 titled '*Woodie Woodie Mine Site (L6131/1990/13) – Response to 2015 DER AER and AACR Request for additional information [DER reference 2013/001337])*", studies conducted by CMW geosciences and PMPL consider this monitoring bore reflects a perched water level, which may not represent the natural groundwater. The results for the reporting period are consistent with historical data, and no non-conformances were reported during the period.

Dartmoor TSF and Malta TSF

The Dartmoor TSF (DAPTSF) and Malta TSF (MAPTSF) monitoring bores (DAPTSFMB01, DAPTSFMB02, and MAPTSFMB01) are located adjacent to these historic TSFs. All monitoring events for this period reported the bores as dry, which has been reported since 2014.

Homestead TSF

During the reporting period, the Homestead Pit TSF (HPTSF) was the only active TSF operated by PMPL. Three bores—HPTSFMB01, HPTSFMB02, and HPTSFMB03 located at the HPTSF as seen in Figure 3 of Appendix A , were monitored quarterly as per LC 29 (Table 17) of L6131. No non-conformances were reported against LC 29 and all monitoring requirements were met. Since January 2023, all monitoring events have indicated that HMTSFMB02 remains dry.

3.3.2 Downstream Water Quality

PMPL completed downstream water quality monitoring in accordance with LC 29 (Table 15) throughout the reporting period. Three monitoring locations; Muddauthera creek (MMS), Warri Warri Creek (WWMS) and Brumby creek (BMS) were monitored monthly during the reporting period. Figure 4 in shows the locations of these downstream monitoring sites and their proximity to the point source emission discharge locations. MMS is located downstream of the W1 discharge point and BMS is located downstream of the W12 discharge point.

No surface water was reported at WWMS which is to be expected with no discharge occurring into Warri Warri Creek during the reporting period. All monitoring data for the reporting period was consistent with historical results and is presented in Form WR3 in Appendix C and summarised below in Chart 2,Chart 3,Chart 4 Chart 5.

Muddauthera Creek (MMS)

Dry Periods:

MMS experienced dry conditions September 2025, due to seasonal dryness and limited dewatering discharge from Cracker pit (W1).

pH Levels:

pH remained stable between 7.77 and 8.56, consistent with natural surface water characteristics and historical results.

Total Dissolved Solids (TDS):

Notably, TDS values at MMS were generally higher compared to BMS ranging from 740mg/L to 11,000 mg/L, consistently increasing since December 2024. The increase in TDS may indicate evapoconcentration of dissolved solids.

Total Suspended Solids (TSS):

TSS values fluctuated, with a peak of 85 mg/L in Feb 2025, likely indicating suspended particles due to either seasonal flow changes or nearby land disturbances.

Nitrogen Compounds:

Nitrate (as N) peaked in November 2024 to 3.0 mg/L. Total oxidized nitrogen also peaked in November 2024.

Metals:

Similar to BMS, heavy metals like zinc, lead, cadmium, and mercury are generally below detectable limits. Filtered manganese, however, showed slight increases across sampling dates.

Chart 2. MMS pH and Nitrogen Compounds

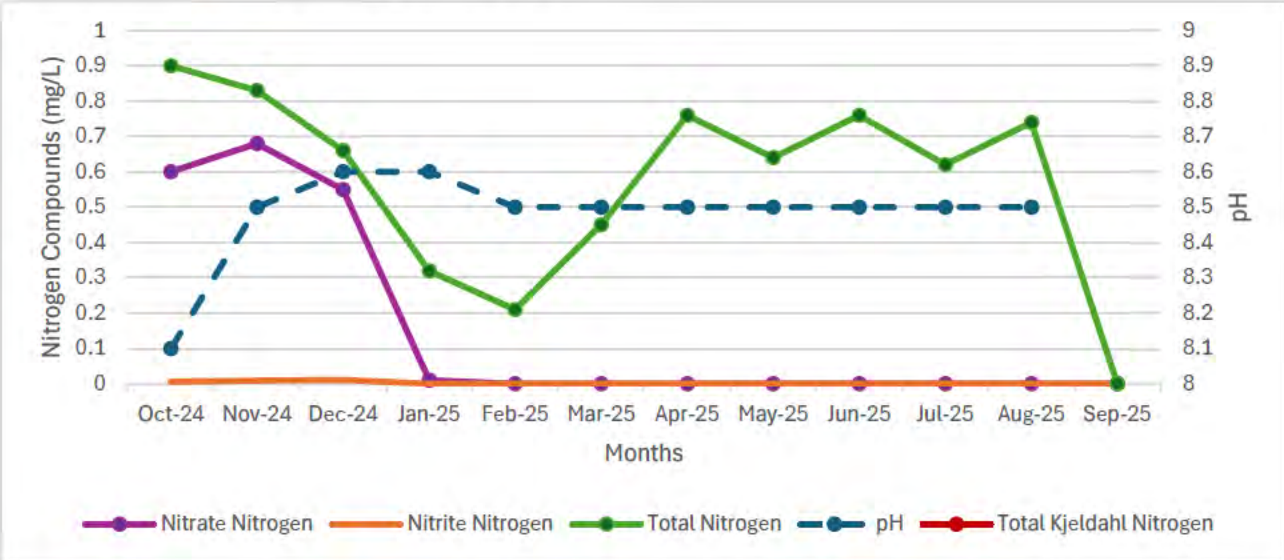
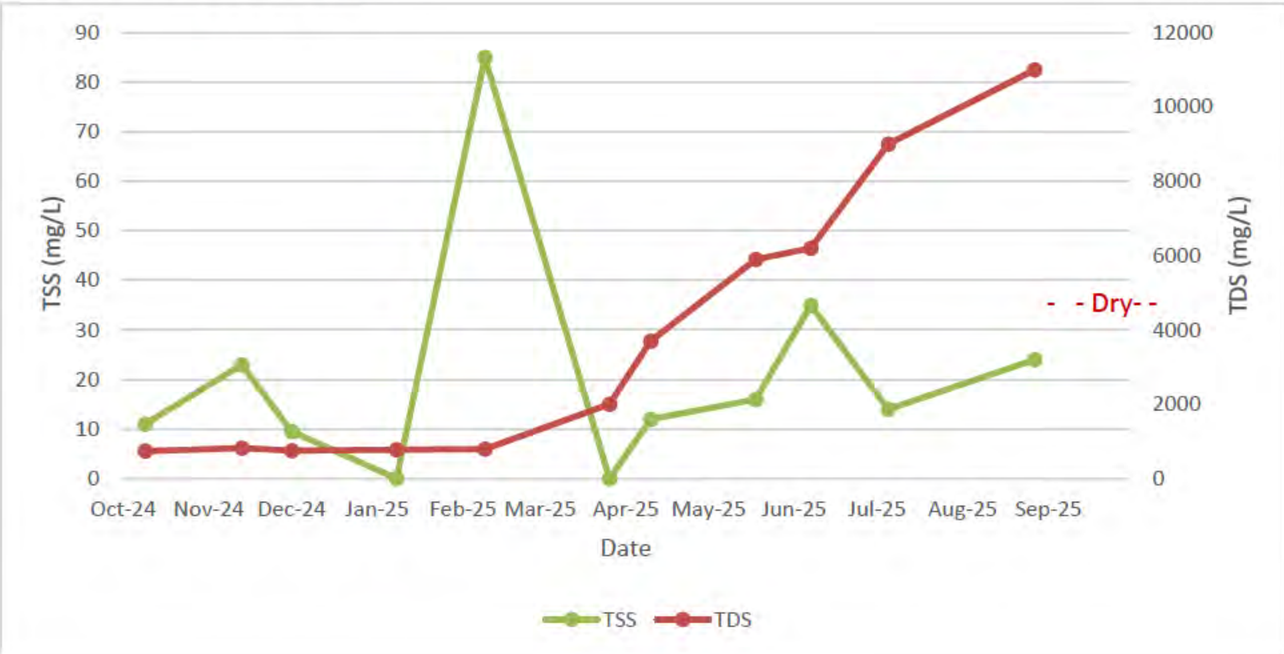


Chart 3. MMS TSS and TDS



Brumby Creek (BMS)

Dry Periods:

BMS did not experience any dry periods during the reporting period.

pH Levels:

The pH values for BMS remained between 7.76 and 8.53, which aligns with neutral to slightly alkaline conditions.

Total Dissolved Solids (TDS):

TDS readings ranged from 590 mg/L in October 2024 and July 2025, to a maximum TDS of 810 mg/L in March 2025. These fluctuations may reflect seasonal changes, evapoconcentration, or variations in dissolved minerals and salts.

Total Suspended Solids (TSS):

Most readings for TSS were low (<5 mg/L), however, there were detection readings ranging from 5.5 mg/L in June 2025, likely reflecting minor sediment presence during the sampling events.

Nitrogen Compounds:

Nitrate (as N) ranged from 0.33 mg/L to 1mg/L which is an increase from previous years, and nitrite levels were relatively low. Total oxidized nitrogen ranged between 0.32 mg/L and 1 mg/L during the reporting period.

Metals:

Filtered metals (e.g., lead and cadmium) were below detection limits or very low.

Chart 4. BMS pH and Nitrogen Compounds

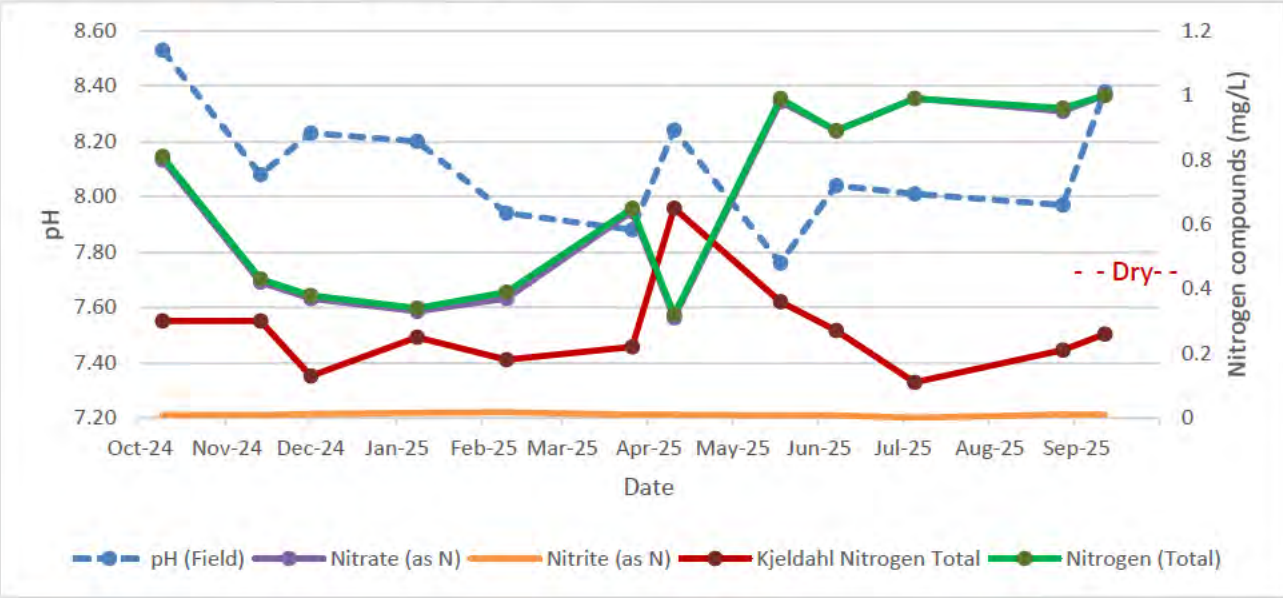
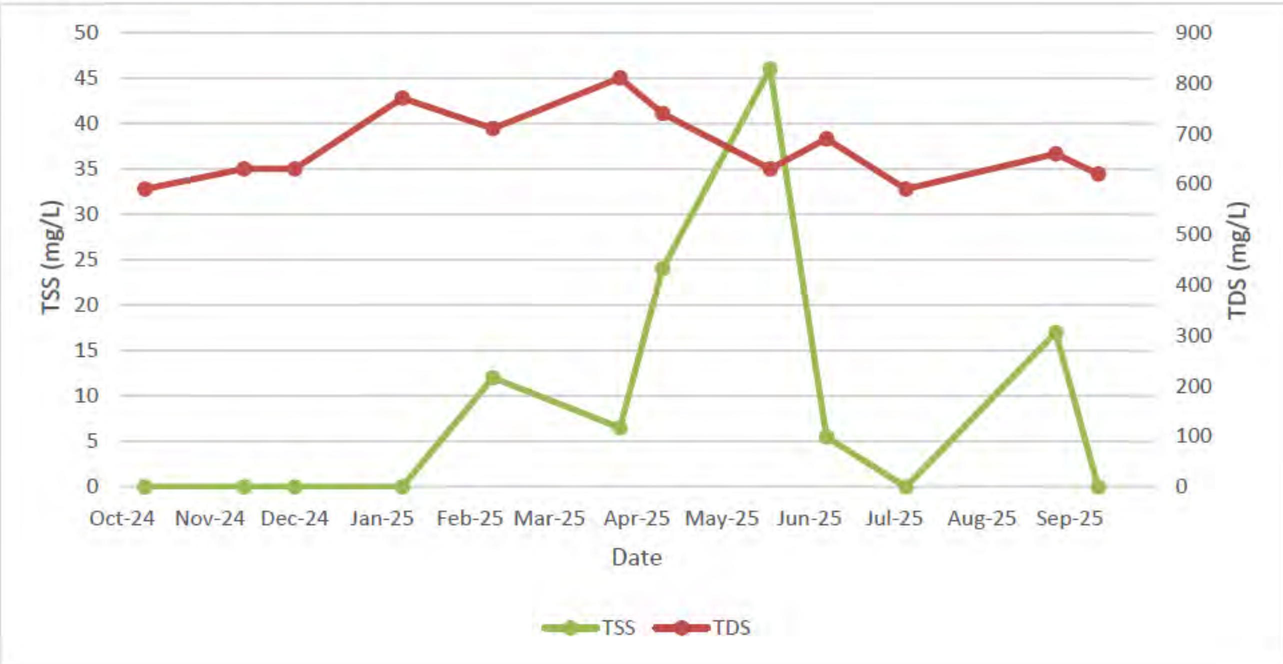


Chart 5. BMS TSS and TDS



3.3.3 Background Sediment and Surface Water Quality

Background sediment and surface water and quality monitoring was conducted in accordance with LC 29 (Table 15 and 16) along the Oakover River at the following background locations: Lower Carawine Gorge (CG1), Oakover Crossing (OC), Tooncoonaragee Pool (TC1) and Tooma Stockyards (TS).

The Oakover River consists of a series of semi-permanent pools that are typically disconnected. OC and TC1 monitoring sites are situated upstream of all mining and dewatering effluent discharge activities at Woodie. Meanwhile, CG1 and TS are located downstream, but dewatering effluent only reaches these sites during regional flood events when the Oakover River is actively flowing. During the reporting period no monitoring or licence non-conformances were identified. Form WR4 in Appendix C displays the monitoring results for background surface water and sediment quality. A summary of the monitoring results is presented below in Chart 6,Chart 7 and Chart 8:

pH Levels:

pH levels Ranged from 6.52 to 8.53, indicating slightly acidic to slightly basic conditions.

Total Dissolved Solids (TDS)

TDS varied widely, with values ranging from 254 mg/L to 865 mg/L.

Total Suspended Solids (TSS)

TSS ranged from non-detect (below 5 mg/L) to 67 mg/L at CG1 in February 2025. This elevated result aligns with a significant rainfall event which occurred in mid-February 2025. Water quality returned to normal trends following the event and remained stable for the rest of the year.

Chart 6. Background Surface Water Quality pH Results

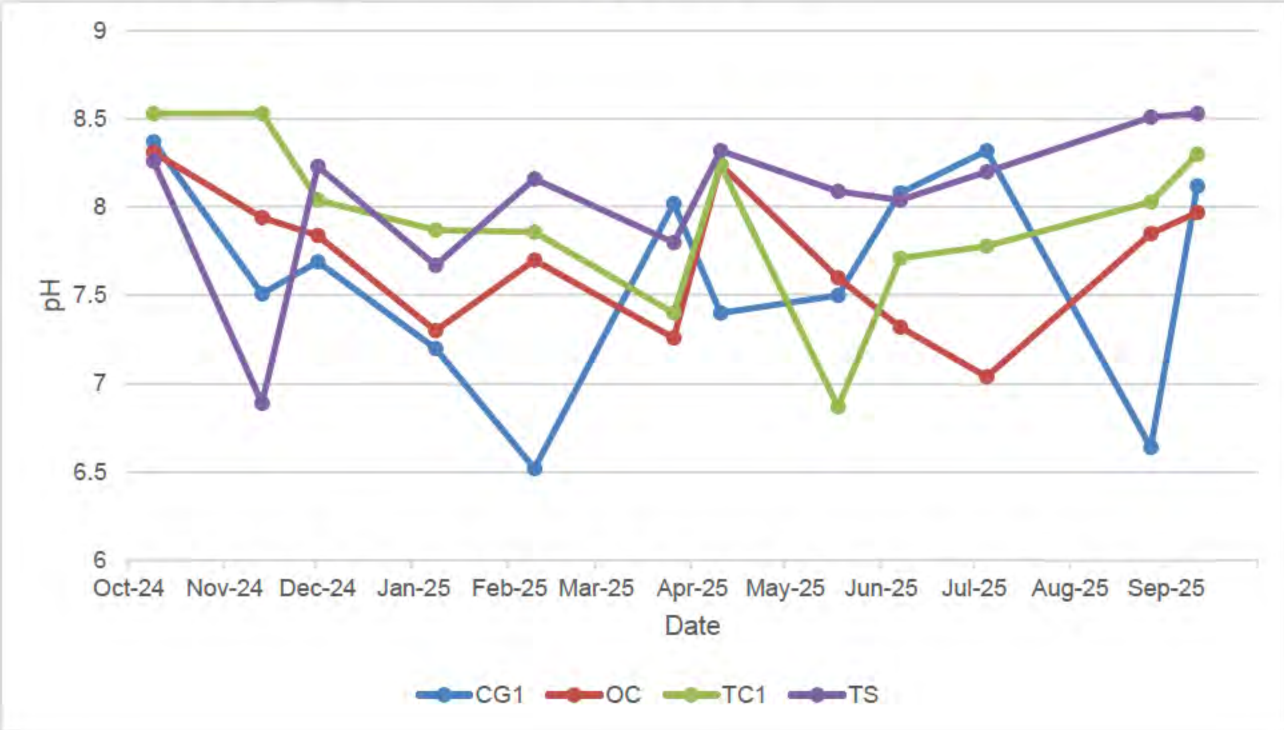


Chart 7. Background surface water quality TDS Results

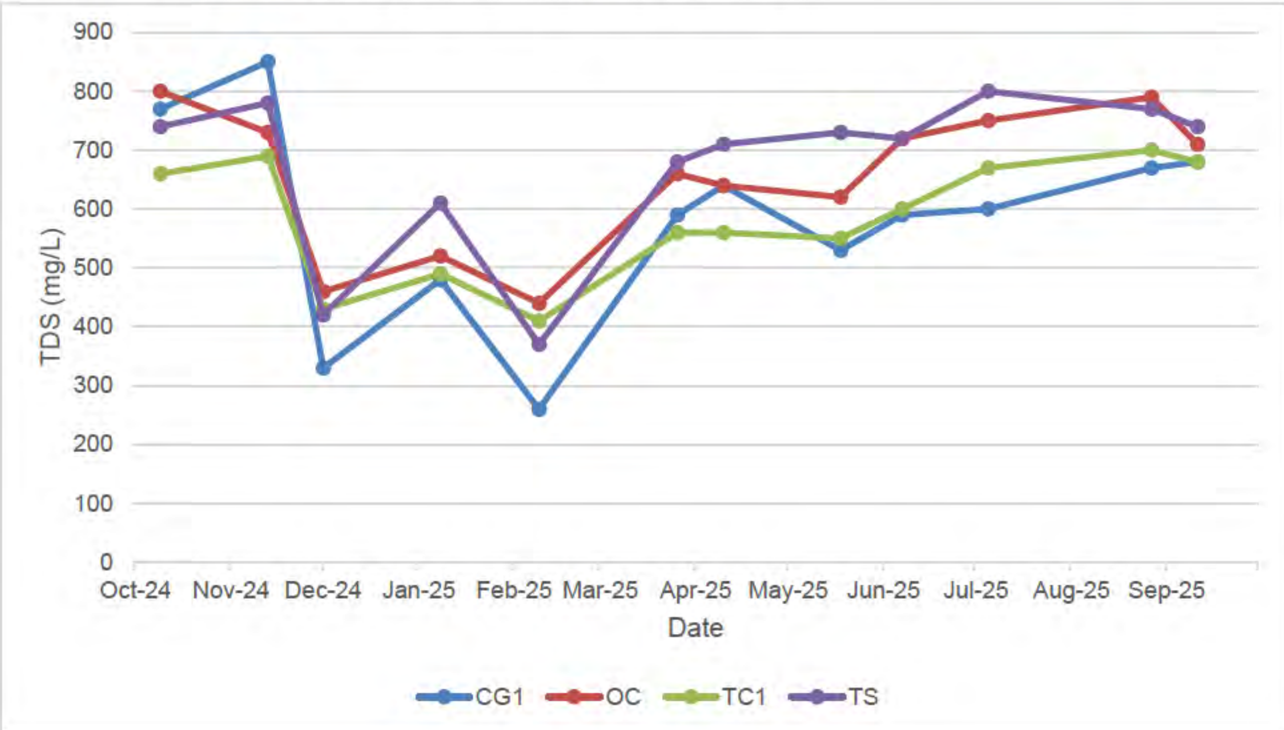
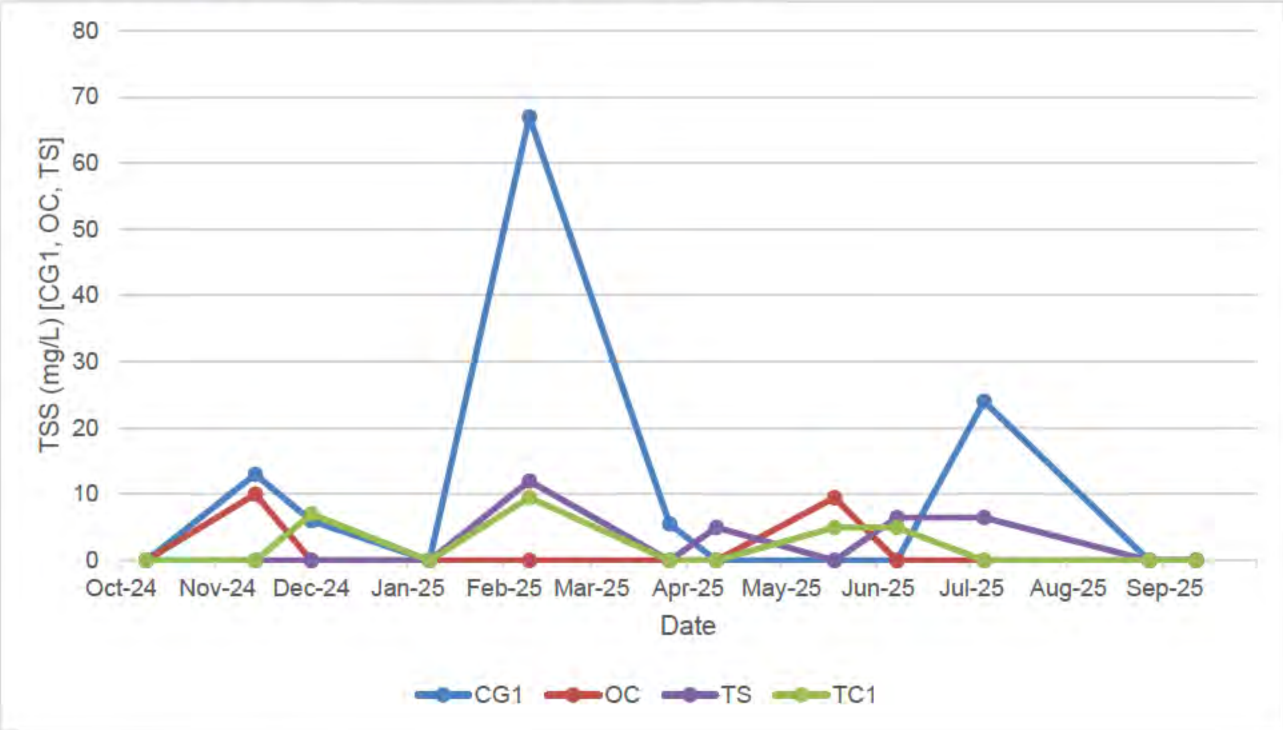


Chart 8. Background surface water quality TSS Results



Nitrogen Compounds

Nutrients such as nitrates, nitrites, and total nitrogen, showed generally low levels, with nitrates occasionally spiking (e.g., up to 0.55 mg/L).

Metals

Filtered metals like magnesium, zinc, manganese, and iron were reported at low levels, with most metals results below the laboratory reporting limits.

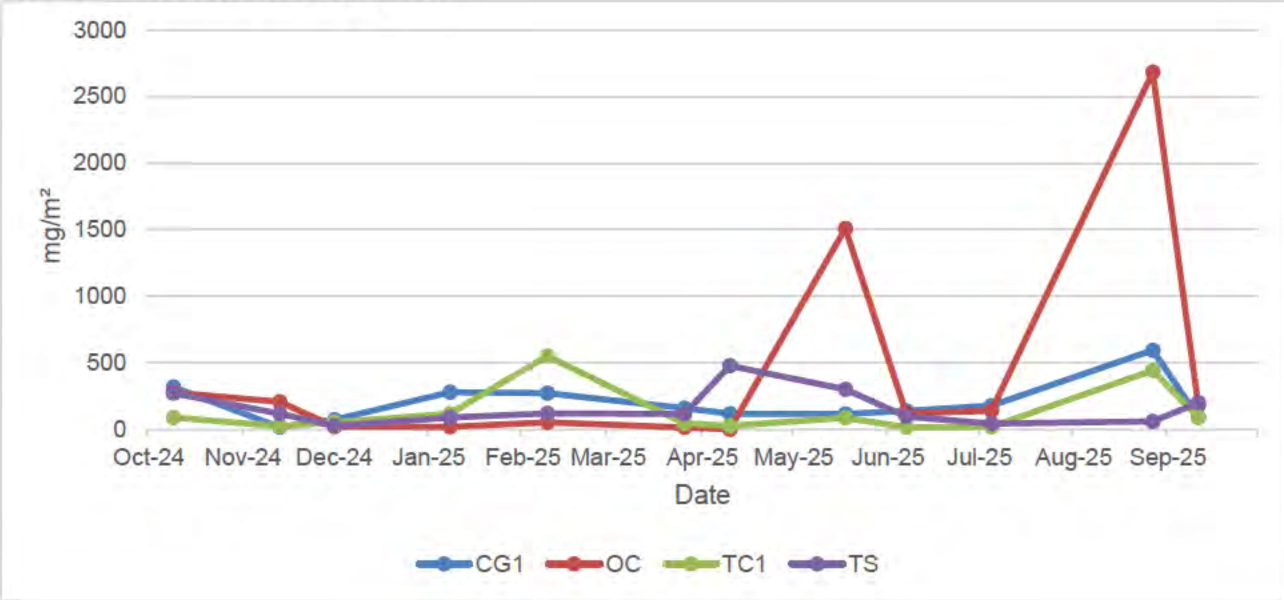
All sampling events for ambient sediment quality were conducted in accordance with LC 29 (Table 16), and no monitoring non-conformances were identified during the reporting period. Monitoring of ambient sediment quality has been included in Chart 9, Chart 10 and form WR4 (Appendix C removing the need for form WR5. The findings are summarised below.

Chlorophyll-a

The highest value is 2683 mg/m² at the OC location on 27 Aug 2025.

The lowest value was a non-detect (<2 mg/m²) at the OC location on 10 Apr 2025.

Chart 9.Sediment Chlorophyll-a



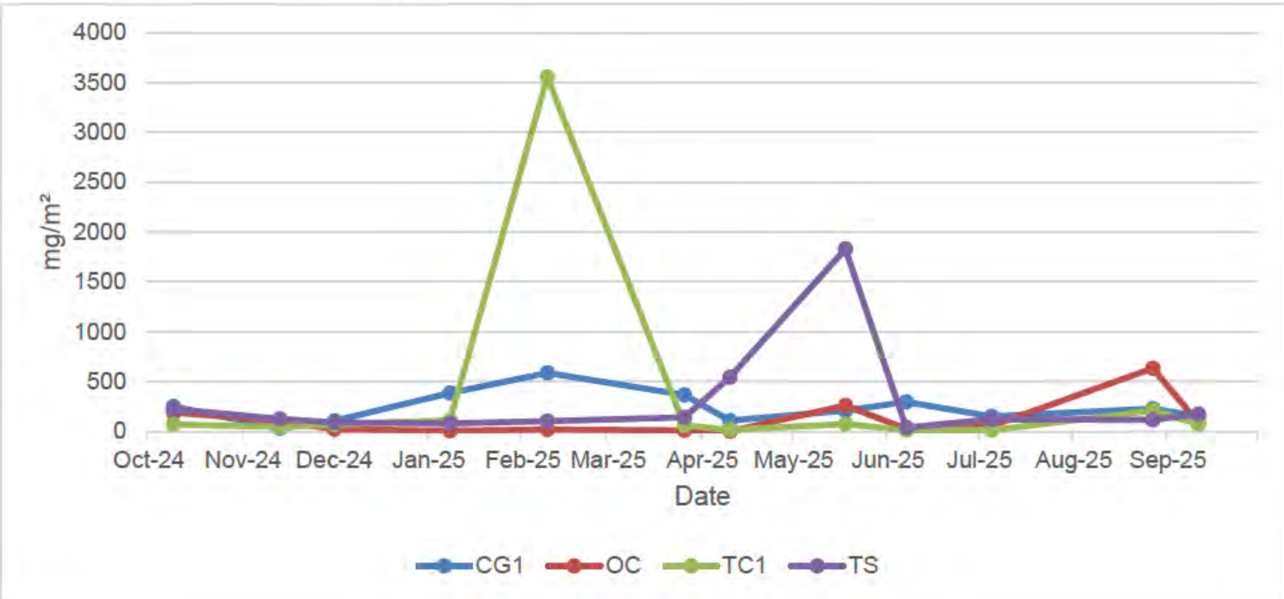
Phaeophytin

The highest value is 3555 mg/m² at the TC1 location on 09 Feb 2025.

The lowest value is 2 mg/m² at the OC location on 10 Apr 2025.

Sediment quality concentrations vary significantly across dates and locations but are in line with historical data and seasonal trends.

Chart 10. Sediment Phaeophytin



3.3.4 Vegetation Monitoring

As per LC 29 (Table 18) and LC 30 (Table 19), PMPL undertakes inspections of vegetation health at seven monitoring sites on a six-monthly basis. Health assessments are conducted at downstream sites, background sites and the WWTP to determine the impact of dewatering discharge and wastewater irrigation on vegetation health. The vegetation health monitoring locations are displayed in Figure 4 of Appendix A and listed below:

- V1 – Brumby Creek Crossing
- V2 – Lower Carawine Pool
- V3 – Muddauthera Crossing
- V4 – Running Water Pool
- V5 – Tooma Stockyards
- V6 – Warri Warri Creek Crossing
- WWTP – Wastewater effluent irrigation fields

The vegetation monitoring at each location consists of a visual inspection and drone aerial image of the monitoring site following PMPL's vegetation health monitoring work instruction with the Keighery Scale incorporated in the 2025 monitoring event, where the following parameters are recorded:

- An estimation of the average foliage cover of the species *Eucalyptus camaldulensis and Melaleuca agentea* (only applicable to V1-V6).
- A health condition score of the species *Eucalyptus camaldulensis and Melaleuca agentea* (only applicable to V1-V6).
- General environmental description of the site and any changes since previous monitoring.
- Replicate photographs of foliage density and shadow areas beneath trees.

Vegetation health monitoring photographs taken during the reporting period are displayed in Appendix D and summarised below in **Table 2** and the following site summaries:

Table 2. Vegetation Health Monitoring Data

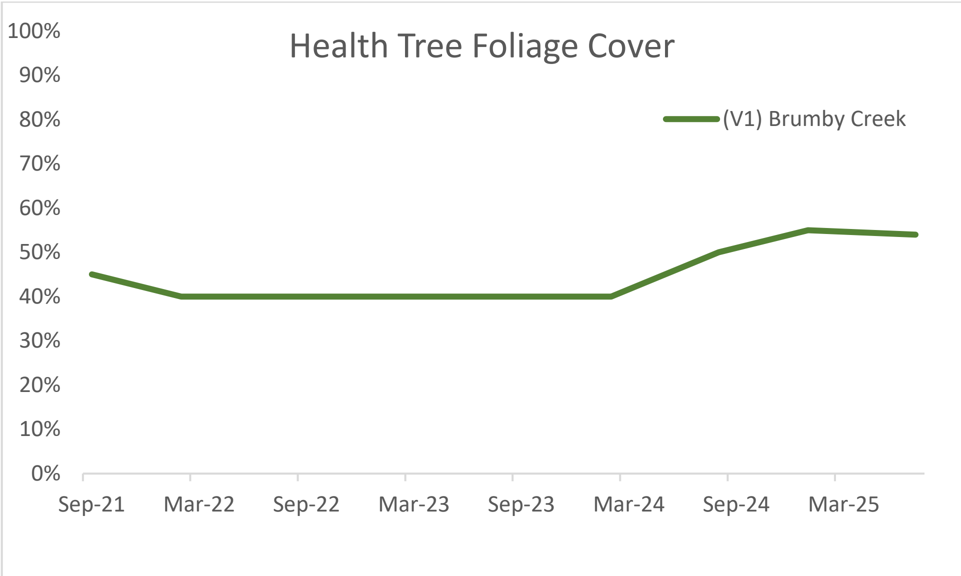
Location	Parameter	Sep-21	Feb-22	Aug-22	Feb-23	Aug-23	Feb-24	Aug-24	Jan-25	Jul-25
(V1) Brumby Creek	Health Tree Foliage Cover	45%	40%	40%	40%	40%	40%	50%	55%	54%
	Health Score	4	4	4	4	4	4	4	5	3
(V2) Carawine	Health Tree Foliage Cover	50%	55%	55%	55%	60%	60%	45%	60%	51%
	Health Score	4	4	4	4	4	4	4	4	3
(V3) Muddauthara	Health Tree Foliage Cover	50%	50%	55%	55%	55%	50%	60%	60%	65%
	Health Score	4.5	4.5	4	4	4	4	4	4	3
(V4) Running water	Health Tree Foliage Cover	40%	40%	40%	40%	45%	-	50%	55%	59%
	Health Score	4.5	4	4	4	4	-	4	4	3
(V5) Tooma Stockyards	Health Tree Foliage Cover	40%	45%	45%	45%	35%	35%	40%	40%	60%
	Health Score	4	4	4	4	3.5	3.5	3	3	3
(V6) Warri Warri	Health Tree Foliage Cover	40%	45%	40%	40%	40%	50%	50%	55%	71%
	Health Score	4	4	3.5	3.5	3	4	4	4	3

Vegetation Monitoring Site V1: Brumby Creek Crossing

The alluvial banks at the Brumby Creek monitoring site supports a vegetation profile of scattered *Eucalyptus camaldulensis* (River Red Gum) to 20 m in height, dense perennial grassland cover of *Cenchrus ciliaris* (Buffel grass) and *Cenchrus setiger* (Birdwood grass), plus very dense stands of *Typha sp*. (Native Bulrush). Surrounding vegetation (*Acacia sp*.) improved overall condition with continued growth.

The vegetation is in good condition, with foliage cover experiencing an increase (+5%) from the 2024 monitoring events, and the vegetation health has been comparable to the previous reporting period. Results for foliage assessments at V1 monitoring site are presented below in Chart 11 and above in Table 2.

Chart 11. V1 Health and foliage score 2021 to 2025

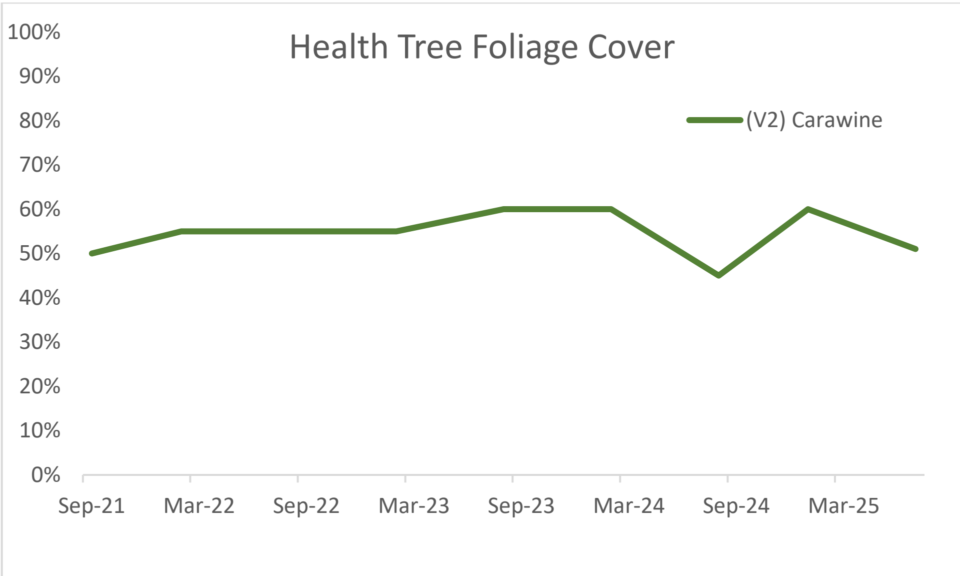


Vegetation Monitoring Site V2: Lower Carawine Pool

The alluvial bank of the Lower Carawine Gorge supports a vegetation profile of scattered *Eucalyptus camaldulensis* (River Red Gum) to 20 m in height, dense *Cynodon dactylon* (*Vilfa stellate durva*) grassland cover, occasional *Cenchrus ciliaris* (Buffel grass) and *Cenchrus setiger* (Birdwood grass). This site is actively used by the Warrawagine Station to muster cattle and is a popular camping spot for travellers passing through the East Pilbara region, with a significant increase in tourist numbers from April to October. Public use impacts are noticeable at the site including the taking of branches for fires, rubbish and vehicles tracks on riverbanks.

Foliage cover and health scores were steady through the reporting period, with foliage cover experiencing an increase (+10%) from 2024 monitoring events. Results for foliage and health condition assessments at the V2 monitoring site are presented below in Chart 12 and above in Table 2.

Chart 12. V2 Health and foliage score 2021 to 2025

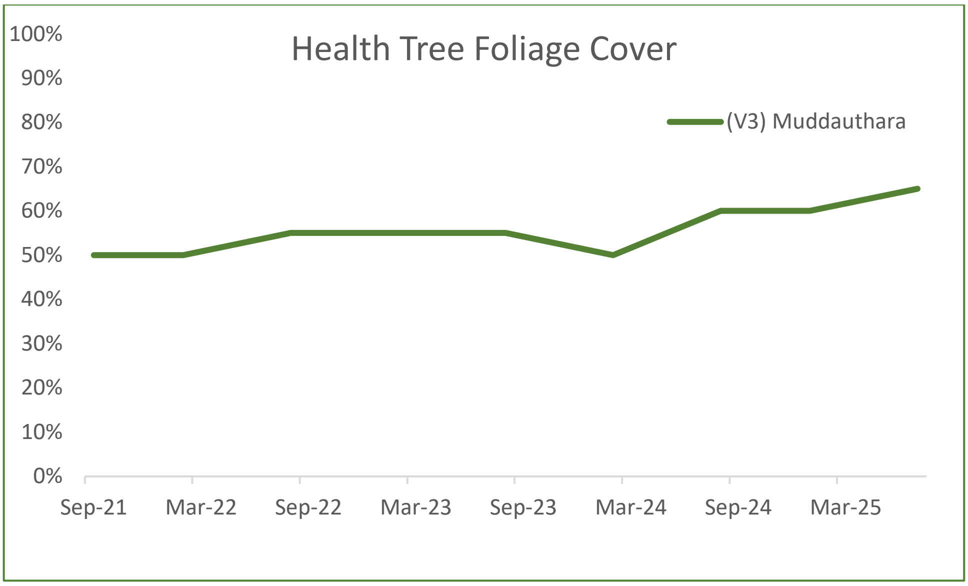


Vegetation Monitoring Site V3: Muddauthera Crossing

The banks of Muddauthera Creek support a vegetation profile of widely scattered *Eucalyptus camaldulensis* (River Red Gum) to 20 m in height, the occasional *Melaleuca argentea* (Silver cajuput), dense perennial grassland of *Cenchrus ciliaris* (Buffel grass) and *Cenchrus setiger* (Birdwood grass), dense stands of *Sesbania sp.* (River hemp), and scattered populations of *Calotropis procera* present.

The foliage coverage and health scores during the reporting period maintained consistency with historic monitoring events. Foliage cover experienced a slight increase (+5%) from the 2024 monitoring events. Results for foliage coverage and health condition assessments at the V3 monitoring site are presented below in Chart 13 and above in Table 2.

Chart 13. V3 Health and foliage score 2021 to 2025

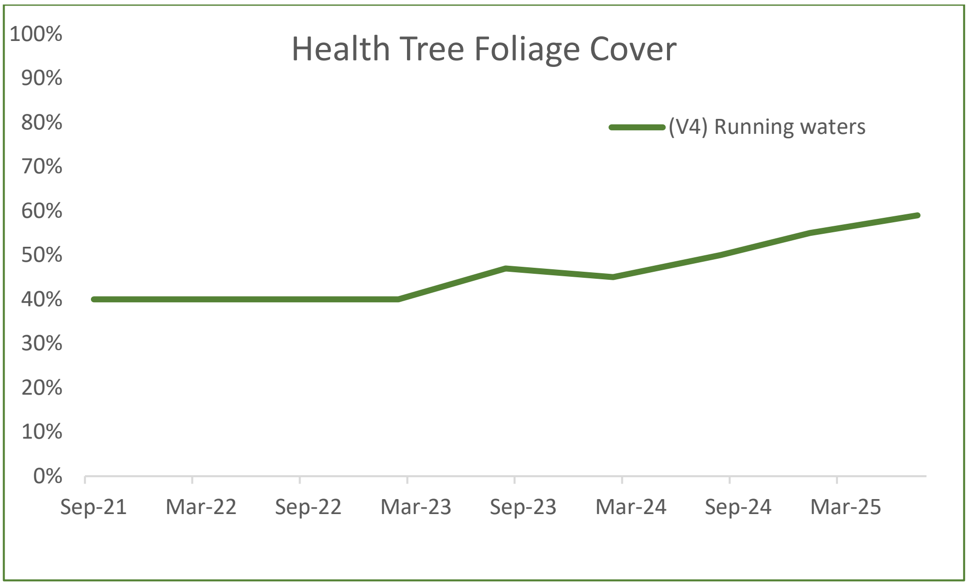


Vegetation Monitoring Site V4: Running Waters

The alluvial banks of the Running Waters monitoring site supports a vegetation profile of scattered *Eucalyptus camaldulensis* (River Red Gum) to 20 m in height, long-leaved Paperbark *(Melaleuca leucadendra*), dense *Cynodon dactylon (Vilfa stellate durva*) grassland cover, the occasional *Cenchrus ciliaris* (Buffel grass), *Cenchrus setiger* (Birdwood grass), and scattered populations of *Calotropis procera* present.

Foliage coverage has slightly increased (+9%)during the reporting period, whilst tree health may have declined slightly with the previous reporting period. Results for foliage coverage and health condition assessments at the V4 monitoring site are presented below in Chart 14 and above in Table 2.

Chart 14. V4 Health and foliage score 2021 to 2025



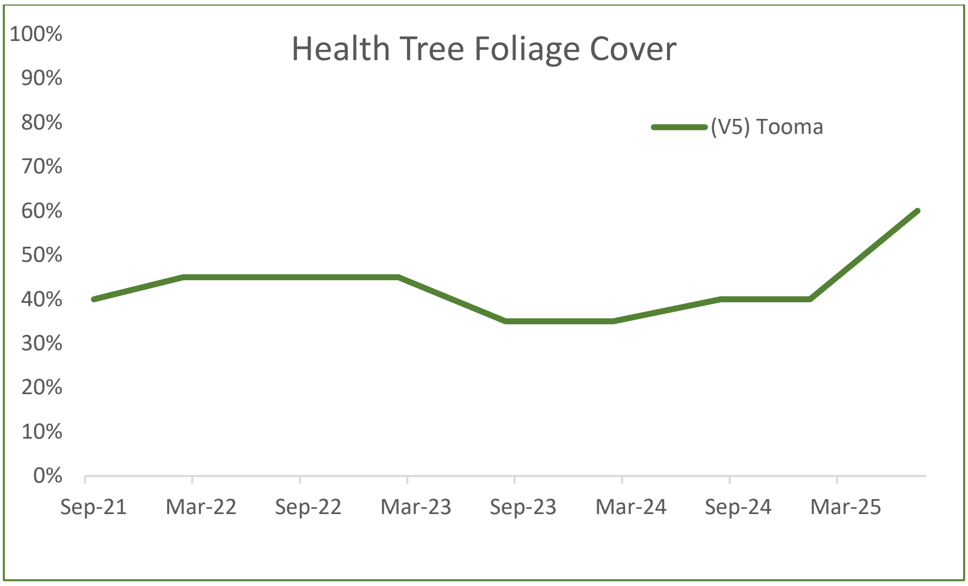
Vegetation Monitoring Site V5: Tooma Stockyards

The alluvial banks of the Tooma Stockyard monitoring site support a vegetation profile of scattered *Eucalyptus camaldulensis* (River Red Gum) to 20 m in height, long-leaved Paperbark (*Melaleuca leucadendra*), the occasional *Cenchrus ciliaris* (Buffel grass) and Cenchrus setiger (Birdwood grass), an extensive grassland of Hard Spinifex (*Triodia wiseana*) and scattered populations of *Calotropis procera* present.

This site is actively used by Warrawagine Station to muster cattle and will continually have a high number of cattle grazing along the creek line and standing within the pooling water. The bank stability and water quality show visual signs of impact from cattle.

Tooma Stockyards experienced a dramatic increase (+20%) in health tree foliage cover and consistent with the health scores in comparison to the 2024 monitoring events. Results for foliage coverage and health condition assessments at the V5 monitoring site are presented below in Chart 15 and above in Table 2.

Chart 15. V5 Health and foliage score 2021 to 2025

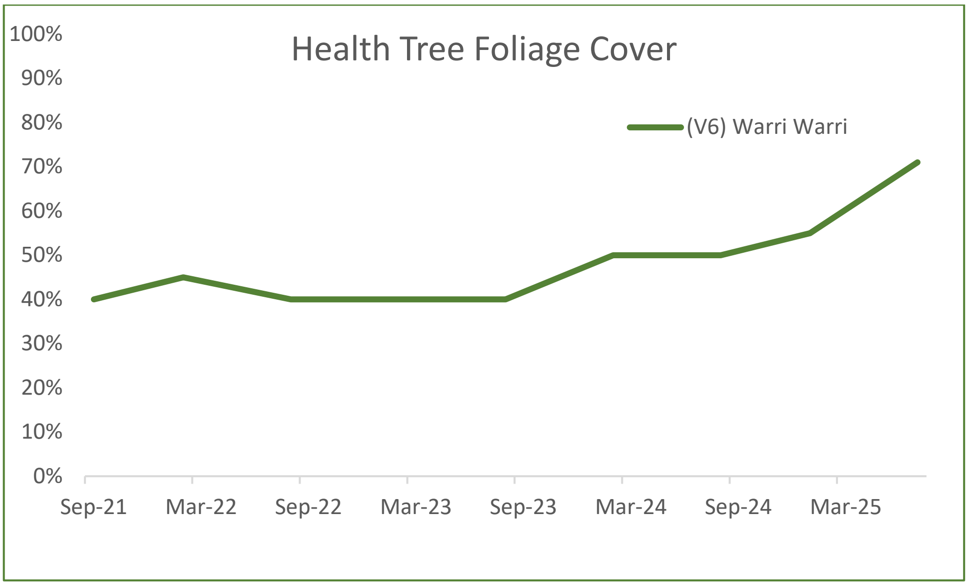


Vegetation Monitoring Site V6: Warri Warri Creek

The alluvial banks of the Warri Warri monitoring site support a vegetation profile of scattered *Eucalyptus camaldulensis* (River Red Gum) to a height of 20 m, dense perennial grassland of *Cenchrus ciliaris* (Buffel grass), prolific stands of *Typha* sp. (Native Bulrush), and scattered populations of *Calotropis procera*.

Foliage coverage scores experienced an increase (+20%) during this monitoring period. Health scores however decreased by one unit when compared with the previous monitoring period. Results for foliage coverage and health condition assessments at the V4 monitoring site are presented below in Chart 16 and above in Table 2.

Chart 16. V6 Health and foliage score 2021 to 2025



WWTP Irrigation Area

The WWTP Irrigation area at Woodie is designed to sustainably manage treated effluent from the wastewater treatment plant. The area supports a vegetation profile adapted to the arid Pilbara environment, characterised by native shrubs, grasses, and an extensive grassland of Hard Spinifex (Triodia wiseana) with occasional regenerating ground cover present.

Fencing around the area ensures protection from grazing and promotes revegetation efforts. Potential impacts to vegetation caused from wastewater irrigation are visually monitored and also controlled by limiting the TDS of irrigated wastewater to below 2000mg/L.

Vegetation health monitoring at the WWTP was implemented following the licence amendment received in September 2024. The general vegetation foliage cover was 80% in January and July 2025.

3.4 Monitoring of Point Source Emissions

3.4.1 Emissions to Surface Water

PMPL monitors point source emissions to surface water at 13 monitoring locations to mitigate and determine any potential environmental impacts from its operations; these licenced emission points are displayed in Figure 3 (Appendix A and listed in LC 16 (Table 7). Point source emissions to surface water are produced from the dewatering discharge required for below groundwater table open pit mining activities at Woodie.

PMPL discharged dewatering effluent from Cracker (W1), Topvar (W12), and Cracker (W9) for the 2024-2025 reporting period. Discharge from W9 commenced on 28 July 2025, sourced from newly established dewatering bores WBC006 and WBC008. These bores were brought online to initiate the development of a cone of depression at Chutney Pit. As the bores were not incorporated into the monthly water balance at the time, qualitative monitoring for W9 was inadvertently missed for July, August, and September 2025. This resulted in a non-compliance with LC 25 (Part V) for the current reporting period, detailed in the AACR in Appendix F . W9 is equipped with a sediment pond, and discharged 485,930kL to Brumby Creek during the 24-25 reporting period.

Form WR1 (Appendix C) displays the monthly volume and TSS recorded for point source emissions to surface water. Form WR2 (Appendix C displays the monitoring results recorded for point source emissions to surface water. PMPL monitored point source emissions to surface water in accordance with the following licence conditions:

- LC 16 and Table 7: Emission points to surface water
- LC 17 and Table 8: Point source emission limits to surface water
- LC 25 and Table 11: Monitoring of point source emissions to surface water

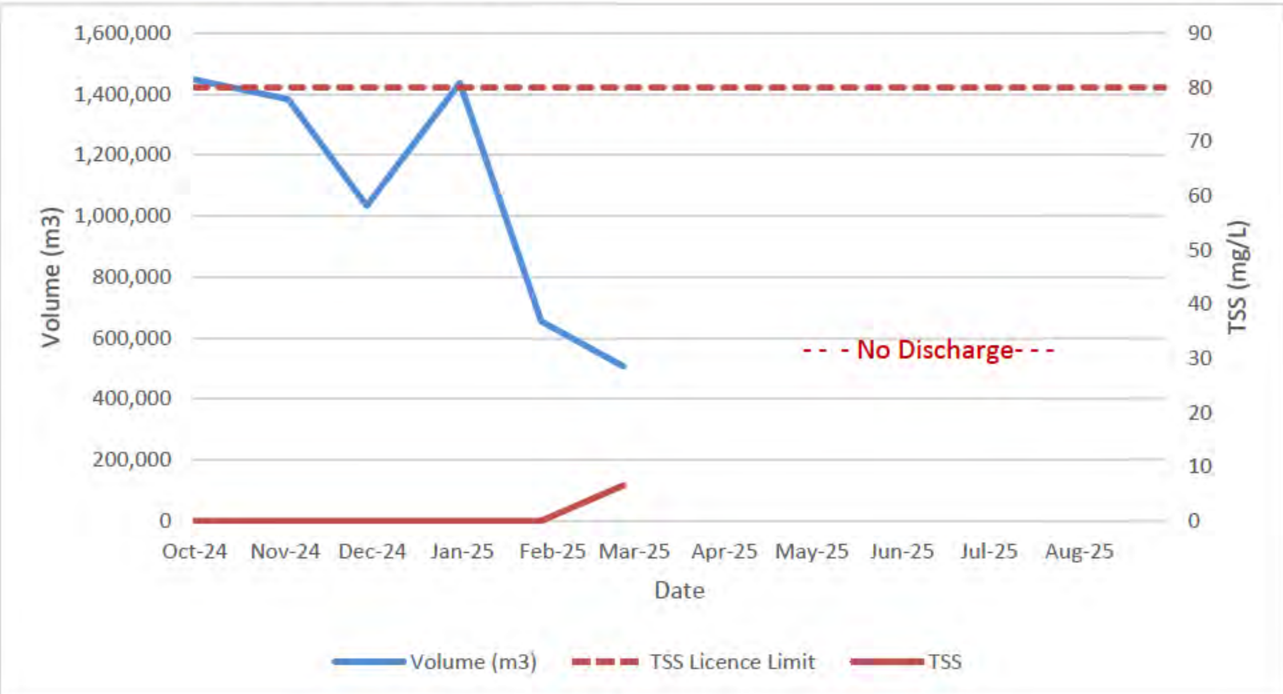
W1 – Cracker

Dewatering at Cracker ceased in February 2024 and recommenced at the end of the reporting period in September 2025. A total of 6,463,116 kilolitres of dewatering effluent was discharged during the reporting year, with no exceedances or non-conformances of L6131. Monitoring results for W1 remained consistent with previous reporting periods and are presented in Form WR2 (Appendix C , Chart 17 and summarised below:

- **pH**: Mostly stable and neutral, ranging between 7.48 and 8.39.
- **Total Dissolved Solids (TDS)**: minor fluctuation, with most readings between 536 mg/L and 702 mg/L.
- **Total Suspended Solids (TSS)**: Was generally below the detection limit of 5 mg/L, except for 6.5 mg/L recorded on March 9, 2025. This slight increase was likely caused by pit activities and or weather events.
- **Metals**: Iron, manganese, and other metals generally remain below detection limits with minor fluctuation.

Dewatering effluent discharged to W1 flows offsite via a minor branch of Muddautherra Creek. The downstream monitoring site, Muddautherra Creek (MMS), is located approximately 3 km northwest of W1, as displayed in Figure 4 (Appendix A .

Chart 17. W1 TSS and Discharge Volume



W12 – Topvar

The Topvar hub ex-pit dewatering bores (TDHW01–THDW05) discharged a total of 3,165,052 kilolitres of dewatering effluent to the Topvar discharge point (W12) throughout the reporting period, with no exceedances or non-conformances of the monitoring parameters identified. Monitoring results for W12 remained consistent with previous reporting periods and are presented in Form WR2 (Appendix C , Chart 18 and summarised below:

- pH: Mostly stable and neutral, ranging from 6.58 to 7.29.
- Total Dissolved Solids (TDS): Ranges from around 434 mg/L to 578 mg/L.
- Total Suspended Solids (TSS): consistently below the detection limit of 5 mg/L.
- Metals: Iron, manganese, and other metals remain low overall or below detection limits.

Dewatering effluent flows downstream via Brumby Creek to the Oakover River. Offsite monitoring for all discharge to Brumby Creek is conducted at Brumby Creek crossing (BMS), located 3.9 km downstream of W12, as displayed in Figure 4 (Appendix A

Chart 18. W12 TSS and Discharge Volume

3.4.2 Emissions to Land

PMPL monitored point source emissions to land in accordance with the following licence conditions:

- LC 18 and Table 9: Emission to land
- LC 20 and Table 10: Emission limits to land
- LC 26 and Table 12: monitoring emissions to land

PMPL point source emissions to land are comprised of two locations:

- **L1** (Greensnake Oil Water separator discharge) required for the management of the workshop and washdown are indicated on Figure 2 (Appendix A).
- **L2A, L2B** (Irrigation Sprayfield) for the management of Wastewater produced from Woodie's village, indicated on Figure 2, (Appendix A).

L1 – Greensnake Oil Water Separator

Monitoring location L1 is the treated wastewater from an oil water separator unit originating from the green snake workshop and washdown area. Waste hydrocarbons are removed from the discharged water and disposed of into a bunded IBC for disposal offsite. The treated wastewater is then discharged into an adjacent evaporation pond via a dedicated pipeline.

All sample events were within licence limits and met the sampling and frequency conditions depicted in LC 18 (Table 9) and LC 21 to 24.

Quarterly monitoring was undertaken between 63 and 147 days apart throughout the reporting period.

The highest value for total recoverable hydrocarbons (TRH) recorded was 4.3mg/L, this is below the licence limit for TRH (15mg/L). Monitoring data for L1 is displayed in Form LR1 of Appendix C .

L2 – Wastewater Irrigation Area

PMPL discharges wastewater via two licenced discharge points located at the Irrigation Sprayfield (L2).

Monitoring at L2 was conducted in accordance with the quarterly frequency requirements, with all samples taken more than 45 days apart. All parameters were sampled each quarter as specified in LC 21 to 24 and LC 26 (Table 12) of L6131. No exceedances or non-compliances with L6131 were observed during the reporting period. Quarterly monitoring data is presented in Form LR3-A of Appendix C .

Total Nitrogen (TN) and Total Phosphorus (TP) loads were calculated using the annual average values measured during the quarterly water sampling events. The calculated loads for the reporting period were 118.3 kg/ha/year for TN and 42.4 kg/ha/year for TP.

These values are within the compliance limits of 480 kg/ha/year for TN and 120 kg/ha/year for TP, as specified in L6131.

The TDS also averaged from the quarterly sampling events, was calculated at 1248 mg/L for the year, which is well below the limit of 2000 mg/L. Monitoring results for TDS, TN, and TP loads are presented in Form LR2 in of Appendix C .

3.4.3 Monitoring of Inputs and Outputs

PMPL managed treated wastewater and solid waste in compliance with the following licence conditions:

- LC 9 and Table 4: Management of waste
- LC 27 and Table 13: Monitoring of inputs and outputs
- LC 28 and Table 14: Process monitoring

Treated Wastewater- Assessment of L2 Wastewater discharge Volumes

Wastewater discharge volume was measured daily during the reporting period to ensure compliance with LC 9 in Table 4 of L6131, which limits discharge to no more than 300m³ per day. Form LR3-B in Appendix C displays the measured volume of wastewater discharged to L2. During the reporting period a total of 56,059 m³ of treated wastewater effluent was discharged to L2 (WWTP Sprayfield), averaging 153.58m3 /day.

Solid Waste Inputs

PMPL disposed of a total of 554.57 tonnes of waste to Greensnake Landfill, Kia Landfill and Bells West Pit during the reporting year, as seen in Table 3 and in Figure 2 (Appendix A . This remains below the licence limit of 1,950 tonnes, as outlined in LC 9 and Table 4 of L6131.

Greensnake Landfill

The Greensnake Landfill consists of an active trench situated on the Greensnake waste dump accepting putrescible waste, clean fill, and Type 1 inert waste streams. Throughout the reporting period, a total of 525.17 tonnes and 3366.5 m³ of putrescible and Type 1 inert waste was recorded in the Greensnake Landfill Register.

Putrescible waste generated at woodie has been calculated to weigh 0.113 tonnes per cubic meter. This calculation was derived from mass and volume measurements of a standard daily trailer load. Throughout the reporting period, 3366.5 m³ of putrescible and Type 1 inert waste was disposed of at Greensnake Landfill.

Kia Landfill

Kia landfill is a sterilized open mine pit primarily used as a backup facility for the disposal of non-recyclable plastic and large waste items that may reduce the capacity of landfill cells at Greensnake landfill. In September 2024, the disposal of PVC pipe material was diverted to Kia landfill to maximise capacity at Greensnake and segregate waste streams. Throughout the reporting period 22m³ of waste was recorded in the Kia landfill register totalling 2.492 tonnes.

Bells West Pit

Bells west pit has been historically used to manage and dispose of rubber waste and tyres. Throughout the reporting period, 1254 LV tyres (averaging 15kg each) and 162 HV tyres (averaging 50kg each) were reported in the Bells West register, totalling 26.91 Tonnes. In September 2024, a licence amendment was issued to permit the disposal of conveyor belts at the Bells West facility. No conveyor belt waste was disposed of throughout this reporting period.

Table 3. Solid Waste Disposal at Woodie

Facility	Waste Type	Licence Limit	Register Volume or Quantity	Tonnes
Greensnake	Putrescible, Inert Waste Type 1	Less than 1,950 t per year of all waste types	3366.5 m³	525.17
Kia	Inert Waste Type 1		22 m³	2.49
Bells west	LV tyres		1254	18.81
	HV Tyres		162	8.1
	Conveyor Belt		0	0
			Total	554.57 t

4 COMPLIANCE

4.1 Prescribed Premises Category Compliance

The scheduled monthly qualitative monitoring events for discharge point W9 were missed from July 2025 to September 2025 due to an administrative oversight, resulting in 3 non-compliances against condition 25 in L6131 for the reporting period. W9 discharge was sampled on 25 Oct 2025, and results did not indicate any environmental harm. This is detailed in the AACR. The AACR can be found in Appendix F , and is summarised below in Table 4.

Table 4. Prescribed limits for licence L6131/1990/13

Prescribed premises category	Approved premises capacity or limit	Reported capacity or limit
Category 5 - Processing or benefaction of metallic or non-metallic ore	5,000,000 tonnes per annual period	1,343,782 tonnes
Category 6 - mine dewatering	55,188,000 tonnes per annual period	11,547,768 tonnes
Category 54 - Sewage Facility	300 m^3 per day	153.58 m^3 per day
Category 73 - Bulk Storage of Chemicals	2144 m^3 in aggregate	1773.66m^3
Category 89 - Putrescible landfill site	1950 tonnes per annual period	525.17 tonnes

4.2 Complaints Summary

There were no complaints received in relation to the Part V prescribed premises activities throughout the reporting period at Woodie.

Appendix A Figures

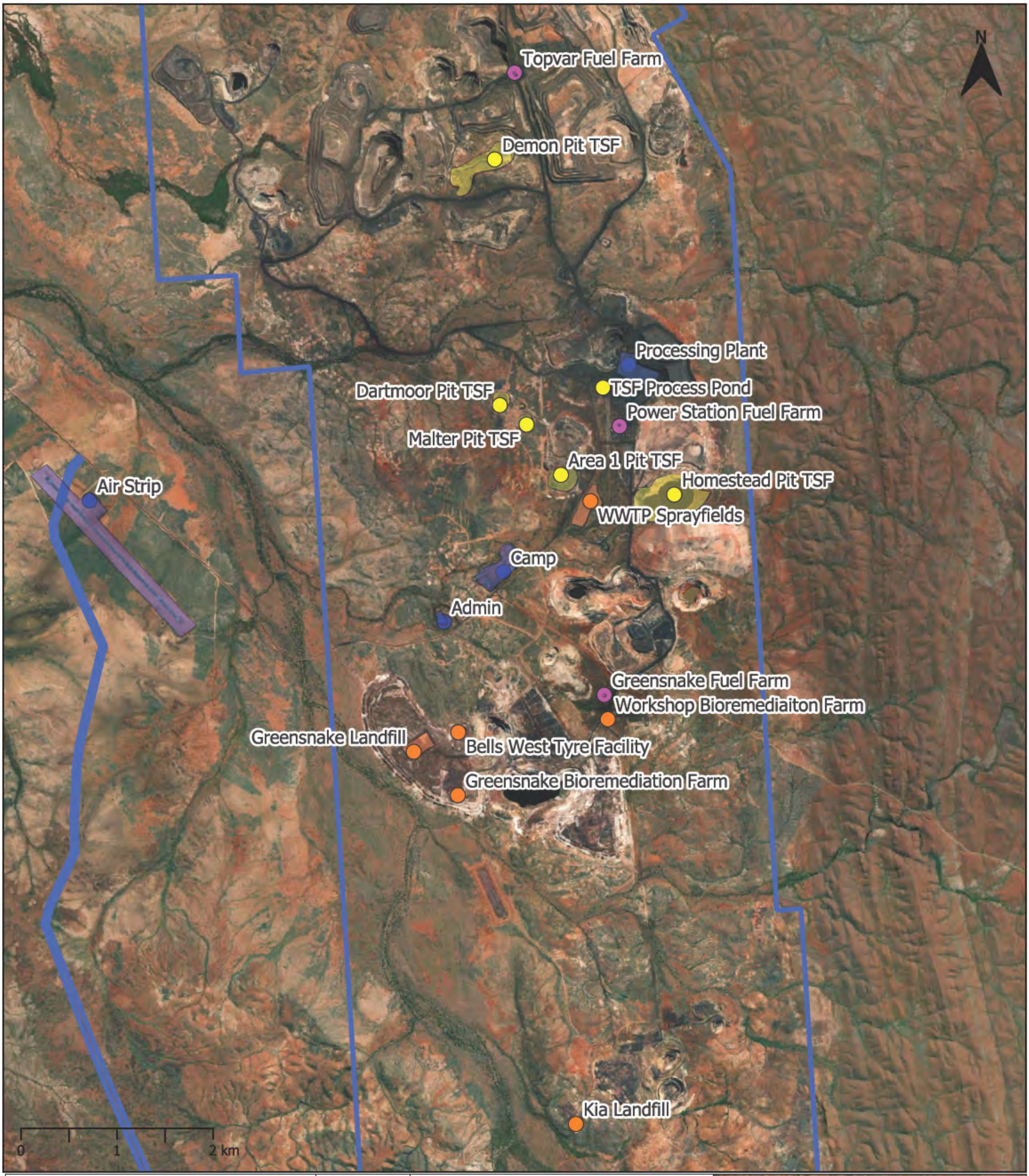


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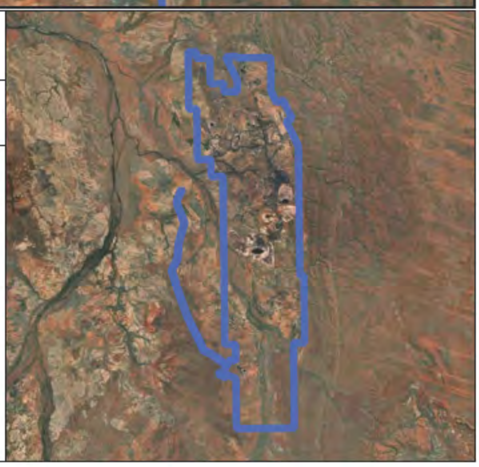
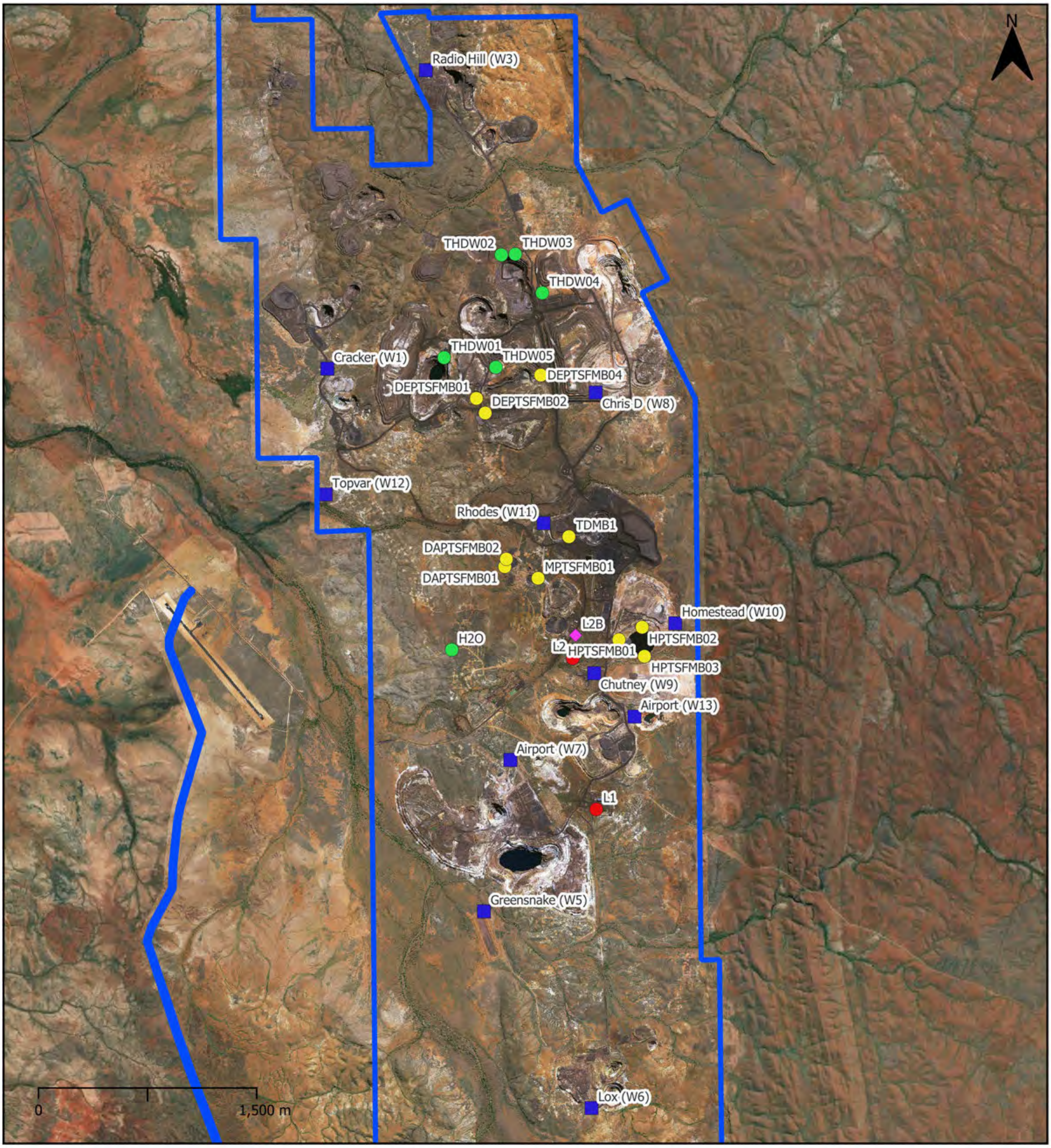
FIGURE:		
FIGURE 2	WOODIE WOODIE INFRASTRUCTURE	
DATE: 16/11/2024	CREATED BY: ENV. DEPT.	SCALE: 1:52 500



MAP LEGEND

- Waste Managment Infrastructure
- Containment Infrastructure
- Fuel Farms
- Other Infrastructure
- Woodie Woodie Premise Boundary



ConsMin	Figure: FIGURE 3	L6131 AER 2024 - Monitoring Locations	
	DATE: 26/11/2024	CREATED BY: ENV. DEPT.	SCALE: 1:70907

MAP LEGEND

Premise Boundary

Monitoring Locations

- Oily Water Seperator
- Production Bore
- Sediment Pond
- TSF MB
- WWTP Monitoring Site

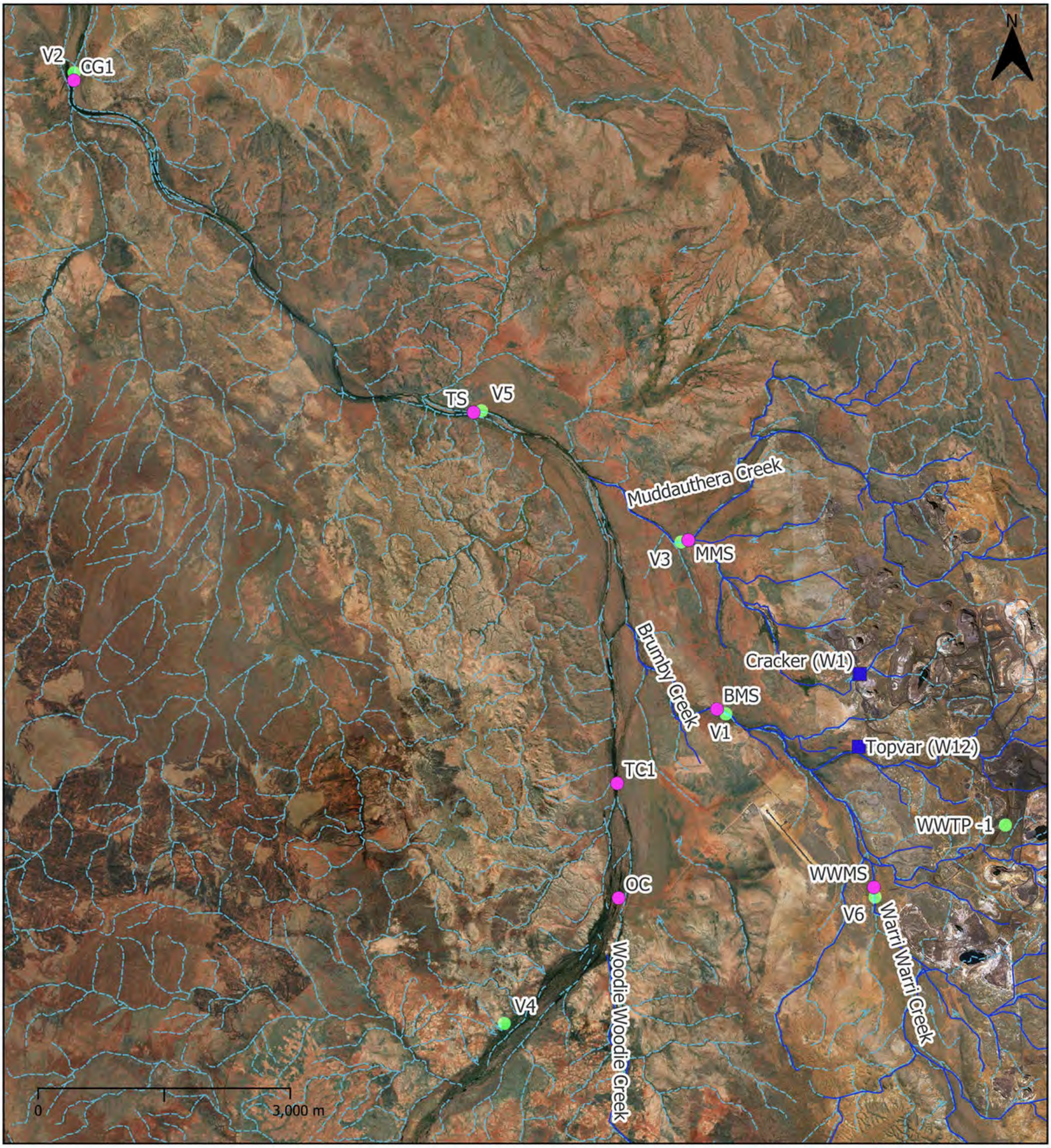


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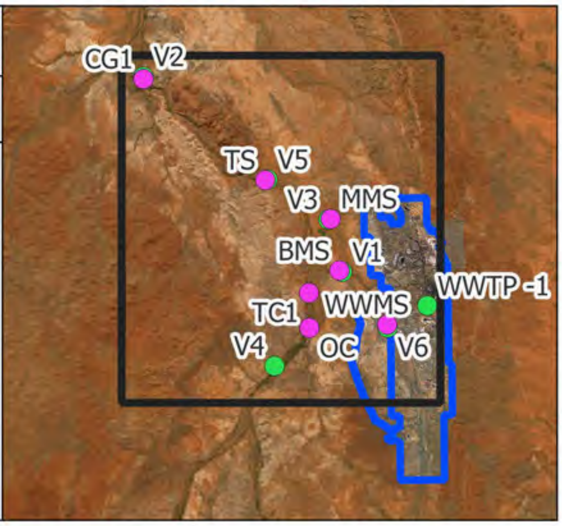
Figure: FIGURE 4	L6131 AER 2024 - Regional and Vegetation Health Monitoring Locations	
DATE: 26/11/2024	CREATED BY: ENV. DEPT.	SCALE: 1:122782

MAP LEGEND

- Regional Monitoring
- Discharge Points
- Veg monitoirng locations
- Premise Boundary
- Major Surface Water and Tributaries
- Surface Water and Drainage Lines



Appendix B Pilbara Manganese Pty Ltd Environmental Licence (L6131/1990/13).

Government of Western Australia
Department of Water and Environmental Regulation

Licence

Licence Number	L6131/1990/13
Licence Holder	Pilbara Manganese Pty Ltd
ACN	074 106 577
Registered business address	L2/24 Outram Street WEST PERTH WA 6005
File Number	DER2013/001337-1
Duration	01/10/2013 to 30/09/2028
Date of issue	26/09/2013
Date of amendment	05/09/2024
Premises	Woodie Woodie Manganese Project Mining tenements: G45/332, G45/333, G45/334, G45/335, G45/336, G45/37-40, G46/4-5, L46/29, M45/107, M45/429-433, M45/517, M45/600-602, M45/637-641, M45/1218, M46/92-93, M46/108, M46/137, M46/150, M46/161-162, M46/383, M46/384, G45/279-284 MARBLE BAR WA 6760

Category number	Approved Premises production or design capacity
5 - Processing or beneficiation of metallic or nonmetallic ore	5,000,000 tonnes per annual period
6 - Mine dewatering	55,188,000 tonnes per annual period
54 - Sewage facility	300 cubic metres per day
73 - Bulk storage of chemicals	2,144 cubic metres in aggregate
89 - Putrescible landfill site	1,950 tonnes per annual period

This Licence amendment is granted to the Licence Holder, subject to the following conditions, on 5 September 2024 by:

MANAGER – RESOURCE INDUSTRIES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Licence history

Reference number	Date	Summary of changes
L6131/1990/9	1/10/2004	Licence reissue.
28/4/2006	28/4/2006	Licence amendment.
28/09/2006	L6131/1990/10	Licence reissue.
18/9/2008	L6131/1990/11	Licence reissue. Added category 54 and 89 to the licence.
30/9/2010	L6131/1990/12	Licence reissue. Added conditions for WWTP monitoring, landfill management and targets for dewatering monitoring.
29/3/2012	L6131/1990/12	Proponent amendment: Additional conditions for tyre disposal, bioremediation facility management, changes annual period and update monitoring sites.
26/09/2013	L6131/1990/13	Licence reissue and REFIRE conversion.
30/04/2015	L6131/1990/13	Proponent requested licence amendment.
26/11/2015	L6131/1990/13	Proponent requested licence amendment.
25/02/2016	L6131/1990/13	Licence amended to add tenements, include the Greensnake landfill and remove improvement conditions for the bioremediation facility.
29/04/2016	L6131/1990/13	Department initiated amendment in accordance with section 59(1)(k) of the Act to amend the duration of the licence date month year.
30/06/2016	L6131/1990/13	Licence amended as the mine went in Care and Maintenance and to reduce the frequency of TSF inspections from daily to weekly and converting back to the Telfer's weather stations for weather records.
22/12/2016	L6131/1990/13	Amendment Notice: Licence Holder advised that the mine will resume operation and TSF inspections revert back to daily. Condition 4.3.1 was amended to reduce the required period of notice.
31/03/2017	L6131/1990/13	Amendment Notice 2: a Licence Holder initiated amendment to include the Homestead In-Pit tailing storage and its groundwater monitoring bores that were approved via works approval W5821/2015/1. Additional parameters for mine dewatering discharge were added and ambient surface water quality respectively have been updated to include chloride, sulfate, sodium, potassium, cobalt, iron, nickel, selenium, mercury, chromium(VI) and total chromium to fully assess the potential impacts of discharging dewatering effluent to rivers near the mine site.
1/11/2017	L6131/1990/13	Amendment Notice 3: on 21 August 2017 the Licence Holder applied for the following changes: • Change in treatment methods for the licensed WWTP; and • To allow dewatering water from Hunter pit to be discharged into Cracker Sedimentation Pond, prior to discharge to Muddauthera Creek.
2/05/2018	L6131/1990/13	Amendment Notice 4: on 19 December 2017 the Licence Holder applied for the following amendments to the licence: • Construction and operation of a new bioremediation area

		on top of the Greensnake Western Waste Dump; and Disposal of waste tyres within the Chutney/Vespa Waste Dump. On 1 March 2017 an application for additional amendment received for the following: • An increase to the approved throughput for Category 89 from 1,650 tonnes per annum (tpa) to 1,950 tpa.
30/01/2019	L6131/1990/13	Amendment Notice 5: on 25 October 2018 the Licence Holder applied for the following amendment in the licence: • Dispose waste tyres within the Paystar Waste Dump; • Dispose waste tyres within the Bells West Pit; • Extend the Greensnake Landfill footprint; • Dispose dewatering discharge from Extension Cord pit into Paystar pit; and Dispose dewatering discharge from Topvar Pit into Cracker (W1) sedimentation pond, which discharges to Muddauthera Creek.
29/07/2020	L6131/1990/13	DWER initiated amendment to consolidate/ amalgamate separately issued Licence amendment notices in the main Licence.
5/09/2024	L6131/1990/13	Licence amendment to increase maximum daily treated wastewater effluent volume from 150 m3 to 300 m3 with the inclusion of reject water from the Reverse Osmosis Plant, and to authorise the disposal of conveyor belt waste in the Bells West Landfill Facility.

Interpretation

In this licence:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this licence:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

Licence conditions

General conditions

1. The Licence Holder must immediately recover or remove and dispose of spills of environmentally hazardous materials outside an engineered containment system.

Premises operation

2. The Licence Holder must ensure that all pipelines containing environmentally hazardous materials are either:

   (a) equipped with telemetry system and pressure sensors along pipelines to allow the detection of leaks and failures; or

   (b) equipped with automatic cut-outs in the event of a pipe failure; or

   (c) provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections.

3. The Licence Holder must ensure that waste materials are only stored/treated within vessels or compounds provided with the infrastructure detailed in Table 1 and identified on the Premises map in Schedule 1.

Table 1: Containment infrastructure

Containment point reference	Material	Specification
Demon Pit TSF (DEPTSF)	Tailings	A minimum total freeboard of 820 mm from the top of the pit crest is maintained at all times
Dartmoor Pit TSF (DAPTSF)		
Malta Pit TSF (MAPTSF)		
Area 1 Pit TSF (A1PTSF)		
Homestead TSF (HPTSF)		
Process Water Pond	TSF return water and mine dewater	A minimum total freeboard of 500 mm or a 1 in 100 year/72 hour storm event (whichever is greater) from the top of the embankment is maintained at all times. Methods of operation minimise the likelihood of erosions of the embankment by wave action.
Bioremediation Facility	Hydrocarbon contaminated waste	Base and bunding clay lined. Stormwater runoff diverted so as not to flow onto the treatment facility.

4. The Licence Holder must manage each TSF detailed in Table 1 such that the supernatant pond on the TSF is minimised as far as practicable.

5. The Licence Holder must undertake an annual water balance for each TSF detailed in Table 1. The water balance must as a minimum consider the following:

   (a) site rainfall;

   (b) evaporation;

   (c) decant water recovery volumes;

(d) seepage recovery volumes; and

(e) volumes of tailings deposited.

6. The Licence Holder must:

(a) undertake inspection as detailed in Table 2;

(b) where any inspection identifies that an appropriate level of environmental protection is not being maintained, take corrective action to mitigate adverse environmental consequences as soon as practicable; and

(c) maintain record of all inspections undertaken.

Table 2: Inspection of infrastructure

<table>
<tr><th>Scope of inspection</th><th>Type of inspection</th><th>Frequency of inspection</th></tr>
<tr><td>Tailings pipelines</td><td rowspan="2">Visual integrity and leak assessment</td><td rowspan="3">Daily when the facilities are active

Weekly when the facilities are inactive</td></tr>
<tr><td>Tailings return water lines</td></tr>
<tr><td>Embankment freeboards of containment infrastructure listed in Table 1</td><td>Visual to confirm required freeboard capacity is available</td></tr>
</table>

7. The Licence Holder must ensure groundwater levels within the zone of influence at monitoring bores detailed in Table 17 and shown in Schedule 1, does not exceed the limit specified in Table 3.

Table 3: Groundwater level controls

Parameter	Limit (mbgl)	Averaging Period
Groundwater	4	Spot Sample

8. The Licence Holder must, when standing water levels rise higher than 6 mbgl within monitoring bores detailed in Table 17 and shown in Schedule 1, provide the CEO with the following information:

(a) the monitoring bore location;

(b) the root cause analysis for the exceedances; and

(c) a description of remedial measures taken or planned to be taken.

9. The Licence Holder must ensure that where wastes produced on the Premises are not taken offsite for lawful use or disposal, they are managed in accordance with the requirements of Table 4.

Table 4: Management of Waste

<table>
<tr><th>Facility</th><th>Waste type</th><th>Processes</th><th>Requirements[1,2]</th></tr>
<tr><td rowspan="3">Kia landfill

Greensnake landfill</td><td>Clean Fill</td><td rowspan="3">Storage and disposal of waste by landfilling</td><td rowspan="3"><u>All waste types</u>

No more than 1,950 tonnes per year of all waste types cumulatively shall be disposed of by landfilling.</td></tr>
<tr><td>Putrescible Waste</td></tr>
<tr><td>Inert Waste Type 1</td></tr>
</table>

Greensnake Tyre Disposal Facility Vespa/Chutney Waste Dump Paystar Waste Dump Bells West Pit	Inert Waste Type 2		Disposal of waste by landfilling must only take place within the Kia landfill, Greensnake landfill, Paystar Waste Dump, Bells West Pit, Greensnake Tyre Disposal Facility and Vespa Waste Dump shown on the Premises map in Schedule 1. The separation distance between the base of the landfill and the highest groundwater level must be not less than 3 metres. **Tyres (Inert Waste Type 2)**[2] Tyres must only be landfilled within the Greensnake Tyre Disposal Facility, Vespa Waste Dump, Paystar Waste Dump and Bells West Pit shown on the Premises map in Schedule 1. Tyres must consist of batches of no more than 1,000 tyres or 40 m^3 of tyre pieces. Batches must be separated from each other by at least 100 mm of soil. **Conveyor Belt (Inert Waste Type 2)**[2] No more than 600 tonnes of conveyor belts must be disposed of by landfilling. Disposal of conveyor belts can only take place within the Greensnake Tyre Disposal Facility and the Bells West Landfill Facility shown on the Premises map in Schedule 1. Conveyor belts must be batched in volumes of 40 m^3 or less with batches separated by 100 mm or more of soil. The disposal site of tyres and conveyor belts must be surveyed and recorded for location and relative level.
Wastewater treatment plant	Sewage	Biological, physical and chemical treatment.	No more than 300 m^3 per day

Note 1: Requirements for landfilling tyres are set out in Part 6 of the Environmental Protection Regulations 1987.
Note 2: Additional requirements for the acceptance and landfilling of controlled waste (including asbestos and tyres) are set out in the Environmental Protection (Controlled Waste) Regulations 2004.

10. The Licence Holder must manage the landfilling activities to ensure:

(a) waste is placed and compacted to ensure all faces are stable and capable of retaining rehabilitation material; and

(b) rehabilitation of a cell or phase takes place within 6 months after disposal in that cell or phase has been completed.

11. The Licence Holder must ensure that cover is applied and maintained on landfilled wastes in accordance with Table 5 and that sufficient stockpiles of cover are maintained on site at all times.

Table 5: Cover requirements[1]

Waste Type	Material	Depth	Timescales
Inert Waste Type 1	No cover required		
Putrescible Waste	Type 1 Inert waste or soil	300 mm	Weekly or as soon as practicable after deposit.
Inert Waste Type 2		500 mm	As soon as practical following the achievement of final waste levels in the area(s) in which tyres are deposited.

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

12. The Licence Holder must take all reasonable and practical measures to ensure that no wind-blown waste escapes from the Premises and that wind-blown waste is collected on at least a weekly basis and returned to the tipping area.

13. The Licence Holder must manage the irrigation of treated wastewater such that:

(a) no irrigation generated run-off, spray drift or discharge occurs beyond the boundary of the defined irrigation area(s);

(b) treated wastewater is evenly distributed over the irrigation area;

(c) no soil erosion occurs;

(d) irrigation does not occur on land that is waterlogged; and

(e) vegetation cover is maintained over the irrigation area.

14. The Licence Holder must construct the Hunter, Extension Cord and Topvar dewatering pipelines in accordance with the requirements specified in the infrastructure requirements detailed in Table 6. The Licence Holder must not depart from the requirements specified in Table 6 except:

(a) where such departures are minor in nature and do not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase the risks to public health, public amenity or the environment;

and all other conditions in this Licence are still satisfied.

Table 6: Infrastructure requirements

Infrastructure	Requirements (design and construction)
Extension Cord / Chutney pipeline	• Constructed of high density polyethylene • Pipeline contained within windrows, constructed from inert material • Flow meters installed to record volume of all water discharged into the Paystar pit
Topvar pipeline	• Constructed of high density polyethylene • Pipeline contained within windrows, constructed from inert material • Flow meters installed to record volume of all water discharged into the Cracker Sedimentation Pond

Emissions

General

15. The Licence Holder must record and investigate the exceedance of any descriptive or numerical limit specified in any part of section 2 of this Licence.

Point source emissions to surface water

16. The Licence Holder must ensure that where waste is emitted to surface water from the emission points in Table 7 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 7: Emission points to surface water

Emission point reference on Map of emission points	Emission point reference	Description	Source including abatement
W1	Cracker (CK1)	Discharge to Muddauthera Creek	Sedimentation Pond originating from dewatering at Austin, Big Mack, Lucy Mack, Demon, Hunter SE, Hunter and Topvar pits.
W2	Hunter (H2)		Sedimentation Pond originating from dewatering at Hunter pit.
W3	Radio Hill (RH1)		Sedimentation Pond originating from dewatering at Radio Hill pit.
W4	Sardine (SD1)		Sedimentation Pond originating from dewatering at Dhufish pit.
W5	Greensnake (GS1)	Discharge to Warri Warri Creek	Sedimentation Pond originating from dewatering at Greensnake pit.
W6	Lox (LX1)		Sedimentation Pond originating from dewatering at Lox pit.
W7	Airport (AP1)	Discharge to Brumby Creek	Sedimentation Pond originating from dewatering at Airport pit.
W8	Chris D (CD1)		Sedimentation Pond originating from dewatering at Chris D pit.
W9	Chutney (CT1)		Sedimentation Pond originating from dewatering at Chutney/Extension cord pits and Paystar.
W10	Homestead (HS1)		Sedimentation Pond originating from dewatering at Homestead pit.
W11	Rhodes (RD)		Sedimentation Pond originating from dewatering at Rhodes pit.
W12	Topvar (TD)		Dewatering from Big Mack pit and the Topvar Hub Dewatering Bores

W13	Paystar	Evaporate and reinfiltrate into the unconfined aquifer	Dewatering from Chutney/Extension Cord pit

17. The Licence Holder must not cause or allow point sources emissions to surface water greater than the limits listed in Table 8.

Table 8: Point source emission limits to surface water

Emission point reference	Parameter	Limit (including units)	Averaging period
W1- W12	Total Suspended Solids	80 mg/L	Spot sample

Emissions to land

18. The Licence Holder must ensure that where waste is emitted to land from the emission points in Table 9 and identified on the maps of emission points in Schedule 1 it is done so in accordance with the conditions of this licence.

Table 9: Emissions to land

Emission point reference on Maps of emission points	Emission point reference	Description	Source including abatement
L1	Storage pond	Pipe from oily water separator into unlined storage pond	Treated wastewater from oil water separator originating from Greensnake workshop and wash down area
L2 – L2a or L2b (dependent on disposal pattern)	Irrigation area	Effluent from accommodation camp wastewater treatment plant to on-site irrigation area	Treated effluent from wastewater treatment plant

20. The Licence Holder must not cause or allow emissions to land greater than the limits listed in Table 10.

Table 10: Emissions limits to land

Emission point reference	Parameter	Limit (including units)	Averaging period
L1	Total Recoverable Hydrocarbon	15 mg/L	Spot sample
L2 – L2a or L2b (dependent on disposal pattern)	Load of Total Nitrogen (TN)	480 kg/ha	Annual
	Load of Total Phosphorus (TP)	120 kg/ha	
	Total Dissolved Solids (TDS)	2,000 mg/L	Spot sample

Monitoring

General Monitoring

21. The Licence Holder must ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1 unless otherwise indicated in the relevant table;

(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 all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.

22. The Licence Holder must ensure that:

(a) monthly monitoring is undertaken at least 15 days apart;

(b) quarterly monitoring is undertaken at least 45 days apart; and

(c) six monthly monitoring is undertaken at least 5 months apart.

23. The Licence Holder must 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.

24. The Licence Holder must, 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.

Monitoring of point source emissions to surface water

25. The Licence Holder must undertake the monitoring of emission points in Table 11 at locations identified on the map of monitoring points in Schedule 1 according to the specifications in that table.

Table 11: Monitoring of point source emissions to surface water

Emission point reference	Parameter	Units	Frequency
W1 W2 W3 W4 W5 W6 W7 W8 W9	Volume (cumulative)	m^3	Continuous
	pH[1]	pH units	Monthly
	Total Dissolved Solids	mg/L	
	Nitrate and Nitrite Nitrogen	mg/L	
	Total Kjeldahl Nitrogen	mg/L	
	Total Nitrogen	mg/L	
	Filterable Reactive Phosphorus	mg/L	

W10 W11 W12 W13	Total Phosphorus	mg/L	
	Sodium	mg/L	
	Magnesium	mg/L	
	Zinc[2]	mg/L	
	Lead[2]	mg/L	
	Cadmium[2]	mg/L	
	Manganese	mg/L	
	Chloride	mg/L	
	Sulfate	mg/L	
	Potassium	mg/L	
	Cobalt	mg/L	
	Iron	mg/L	
	Nickel	mg/L	
	Selenium	mg/L	
	Mercury	mg/L	
	Chromium (VI)	mg/L	
	Total Chromium	mg/L	

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: With adjustments for hardness as per ANZECC (2000) guidelines

Monitoring of emissions to land

26. The Licence Holder must undertake the monitoring of emission points in Table 12 at locations identified on the maps of monitoring points in Schedule 1 according to the specifications in the table.

Table 12: Monitoring of emissions to land

Emission point reference	Parameter	Units	Frequency
L1	Total Recoverable Hydrocarbon	mg/L	Quarterly
L2a or L2b (dependent on disposal pattern)	pH[1]	pH units	
	Biochemical Oxygen Demand	mg/L	
	Total Suspended Solids	mg/L	
	Total Nitrogen	mg/L	
	Total Phosphorus	mg/L	
	E.coli	cfu/100mL	
	Total Dissolved Solids (TDS)	Mg/L	

Note 1: In-field non-NATA accredited analysis permitted.

Monitoring of inputs and outputs

27. The Licence Holder must undertake the monitoring in Table 13 according to the specification is that table.

Table 13: Monitoring of inputs and outputs

Input/ Output	Parameter	Units	Averaging Period	Frequency
Treated Wastewater	Volume (cumulative) recycled for on-site irrigation from the Wastewater Treatment Plant and Reverse Osmosis Plant	m^3	Monthly	Continuous
Waste Inputs	Inert Waste Type 1, Inert Waste Type 2, Putrescible Waste, and Clean Fill	tonnes or m^3	N/A	Each load disposed

Process monitoring

28. The Licence Holder must undertake the monitoring in Table 14 according to the specifications in that table.

Table 14: Process monitoring

Process description	Parameter	Units	Averaging Period	Frequency
Tailings deposition	Volume of tailings deposited into each TSF	m^3	Monthly	None specified
	Volume of water recovered from each TSF			

Ambient environmental quality monitoring

29. The Licence Holder must undertake the monitoring of monitoring points in Tables 15, 16, 17 and 18 at locations identified on the map of monitoring points in Schedule 1 according to the specifications in those tables.

Table 15: Monitoring of ambient surface water quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
<u>Downstream sites:</u> Muddauthera Creek (MMS) Warri Warri (WWMS) Brumby Creek (BMS)	pH[1]	pH units	Spot sample	Monthly
	Total Dissolved Solids	mg/L		
	Total Suspended Solids			
	Nitrate and Nitrite Nitrogen			
	Total Kjeldahl Nitrogen			
	Total Nitrogen			
	Filterable Reactive Phosphorus			
	Total Phosphorus			
	Sodium			
	Magnesium			
	Zinc[2]			
	Lead[2]			
	Cadmium[2]			
	Manganese			
	Chloride			
	Sulfate			

	Potassium			
	Cobalt			
	Iron			
	Nickel			
	Selenium			
	Mercury			
	Chromium (VI)			
	Total Chromium			
<u>Background site:</u> Lower Carawine Gorge Pool (CG1) Tooma Stockyard (TS) Tooncoonaragee Pool (TC1) Oakover Crossing (OC)	pH[1]	pH units	Spot sample	Monthly (when accessible)
	Total Dissolved Solids	mg/L		
	Total Suspended Solids			
	Nitrate and Nitrite Nitrogen			
	Total Kjeldahl Nitrogen			
	Total Nitrogen			
	Filterable Reactive Phosphorus			
	Total Phosphorus			
	Sodium			
	Magnesium			
	Zinc[2]			
	Lead[2]			
	Cadmium[2]			
	Manganese			
	Chloride			
	Sulfate			
	Potassium			
	Cobalt			
	Iron			
	Nickel			
	Selenium			

	Mercury			
	Chromium (VI)			
	Total Chromium			
	Chlorophyll-a	µg/L		
	Phaeophytin			

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: With adjustments for hardness as per ANZECC (2000) guidelines.

Table 16: Monitoring of sediment quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
Background site: Lower Carawine Gorge Pool (CG1) Tooma Stockyard (TS) Tooncoonaragee Pool (TC1) Oakover Crossing (OC)	Chlorophyll-a	mg/m^2	Spot sample	Monthly (when accessible)
	Phaeophytin	mg/m^2		

Table 17: Monitoring of ambient groundwater quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
Demon Pit TSF DEPTSFMB01 DEPTSFMB02 DEPTSFMB04 TSF2 TDMB1 Dartmoor TSF DAPTSFMB01 DAPTSFMB02 Malta TSF MAPTSFMB01 Homestead TSF HPTSFMB01 HPTSFMB02 HPTSFMB03	Standing water level	mbgl	Spot sample	Quarterly
	pH[1]	pH units		
	Total Dissolved Solids	mg/L		
	Total Nitrogen	mg/L		
	Arsenic	mg/L		
	Copper	mg/L		
	Molybdenum	mg/L		
	Selenium	mg/L		
	Uranium	mg/L		
	Hexavalent Chromium	mg/L		

Note 1: In-field non-NATA accredited analysis permitted.

Table 18: Monitoring of vegetation health

Monitoring point reference and location	Parameter	Averaging period	Frequency
Brumby Creek Crossing (V1) Lower Carawine Pool (V2) Muddauthera Crossing (V3) Running Water Pool (V4) Tooma Stockyards (V5) Warri Warri Creek Crossing (V6) WWTP Irrigation Area (as displayed in Figure 6)	Visually estimate the average foliage cover of the species *Eucalyptus camaldulensis* and *Melaleuca argentea*	Visual inspection	Six monthly
	Score the health condition of the species *Eucalyptus camaldulensis* and *Melaleuca argentea*		
	General environmental description of the site and record any changes since previous monitoring		
	Take replicate photographs of foliage density and shadow areas beneath trees		

30. The Licence Holder must take the relevant action in the case of an event in Table 19.

Table 19: Management Action

Monitoring point reference	Event/action reference	Event	Management action
V1 – V6	EA1	20% reduction in the average foliage density from previous monitoring at the same site	Undertake an investigation to determine if the impacts are attributable to dewatering at the premises. Include details of the investigation in the Annual Environmental Report and if attributable to dewatering include an outline of corrective action taken or planned to mitigate adverse environmental impacts and management measures to prevent a recurrence of the event.
	EA2	A 2 point reduction in the health condition from the previous monitoring at the same site.	

Information

Records

31. All information and records required by the Licence must:

(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 4.1.1(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.

32. The Licence Holder must submit to the CEO within 90 days after the Anniversary Date, an Annual Audit Compliance Report indicating the extent to which the Licence Holder has complied with the Conditions in this Licence for the Annual Period.

33. The Licence Holder must 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.

Reporting

34. The Licence Holder must submit to the CEO an Annual Environmental Report by 30 November each year. The report must contain the information listed in Table 20 in the format or form specified in that table.

Table 20: 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
6	Water balance	None specified
Table 7	Monitoring of point source emissions to surface water results – Total Suspended Solids (Limit)	WR1
Table 10	Total Recoverable Hydrocarbon	LR1
	Loading of Total Nitrogen and Total Phosphorus	LR2
Table 11	Monitoring of point source emissions to surface water results – pH, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese, Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium	WR2
Table 12	Monitoring of emissions to land	LR1
Table 13	Volume (cumulative) recycled for on-site irrigation	LR3
Table 13	Inert Waste Type 1, Inert Waste Type 2, Putrescible Waste and Clean Fill	None specified
Table 14	Process Monitoring: volume of tailings deposited and volume of water recovered.	None specified

Table 15	Downstream sites: pH, Total Suspended Solids, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium	WR3
	Background sites: pH, Total Suspended Solids, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese, Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium, Chlorophyll-a and Phaeophytin	WR4
Table 16	Sediment - Chlorophyll-a and Phaeophytin	WR5
Table 17	Groundwater: Standing water level, pH, Total Dissolved Solids, Total Nitrogen, Arsenic, Copper, Molybdenum, Selenium, Uranium, Hexavalent Chromium	GR1
Table 18	Average foliage, health score and general environmental description	None specified
	Identical photographs of foliage density and shadow areas beneath trees	Photographs
Table 19	Management actions EA1 and EA2	None specified
32	Compliance	Annual Audit Compliance Report
33	Complaints summary	None specified

Note 1: Forms are in Schedule 3

35. The Licence Holder must ensure that the Annual Environmental Report also contains an assessment of the information contained within the report against previous monitoring results and Licence limits.

36. The Licence Holder must submit the information in Table 21 to the CEO according to the specifications in that table.

Table 21: Non-annual reporting requirements

Condition or table (if relevant)	Parameter	Reporting period	Reporting date (after end of the reporting period)	Format or form
-	Copies of original monitoring reports submitted to the Licence Holder by third parties	Not Applicable	Within 14 days ofthe CEOs request	As received by the Licence Holder from third parties

Notification

37. The Licence Holder must ensure that the parameters listed in Table 22 are notified to the CEO in accordance with the notification requirements of the table.

Table 22: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement[1]	Format or form[2]
-	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	N1
		Part B: As soon as practicable	
-	Recommencing start-up of operations (after a period of care and maintenance)	At least 21 days prior to recommencing production	None specified
9	Standing Water Level exceeding 6 mbgl	Within 7 calendar days of becoming aware of Standing Water Levels exceeding 6 mbgl	None specified
24	Calibration report	As soon as practicable	None specified

Note 1: Notification requirements in the Licence must not negate the requirement to comply with s72 of the Act
Note 2: Forms are in Schedule 3

Definitions

Term	Definition
ACN	Australian Company Number
Annual Audit Compliance Report (AACR)	means a report submitted in a format approved by the CEO (relevant guidelines and templates may be available on the Department's website).
Anniversary date	means 30 September of each year
annual period	a 12 month period commencing from 1 October until 30 September of the immediately following year.
ANZECC (2000)	the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) produced by Australian and New Zealand Environment and Conservation Council and the Agricultural and Resources Management Council of Australia and New Zealand;
AS/NZS 2031'	Australian Standard AS/NZS 2031 *Selection of containers and preservation of water samples for microbiological analysis*
AS/NZS 5667.1	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	Australian Standard AS/NZS 5667.4 *Water Quality – Sampling – Guidance on sampling from lakes, natural and man-made*
AS/NZS 5667.6	Australian Standard AS/NZS 5667.6 *Water Quality – Sampling – Guidance on sampling of rivers and streams*
AS/NZS 5667.9	Australian Standard AS/NZS 5667.9 *Water Quality - Sampling Guidance on sampling from marine waters*
AS/NZS 5667.10	Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on sampling of waste waters*
AS/NZS 5667.11'	Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters*
AS/NZS 5667.12'	Australian Standard AS/NZS 5667.12 *Water Quality – Sampling – Guidance on sampling of bottom sediments*
averaging period'	time over which a limit is measured or a monitoring result is obtained
bioremediation	the above-ground remediation of soils to reduce the concentrations of hydrocarbons through biodegradation. The process involves the stimulation of bacteria in the soil, which consume hydrocarbons as an energy source, releasing water and carbon dioxide as the ultimate breakdown products. This may include bioaugmentation of microbes to target specific contaminants
books	has the same meaning given to that term under the EP Act.

Term	Definition
CEO	means Chief Executive Officer of the Department. "submit to / notify the CEO" (or similar), means either: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au
clean fill	has the meaning defined in Landfill Definitions
cfu/100mL	means colony-forming unit per one hundred millilitres
controlled waste'	has the definition in *Environmental Protection (Controlled Waste) Regulations 2004*
Department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
environmentally hazardous material'	material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, byproducts and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm. Note: Environmentally hazardous materials include dangerous goods where they are stored in quantities below placard quantities. The storage of dangerous goods above placard quantities is regulated by the DEMIRS.
Freeboard	means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
licence	refers to this document, which evidences the grant of a licence by the CEO under section 57 of the EP Act, subject to the specified conditions contained within.
licence holder	refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted.
monthly period	means a one-month period commencing from day 10 of a month until day 9 of the immediately following month.

Term	Definition
NATA	National Association of Testing Authorities, Australia
NATA accredited/accreditation	relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis
premises	refers to the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figure 1) in Schedule 1 to this licence.
prescribed premises	has the same meaning given to that term under the EP Act.
waste	has the same meaning given to that term under the EP Act.

Schedule 1: Maps

Figure 1 - Premises map

The Premises and key infrastructure is shown in the map below. The blue line depicts the Premises boundary.

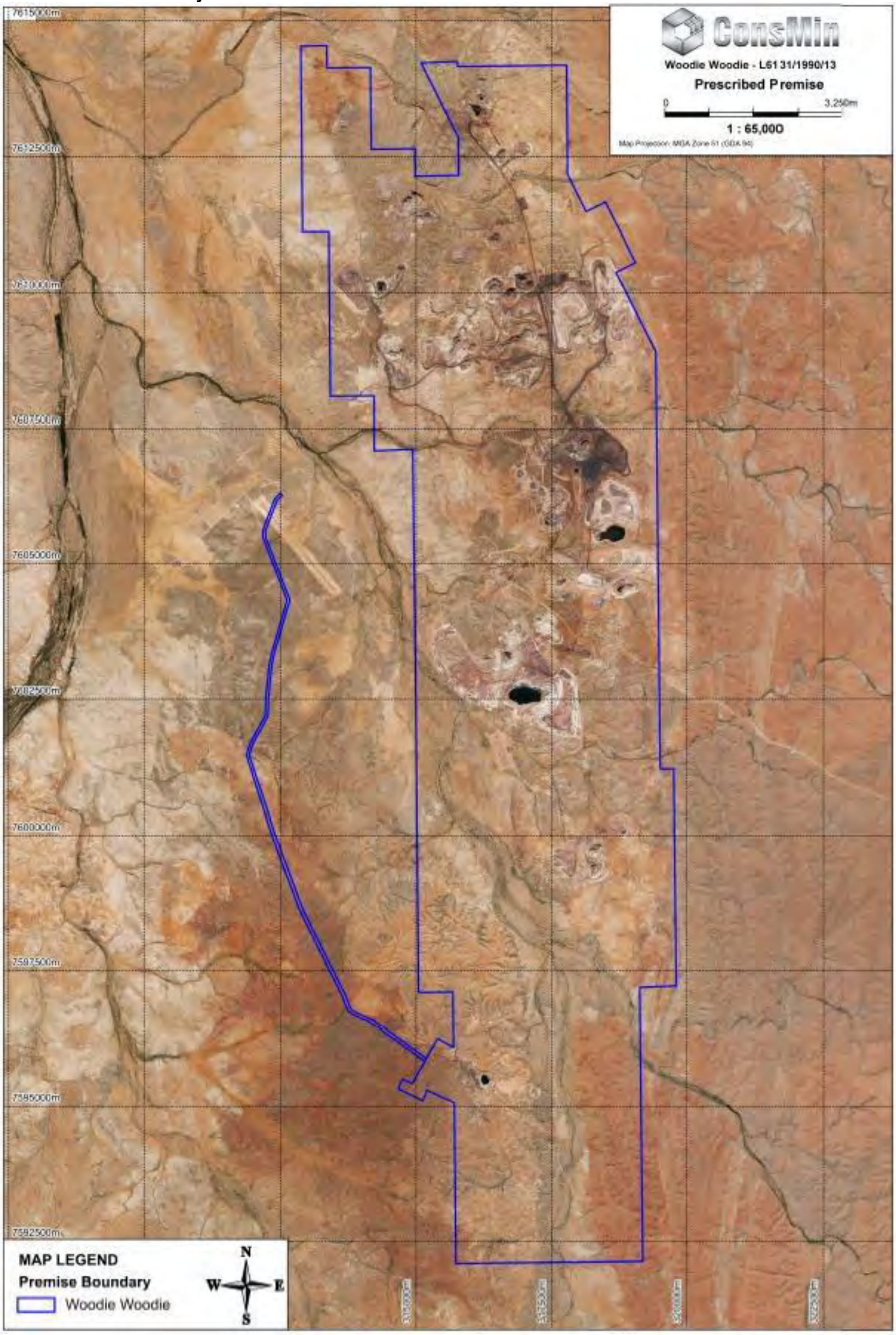


Figure 2 – Containment Infrastructure and Monitoring of Ambient Groundwater Quality

The locations of containment infrastructure as per Table 1 and monitoring of ambient groundwater quality as per Table 17.

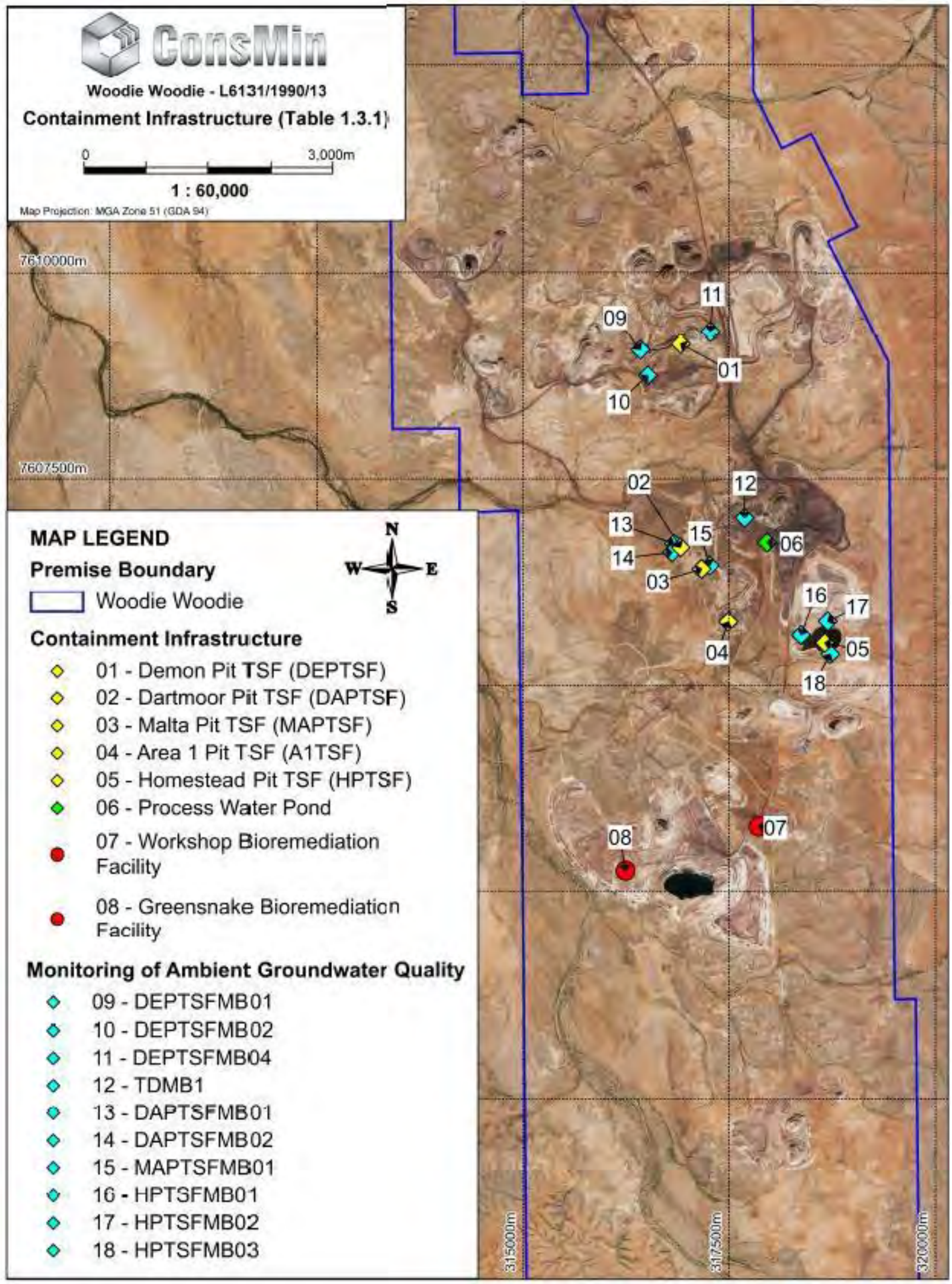


Figure 3 – Emission Points to Surface Water

The locations of emission points to surface water as per Table 7.

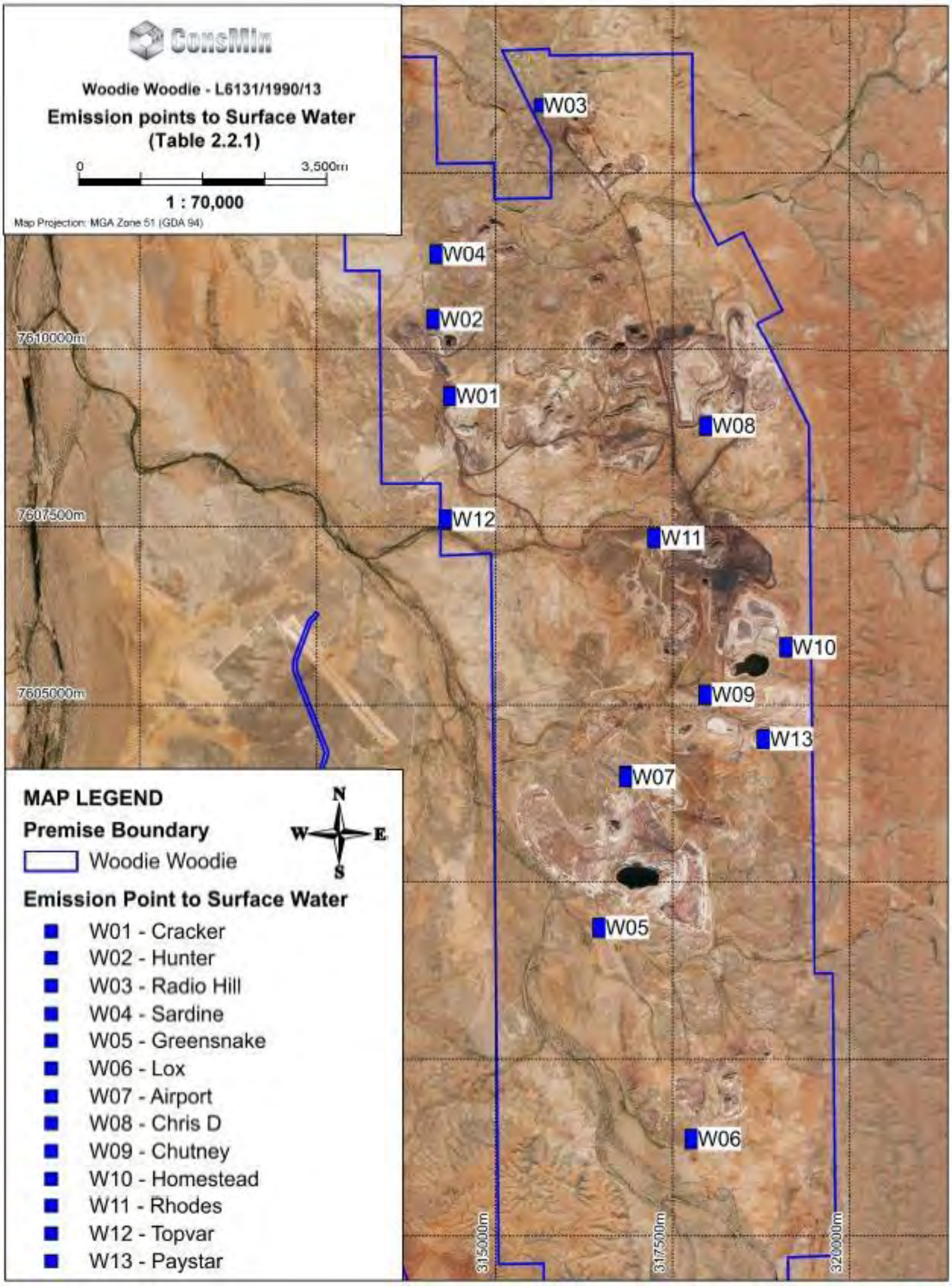


Figure 4 – Off-site Monitoring Locations

Off-site monitoring locations as per Table 15, 16 and 18.

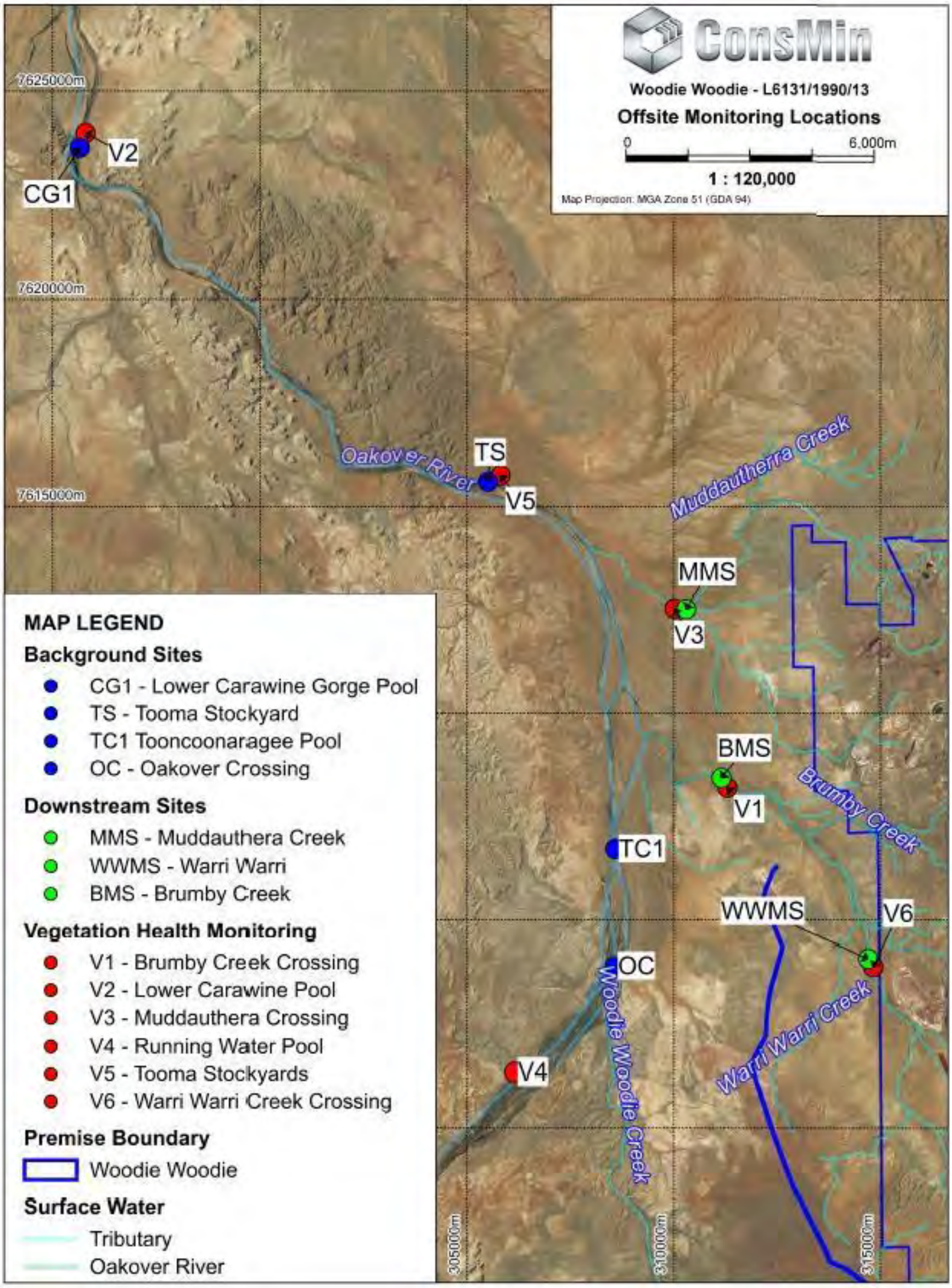


Figure 5 – Management of Waste

Waste management infrastructure as per Table 4 are shown below.

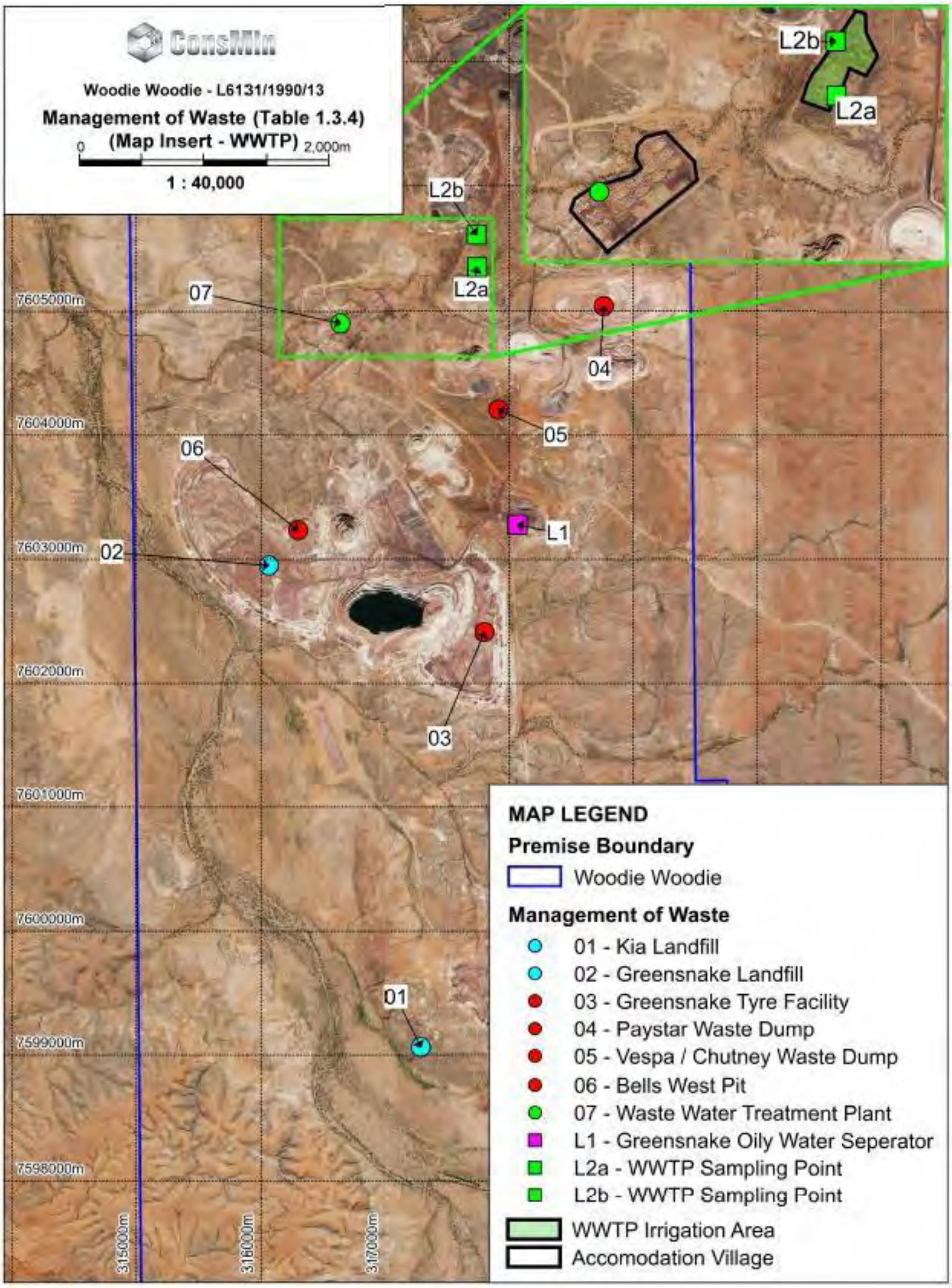
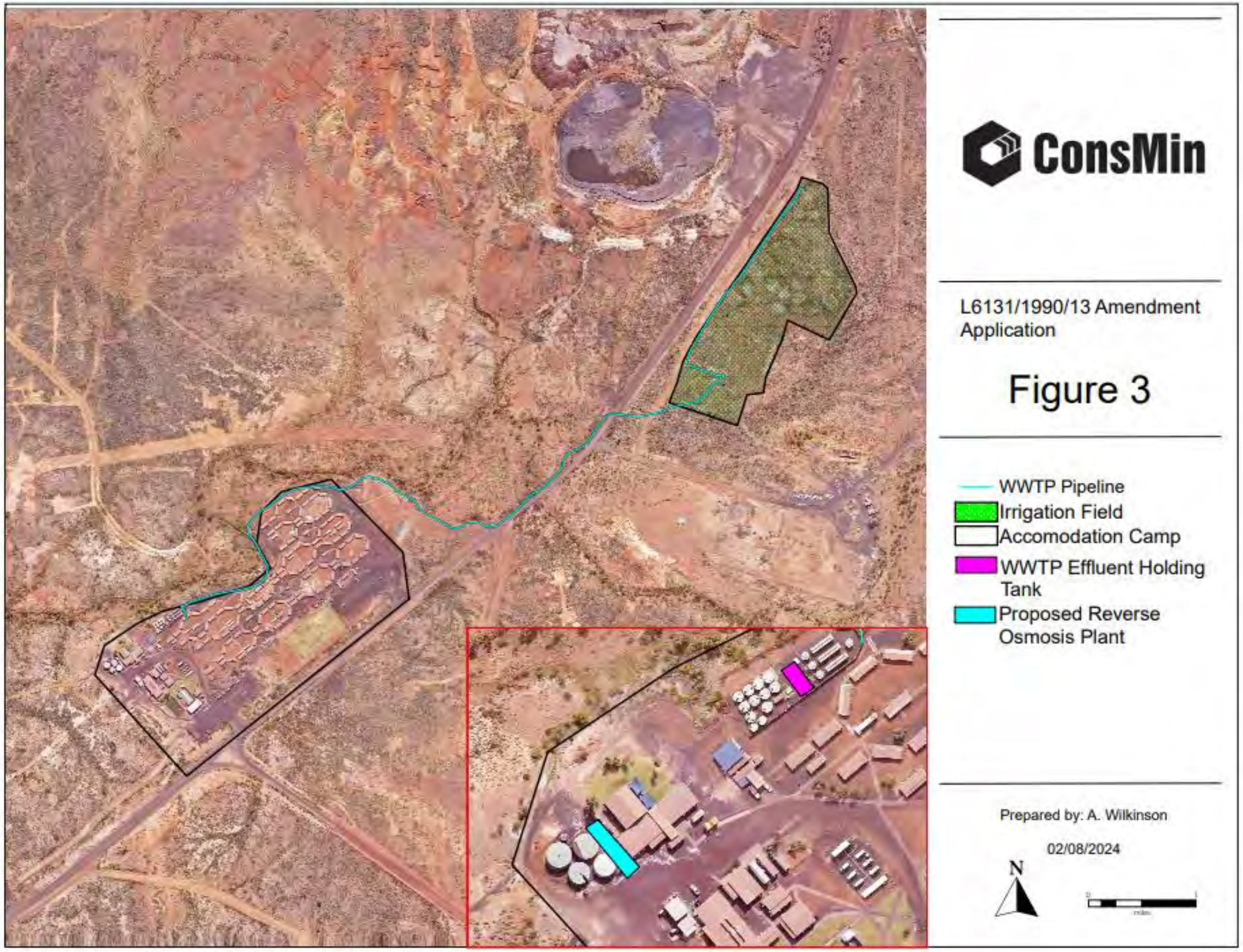


Figure 6 – Wastewater Treatment Plant Sampling Points

The locations of the monitoring points L2a and L2b defined in Table 9 are shown in the map below.

Figure 7 – Reverse Osmosis Plant to Irrigation Field



Schedule 3: Notification & Forms

Licence: L6131/1990/13
Form: WR1
Name: Monitoring of point source emissions to surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form WR1: Monitoring of point source emissions to surface water							
Emission point	**Parameter**	**Limit**	**Unit**	**Result**	**Averaging period**	**Method**	**Sample date & times**
W1 – W12	Total Suspended Solids	80mg/L	m^3/day		Spot Sample		

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………… Date: ……………………

Licence: L6131/1990/13
Form: WR2
Name: Monitoring of point source emissions to surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period:

Form WR2: Monitoring of point source emissions to surface water						
Emission point	**Parameter**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
W1 – W13	Volume (cumulative) dewatering water	m^3/day		Continuous		
	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl Nitrogen	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc	mg/L				
	Lead	mg/L				
	Cadmium	mg/L				
	Manganese	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				

	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				
	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………..

Licence: L6131/1990/13
Form: WR3
Name: Monitoring of ambient downstream surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form WR3: Monitoring of surface water						
Emission point	**Parameter**	**Units**	**Result**	**Averaging period**	**Method**	**Sample date & times**
Downstream sites MMS, WWMS and BMS	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Total Suspended Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc	mg/L				
	Lead	mg/L				
	Cadmium	mg/L				
	Manganese	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				

	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				
	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………

Licence: L6131/1990/13
Form: WR4
Name: Monitoring of ambient surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period:

Form WR4: Monitoring of surface water						
Emission point	**Parameter**	**Units**	**Result**	**Averaging period**	**Method**	**Sample date & times**
Background sites CG1 TS TC1 OC	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Total Suspended Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc[1]	mg/L				
	Lead[1]	mg/L				
	Cadmium[1]	mg/L				
	Manganese[1]	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				
	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				

	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				
	Chlorophyll-a	mg/L				
	Phaeophytin	mg/L				

Note1: With adjustment for hardness as per ANZECC (2000) guidelines.

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………

Licence:	L6131/1990/13	Licence Holder:	Pilbara Manganese Pty Ltd
Form:	WR5	Period:	
Name:	Monitoring of ambient sediment quality		

Form WR5: Monitoring of sediment quality

Emission point	Parameter	Units	Result	Averaging period	Method	Sample date & times
Background sites CG1 TS TC1 OC	Chlorophyll-a	mg/m^2		Spot sample		
	Phaeophytin	mg/m^2				

Signed on behalf of Pilbara Manganese Pty Ltd: .... **Date: ....**

Licence: L6131/1990/13
Form: GR1
Name: Monitoring of ambient groundwater

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form GR1: Monitoring of groundwater

Emission point	Parameter	Units	Results	Averaging period	Method	Sample date & times
Demon Pit TSF DEPTSFMB01 DEPTSFMB02 DEPTSFMB04 **TSF2** TDMB1 **Dartmoor** DAPTSFMB01 DAPTSFMB02 **Malta** MAPTSFMB01 **Homestead TSF** HPTSFMB01 HPTSFMB02 HPTSFMB03	Standing water level	mbgl		Spot Sample		
	pH	pH units				
	Total Dissolved Solids	mg/L				
	Total Nitrogen	mg/L				
	Arsenic	mg/L				
	Copper	mg/L				
	Molybdenum	mg/L				
	Selenium	mg/L				
	Uranium	mg/L				
	Hexavalent Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: .... Date: ....

Licence: L6131/1990/13
Form: LR1
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land							
Emission point	**Parameter**	**Limit**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L1	Total Recoverable Hydrocarbon	15 mg/L	mg/L		Spot sample		

Signed on behalf of Pilbara Manganese Pty Ltd:………………………………………….. Date: …………………….

Licence: L6131/1990/13
Form: LR2
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land							
Emission point	**Parameter**	**Limit**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L2	Load of Total Nitrogen (TN)	480 kg/ha/year	kg/ha/year		Annually		
	Load of Total Phosphorus (TP)	120 kg/ha/year	kg/ha/year				
	Total Dissolved Solids (TDS)	2,000 mg/L	mg/L		Spot sample		

Signed on behalf of Pilbara Manganese Pty Ltd:………………………………………….. Date: …………………….

Licence: L6131/1990/13
Form: LR3
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land						
Emission point	**Parameter**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L2	Volume (cumulative) recycled for on-site irrigation	m^3		Monthly		
	pH	pH units		Spot sample		
	Biochemical Oxygen Demand	mg/L				
	Total Suspended Solids	mg/L				
	Total Nitrogen	mg/L				
	Total Phosphorus	mg/L				
	E.coli	cfu/100mL				
	Total Dissolved Solids (TDS)	Mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd:…………………………………………. Date: …………………….

Licence:	L6131/1990/13	Licence Holder:	Pilbara Manganese Pty Ltd
Form:	N1	Date of breach:	

Notification of detection of the breach of a limit.

These pages outline the information that the operator must provide.
Units of measurement used in information supplied under Part A and B requirements must be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

Part A

Licence Number	
Name of operator	
Location of Premises	
Time and date of the detection	

Notification requirements for the breach of a limit	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Part B

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident.	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission.	
The dates of any previous N1 notifications for the Premises in the preceding 24 months.	

Name	
Post	
Signature on behalf of Pilbara Manganese Pty Ltd	
Date	

Appendix C Monitoring Results

Annual Environmental Report
1st October 2024 - 30th September 2025
Department of Water and Environmental Regulation

Licence: L6131/1990/13
Form: WR1
Name: . Monitoring of point source emissions to surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period: Quarterly from 1st of October 2024 to 30th of September 2025

		Total Suspended Solids	*Volume discha
		mg/L	m^3
EQL		5	
Licence: L6131/1990/13		80	80
Location Code	**Date**		
W1	**01 Oct 2024**	7.5	**1447222**
W1	**01 Nov 2024**	78	**1383256**
W1	**01 Dec 2024**	<5.0	**1033606**
W1	**01 Jan 2025**	<5.0	**1436324**
W1	**01 Feb 2025**	<5.0	**655016**
W1	**01 Mar 2025**	6.5	**507692**
W1	**01 Apr 2025**	<5.0	**0**
W1	**01 May 2025**	<5.0	**0**
W1	**01 Jun 2025**	<5.0	**0**
W1	**01 Jul 2025**	<5.0	**0**
W1	**01 Aug 2025**	<5.0	**0**
W1	**01 Sep 2025**	<5.0	**0**
W12	**22 Oct 2023**	<5.0	**457604**
W12	**26 Nov 2023**	<5.0	**212513**
W12	**17 Dec 2023**	<5.0	**329036**
W12	**11 Jan 2024**	<5.0	**277949**
W12	**25 Feb 2024**	<5.0	**227875**
W12	**27 Mar 2024**	<5.0	**278836**
W12	**17 Apr 2024**	<5.0	**151784**
W12	**05 May 2024**	<5.0	**367369**
W12	**23 Jun 2024**	<5.0	**197252**
W12	**10 Jul 2024**	<5.0	**98839**
W12	**18 Aug 2024**	<5.0	**328303**
W12	**08 Sep 2024**	<5.0	**237692**

Note:

ND	Indicates no discharge
Grey text	Indicates result below EQL
Bold text	Indicates result above EQL
Blue Cell	Indicates result exceeds licence limit

* Volume of discharge water is calculated at end of month, not sample date

Licence: L6131/1990/13
Form: WR2

Name: Monitoring of point source emissions to surface water

Licence Holder: Pilbara Managanese Pty Ltd
Period: Monthly from 1st of October 2024 to 30th of September 2025

Location Code	Date	pH (Field)	Total Dissolved Solids (Field)	Total Dissolved Solids (Lab)	Total Suspended Solids (Lab)	Nitrate (as N)	Nitrate (as NO3-)	Nitrite (as N)	Nitrite (as NO2-)	Kjeldahl Nitrogen Total	Nitrogen (Total)	Nitrogen (Total Oxidised)	Organic Nitrogen as N	Reactive Phosphorus as P (Orthoph
		-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				5	5	0.005	0.02	0.005	0.02	0.1	0.1	0.005	0.1	0.005
Licence: L6131/1990/13					80									
W1	29 Jan 2025	-	-	740	<5.0	-	-	-	-	-	-	-	-	-
W1	05 Feb 2025	-	-	630	<5.0	1.6	7.1	<0.0050	<0.020	0.24	1.8	1.6	0.23	0.0051
W1	09 Mar 2025	7.56	640	790	6.5	1.8	7.9	<0.0050	<0.020	0.27	2.1	1.8	0.26	<0.0050
W12	13 Oct 2024	-	-	570	<5.0	1.8	7.8	<0.0050	<0.020	<0.10	1.8	1.8	<0.10	0.014
W12	14 Nov 2024	-	-	600	<5.0	1.4	6.3	<0.0050	<0.020	0.38	1.8	1.4	0.38	0.01
W12	11 Dec 2024	-	-	580	<5.0	1.4	6.4	<0.0050	<0.020	0.19	1.6	1.4	0.18	0.0078
W12	12 Jan 2025	7.06	578	600	<5.0	1.1	4.9	<0.0050	<0.020	<0.10	1.5	1.5	<0.10	0.018
W12	09 Feb 2025	-	-	560	<5.0	1.6	6.9	<0.0050	<0.020	<0.10	1.6	1.6	<0.10	0.011
W12	09 Mar 2025	6.58	554	670	<5.0	1.6	6.9	<0.0050	<0.020	0.32	1.9	1.6	0.31	0.012
W12	02 Apr 2025	-	-	540	<5.0	1.7	7.4	<0.0050	<0.020	0.36	2	1.7	0.36	0.008
W12	21 May 2025	6.97	-	570	<5.0	1.6	6.9	0.0056	<0.020	0.71	2.6	1.9	0.64	0.0079
W12	18 Jun 2025	-	-	620	<5.0	2	8.8	<0.0050	<0.020	0.35	2.3	2	0.35	0.0076
W12	05 Jul 2025	-	-	590	<5.0	1.9	8.6	<0.0050	<0.020	<0.10	1.9	1.9	<0.10	0.011
W12	10 Aug 2025	-	-	620	<5.0	1.9	8.3	<0.0050	<0.020	0.25	2.1	1.9	0.24	0.028
W12	11 Sep 2025	-	-	620	<5.0	1.8	8	0.0058	<0.020	0.23	2	1.8	0.23	0.01

Location Code	Date	Total Phosphorus (Organic	Sodium (filtered)	Magnesium (filtered)	Zinc (filtered)	Lead (filtered)	Cadmium (filtered)	Manganese (filtered)	Chloride	Sulphate	Potassium (filtered)	Cobalt (filtered)	Iron (filtered)	Nickel (filtered)	Selenium (filtered)	Mercury (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Chromium (hexavalent)	Calcium (filtered)
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL		0.05	0.5	0.5	0.001	0.001	0.0001	0.001	1	1	0.5	0.001	0.01	0.001	0.001	0.00005	0.5	0.001	0.001	0.5
Licence: L6131/1990/13																				
W1	29 Jan 2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W1	05 Feb 2025	<0.050	140	150	75	41	0.013	<1.0	<0.00010	0.0036	4.1	<0.0010	<0.01	<0.0010	2.1	<0.000050	47	<0.0010	<0.0010	-
W1	09 Mar 2025	<0.050	140	150	77	42	0.012	<1.0	<0.00010	0.0019	4.2	<0.0010	<0.010	<0.0010	2.1	<0.000050	47	<0.0010	<0.0010	-
W12	13 Oct 2024	<0.050	110	130	56	41	0.013	<1.0	<0.00010	<0.0010	3.3	<0.0010	<0.01	<0.0010	1.8	<0.000050	44	<0.0010	<0.0010	-
W12	14 Nov 2024	<0.050	120	110	47	42	0.002	<1.0	<0.00010	<0.0010	3.5	<0.0010	<0.01	<0.0010	1.5	<0.000050	49	<0.0010	<0.0010	-
W12	11 Dec 2024	0.33	120	100	46	42	0.0019	<1.0	<0.00010	<0.0010	3.9	<0.0010	<0.01	<0.0010	1.7	<0.000050	46	<0.0010	<0.0010	-
W12	12 Jan 2025	<0.050	110	98	45	40	0.0036	<1.0	<0.00010	0.0015	3.4	<0.0010	<0.01	<0.0010	1.5	<0.000050	47	<0.0010	<0.0010	-
W12	09 Feb 2025	<0.050	110	100	46	42	0.0023	<1.0	<0.00010	<0.0010	3.3	<0.0010	<0.01	<0.0010	1.7	<0.000050	47	<0.0010	<0.0010	-
W12	09 Mar 2025	<0.050	110	100	47	39	0.0019	<1.0	<0.00010	<0.0010	3.4	<0.0010	<0.010	<0.0010	1.6	<0.000050	46	<0.0010	<0.0010	-
W12	02 Apr 2025	<0.050	120	110	58	43	0.014	<1.0	<0.00010	<0.0010	3.8	<0.0010	<0.010	<0.0010	1.7	<0.000050	48	<0.0010	0.0012	-
W12	21 May 2025	<0.050	120	120	55	41	0.0023	<1.0	<0.00010	0.0018	3.7	<0.0010	<0.010	<0.0010	1.7	<0.000050	49	<0.0010	<0.0010	-
W12	18 Jun 2025	<0.050	120	150	75	40	0.0012	<1.0	<0.00010	<0.0010	3.6	<0.0010	<0.010	<0.0010	1.9	<0.000050	46	<0.0010	<0.0010	-
W12	05 Jul 2025	<0.050	130	170	85	40	0.0023	<1.0	<0.00010	<0.0010	3.6	<0.0010	<0.010	<0.0010	2.1	<0.000050	45	<0.0010	<0.0010	-
W12	10 Aug 2025	<0.050	120	120	55	43	0.014	<1.0	<0.00010	<0.0010	4	<0.0010	<0.010	<0.0010	1.8	<0.000050	50	<0.0010	-	<0.0010
W12	11 Sep 2025	<0.050	120	110	52	42	0.013	<1.0	<0.00010	<0.0010	3.3	<0.0010	<0.010	<0.0010	1.7	<0.000050	49	<0.0010	-	<0.0010

Note:

ND	Indicates no discharge
Grey text	Indicates result below EQL
Bold text	Indicates result above EQL
Blue Cell	Indicates result exceeds licence limit

Licence: L6131/1990/13

Licence Holder: Pilbara Managanese Pty Ltd

Form: WR3

Period: Monthly from 1st of October 2024 to 30th of September 2025

Name: Monitoring of ambient downstream surface water

Location	Date	pH (Field)	Total Dissolved Solids (Field)	Total Dissolved Solids (Lab)	Total Suspended Solids (Lab)	Nitrate (as N)	Nitrate (as NO3-)	Nitrite (as N)	Nitrite (as NO2-)	Kjeldahl Nitrogen Total	Organic Nitrogen as N	Nitrogen (Total Oxidised)	Nitrogen (Total)	Total Phosphorus (Organic Phosphate)	Reactive Phosphorus as P (Orthophosphate as P)	Sodium (filtered)	Magnesium (filtered)
		-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				5	5	0.005	0.02	0.005	0.02	0.1	0.1	0.005	0.1	0.05	0.005	0.5	0.5
BMS	09 Oct 2024	-	-	590	<5.0	0.8	3.6	0.0084	0.028	0.3	0.29	0.81	1.1	<0.050	0.016	110	41
BMS	13 Nov 2024	-	-	630	<5.0	0.42	1.8	0.0083	0.027	0.3	0.25	0.43	0.72	<0.050	0.0099	130	43
BMS	01 Dec 2024	8.23	439	630	<5.0	0.37	1.6	0.011	0.035	0.13	0.11	0.38	0.51	<0.050	<0.0050	120	42
BMS	08 Jan 2025	8.2	684	770	<5.0	0.33	1.4	0.015	0.048	0.25	0.23	0.34	0.59	<0.050	<0.0050	150	42
BMS	09 Feb 2025	-	-	710	12	0.37	1.7	0.017	0.055	0.18	0.14	0.39	0.57	<0.050	0.0078	160	41
BMS	26 Mar 2025	-	-	810	6.5	0.64	2.8	0.0093	0.030	0.22	0.20	0.65	0.87	<0.050	0.013	210	52
BMS	10 Apr 2025	-	-	740	24	0.31	1.4	0.0098	0.032	0.65	0.64	0.32	0.97	<0.050	0.0076	190	50
BMS	18 May 2025	-	-	630	46	0.98	4.4	0.0072	0.024	0.36	0.35	0.99	1.4	<0.050	<0.0050	140	43
BMS	07 Jun 2025	-	-	690	5.5	0.89	3.9	0.0075	0.025	0.27	0.26	0.89	1.2	<0.050	<0.0050	150	45
BMS	05 Jul 2025	-	-	590	<5.0	0.99	4.4	<0.0050	<0.020	0.11	0.11	0.99	1.1	<0.050	0.0074	140	42
BMS	27 Aug 2025	-	-	660	17	0.95	4.2	0.010	0.034	0.21	0.20	0.96	1.2	<0.050	0.0070	140	43
BMS	11 Sep 2025	-	-	620	<5.0	1.0	4.5	0.0093	0.031	0.26	0.25	1.0	1.3	<0.050	0.0090	140	43
MMS	09 Oct 2024	-	-	740	11	0.60	2.7	0.0060	<0.020	0.29	0.26	0.61	0.90	<0.050	0.015	160	49
MMS	13 Nov 2024	-	-	820	23	0.68	3.0	0.0089	0.029	0.13	<0.10	0.69	0.83	<0.050	0.0079	170	51
MMS	01 Dec 2024	8.47	541.0	750	9.5	0.55	2.4	0.011	0.036	0.10	<0.10	0.56	0.66	<0.050	<0.0050	160	47
MMS	08 Jan 2025	8.25	734.0	780	<5.0	0.010	0.045	<0.0050	<0.020	0.31	0.30	0.011	0.32	<0.050	<0.0050	170	48
MMS	09 Feb 2025	-	-	800	85	<0.0050	<0.020	<0.0050	<0.020	0.21	0.20	<0.0050	0.21	<0.050	0.0067	170	50
MMS	26 Mar 2025	-	-	2,000	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.45	0.44	<0.0050	0.45	<0.050	0.0078	660	73
MMS	10 Apr 2025	-	-	3,700	12	<0.0050	<0.020	<0.0050	<0.020	0.76	0.76	<0.0050	0.76	<0.050	0.0071	1,300	110
MMS	18 May 2025	-	-	5,900	16	<0.0050	<0.020	<0.0050	<0.020	0.64	0.64	<0.0050	0.64	0.056	0.0097	2,200	140
MMS	07 Jun 2025	-	-	6,200	35	<0.0050	<0.020	<0.0050	<0.020	0.75	0.74	0.0052	0.76	0.058	0.0064	2,600	170
MMS	05 Jul 2025	-	-	9,000	14	<0.0050	<0.020	<0.0050	<0.020	0.62	0.62	<0.0050	0.62	0.07	0.018	2,900	180
MMS	27 Aug 2025	-	-	11,000	24	<0.0050	<0.020	<0.0050	<0.020	0.74	0.74	<0.0050	0.74	0.081	0.013	3,600	210
MMS	11 Sep 2025	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Location	Date	Zinc (filtered)	Lead (filtered)	Cadmium (filtered)	Manganese (filtered)	Chloride	Sulphate	Potassium (filtered)	Cobalt (filtered)	Iron (filtered)	Nickel (filtered)	Selenium (filtered)	Mercury (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Calcium (filtered)	Hardness as CaCO3	Ammonia as N	Temperature (Field)
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	°C
EQL		0.001	0.001	0.0001	0.001	1	1	0.5	0.001	0.01	0.001	0.001	0.00005	0.001	0.001	0.5		0.005	
BMS	09 Oct 2024	0.0086	<0.0010	<0.00010	0.0063	120	48	3.5	<0.0010	<0.01	<0.0010	0.0014	<0.000050	<0.0010	<0.0010	37	260	0.0079	-
BMS	13 Nov 2024	0.0027	<0.0010	<0.00010	0.0066	120	53	3.7	<0.0010	<0.01	<0.0010	0.0013	<0.000050	<0.0010	<0.0010	37	270	0.053	-
BMS	01 Dec 2024	0.0094	<0.0010	<0.00010	0.0073	120	56	4	<0.0010	<0.01	<0.0010	0.0013	<0.000050	<0.0010	<0.0010	36	260	0.019	29.4
BMS	08 Jan 2025	0.0092	<0.0010	<0.00010	<0.0010	140	61	5.1	<0.0010	<0.01	<0.0010	0.0011	<0.000050	<0.0010	<0.0010	43	280	0.024	32.7
BMS	09 Feb 2025	0.010	<0.0010	<0.00010	0.050	160	75	4.8	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	41	270	0.038	-
BMS	26 Mar 2025	0.0083	<0.0010	<0.00010	0.0030	210	100	5.3	<0.0010	<0.010	<0.0010	0.0013	<0.000050	<0.0010	<0.0010	50	340	0.018	-
BMS	10 Apr 2025	<0.0010	<0.0010	<0.00010	0.083	180	86	5.5	<0.0010	0.13	<0.0010	0.0012	<0.000050	<0.0010	<0.0010	42	310	0.011	-
BMS	18 May 2025	0.0065	<0.0010	<0.00010	0.010	140	61	3.8	<0.0010	0.010	<0.0010	0.0015	<0.000050	<0.0010	<0.0010	45	290	0.0079	-
BMS	07 Jun 2025	0.0079	<0.0010	<0.00010	0.0073	160	74	4.2	<0.0010	<0.010	<0.0010	0.0014	<0.000050	<0.0010	<0.0010	46	300	0.014	-
BMS	05 Jul 2025	0.0021	<0.0010	<0.00010	0.0044	160	75	3.7	<0.0010	<0.010	<0.0010	0.0014	<0.000050	<0.0010	<0.0010	42	280	<0.0050	-
BMS	27 Aug 2025	0.0012	<0.0010	<0.00010	0.0069	140	62	4.0	<0.0010	<0.010	<0.0010	0.0016	<0.000050	<0.0010	-	46	290	<0.0050	-
BMS	11 Sep 2025	<0.0010	<0.0010	<0.00010	<0.0010	130	59	3.9	<0.0010	<0.010	<0.0010	0.0024	<0.000050	<0.0010	-	43	290	0.011	-
MMS	09 Oct 2024	0.0069	<0.0010	<0.00010	0.0045	180	84	4.8	<0.0010	<0.01	<0.0010	0.0016	<0.000050	<0.0010	0.0011	44	310	0.035	-
MMS	13 Nov 2024	0.0026	<0.0010	<0.00010	0.014	180	88	4.7	<0.0010	<0.01	<0.0010	0.0018	<0.000050	<0.0010	<0.0010	45	320	0.065	-
MMS	01 Dec 2024	0.0015	<0.0010	<0.00010	0.0020	180	89	4.9	<0.0010	<0.01	<0.0010	0.0015	<0.000050	<0.0010	<0.0010	41	300	0.0051	25.7
MMS	08 Jan 2025	0.0089	<0.0010	<0.00010	0.0023	170	83	4.5	<0.0010	<0.01	<0.0010	0.0014	<0.000050	<0.0010	<0.0010	40	300	0.0089	31.0
MMS	09 Feb 2025	0.010	<0.0010	<0.00010	0.0047	180	100	3.8	<0.0010	<0.010	<0.0010	0.0011	0.000050	<0.0010	<0.0010	40	300	<0.0050	-
MMS	26 Mar 2025	0.0041	<0.0010	<0.00010	0.014	410	230	9.4	<0.0010	<0.010	<0.0010	0.0010	<0.000050	<0.0010	<0.0010	66	460	<0.0050	-
MMS	10 Apr 2025	<0.0010	<0.0010	<0.00010	0.096	1,400	680	15	<0.0010	0.13	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	90	670	<0.0050	-
MMS	18 May 2025	0.0070	<0.0010	<0.00010	0.0070	2,700	1,300	21	<0.0010	0.016	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	110	860	<0.0050	-
MMS	07 Jun 2025	0.0066	<0.0010	<0.00010	0.0083	3,400	1,700	22	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	120	980	0.0071	-
MMS	05 Jul 2025	0.0059	<0.0010	<0.00010	0.028	4,500	2,100	23	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	120	1,000	<0.0050	-
MMS	27 Aug 2025	0.0052	<0.0010	<0.00010	0.012	4,600	2,200	28	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	110	1,100	<0.0050	-
MMS	11 Sep 2025	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Note:
Grey text Indicates result below EQL
Bold text Indicates result above EQL
Dry Indicates no water present during monitoring event

ConsMin

Licence: L6131/1990/13
Form: WR4
Name: Monitoring of ambient surface water

Licence Holder: Pilbara Managanese Pty Ltd
Period: Quarterly from 1st of October 2024 to 30th of September 2025

		pH (Field)	Total Dissolved Solids (Field)	Total Dissolved Solids (Lab)	Total Suspended Solids (Lab)	Nitrate (as N)	Nitrate (as NO3-)	Nitrite (as N)	Nitrite (as NO2-)	Kjeldahl Nitrogen Total	Nitrogen (Total)	Filterable Reactive Phosphorus as PO3	Phosphorus total (P2O5)	Magnesium (filtered)	Zinc (filtered)	Lead (filtered)	Cadmium (filtered)	Manganese (filtered)	Chloride	Sulfate	Sodium (filtered)	Potassium (filtered)	Cobalt (filtered)	Iron (filtered)	Nickel (filtered)	Selenium (filtered)	Mercury (filtered)	Chromium (hexavalent)	Chromium (III+VI) (filtered)	Chlorophyll a	Phaeophytin a	Calcium	Hardness as CaCO3	Ammonia	Temperature (Field)
		-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	°C
EQL				5	5	0.005	0.02	0.005	0.02	0.1	0.1			0.5	0.001	0.001	0.0001	0.001	1	1	0.5	0.5	0.001	0.01	0.001	0.001	0.00005	0.001	0.001	0.0001	0.2	0.5		0.005	
Location	Date																																		
CG1	9-Oct-24	-	-	770	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.27	0.26	<0.0050	0.26	<0.050	0.0076	160	52	0.0017	<0.0010	<0.00010	0.12	230	96	7.4	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	36	300	<0.0050	-
CG1	13-Nov-24	-	-	850	13	<0.050	<0.20	<0.050	<0.20	0.19	0.15	0.065	0.26	<0.050	<0.0050	200	58	0.01	<0.0010	<0.00010	0.0020	250	110	8.2	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	19	290	0.045	-
CG1	1-Dec-24	7.69	304.0	330	6.0	0.026	0.12	<0.0050	<0.020	0.28	0.28	0.030	0.31	<0.050	<0.0050	49	23	0.011	<0.0010	<0.00010	0.0025	74	32	5.5	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	29	170	<0.0050	28.4
CG1	8-Jan-25	7.20	432.0	480	<5.0	0.0098	0.044	<0.0050	<0.020	0.23	0.23	0.010	0.24	<0.050	<0.0050	70	32	0.0018	<0.0010	<0.00010	0.025	86	35	6.5	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	42	240	<0.0050	30.8
CG1	9-Feb-25	-	-	260	67	<0.0050	<0.020	<0.0050	<0.020	0.35	0.35	<0.0050	0.35	<0.050	0.0059	45	16	0.014	<0.0010	<0.00010	0.055	51	22	4.6	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	22	120	<0.0050	-
CG1	26-Mar-25	-	-	590	5.5	<0.0050	<0.020	<0.0050	<0.020	0.22	0.22	<0.0050	0.22	<0.050	0.020	110	44	0.0073	<0.0010	<0.00010	0.0011	150	69	7.2	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	32	260	<0.0050	-
CG1	10-Apr-25	-	-	640	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.37	0.37	<0.0050	0.37	<0.050	0.0069	110	40	0.0010	<0.0010	<0.00010	0.083	98	39	6.7	<0.0010	0.058	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	33	250	<0.0050	-
CG1	18-May-25	-	-	530	<5.0	0.023	0.10	<0.0050	<0.020	0.25	0.23	0.025	0.28	<0.050	0.017	110	41	0.010	<0.0010	<0.00010	0.19	150	57	6.5	<0.0010	0.012	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	38	260	0.020	-
CG1	7-Jun-25	-	-	590	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.17	0.17	<0.0050	0.18	<0.050	<0.0050	120	43	0.0062	<0.0010	<0.00010	0.0045	180	73	6.8	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	40	280	<0.0050	-
CG1	5-Jul-25	-	-	600	24	<0.0050	<0.020	<0.0050	<0.020	0.18	0.18	<0.0050	0.18	<0.050	<0.0050	120	44	0.0073	<0.0010	<0.00010	0.0083	220	86	6.4	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	37	270	<0.0050	-
CG1	27-Aug-25	-	-	670	<5.0	0.0058	0.026	<0.0050	<0.020	0.19	0.19	0.0065	0.20	<0.050	0.0084	130	45	0.0014	<0.0010	<0.00010	0.12	210	72	5.9	<0.0010	0.012	<0.0010	<0.0010	<0.000050	<0.0010	-	42	290	<0.0050	-
CG1	11-Sep-25	-	-	680	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.36	0.35	<0.0050	0.36	<0.050	<0.0050	160	53	0.0040	<0.0010	<0.00010	0.0086	230	79	6.6	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	18	260	<0.0050	-
OC	9-Oct-24	-	-	800	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.13	0.13	<0.0050	0.13	<0.050	0.013	100	60	0.0088	<0.0010	<0.00010	0.11	190	87	8.7	<0.0010	0.017	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	71	420	<0.0050	-
OC	13-Nov-24	-	-	730	10	<0.0050	0.021	<0.0050	<0.020	0.30	0.24	0.0056	0.31	<0.050	0.0078	110	63	0.012	<0.0010	<0.00010	0.13	180	78	9.4	<0.0010	0.032	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	56	400	0.063	-
OC	1-Dec-24	7.84	254.0	460	<5.0	0.044	0.20	<0.0050	<0.020	0.10	0.10	0.046	0.15	<0.050	<0.0050	47	30	0.018	<0.0010	<0.00010	0.075	83	44	6.8	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	42	230	<0.0050	28.1
OC	8-Jan-25	7.30	460.0	520	<5.0	0.012	0.053	<0.0050	<0.020	<0.10	<0.10	0.013	<0.10	<0.050	0.0067	62	39	0.0018	<0.0010	<0.00010	0.052	90	43	8.3	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	56	300	0.025	33.0
OC	9-Feb-25	-	-	440	<5.0	0.0074	0.033	<0.0050	<0.020	0.13	0.13	0.0098	0.14	<0.050	<0.0050	55	35	0.011	<0.0010	<0.00010	0.064	81	39	7.3	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	49	270	<0.0050	-
OC	26-Mar-25	-	-	660	<5.0	0.0065	0.029	<0.0050	<0.020	0.16	0.16	0.0065	0.17	<0.050	0.0066	81	49	0.0020	<0.0010	<0.00010	0.016	140	66	9.2	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	66	370	<0.0050	-
OC	10-Apr-25	-	-	640	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.20	0.19	<0.0050	0.20	<0.050	<0.0050	85	49	<0.0010	<0.0010	<0.00010	0.089	130	61	9.2	<0.0010	0.031	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	64	360	<0.0050	-
OC	18-May-25	-	-	620	9.5	0.0065	0.029	<0.0050	<0.020	0.22	0.22	0.0086	0.23	<0.050	0.0071	91	54	0.0022	<0.0010	<0.00010	0.0088	160	70	9.1	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	67	390	<0.0050	-
OC	7-Jun-25	-	-	720	<5.0	0.0079	0.035	<0.0050	<0.020	<0.10	<0.10	0.0087	<0.10	<0.050	<0.0050	97	63	0.0011	<0.0010	<0.00010	0.045	190	87	8.7	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	72	440	<0.0050	-
OC	5-Jul-25	-	-	750	<5.0	0.013	0.056	<0.0050	<0.020	<0.10	<0.10	0.014	<0.10	<0.050	0.0075	95	59	0.0021	<0.0010	<0.00010	0.056	220	94	7.7	<0.0010	0.012	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	72	420	<0.0050	-
OC	27-Aug-25	-	-	790	<5.0	<0.0050	<0.020	<0.0050	<0.020	<0.10	<0.10	<0.0050	<0.10	<0.050	0.0069	100	70	0.010	<0.0010	<0.00010	0.0056	190	76	8.1	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	78	480	<0.0050	-
OC	11-Sep-25	-	-	710	<5.0	<0.0050	<0.020	<0.0050	<0.020	<0.10	<0.10	0.0052	<0.10	<0.050	0.0056	98	59	0.0014	<0.0010	<0.00010	0.034	180	77	8.1	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	66	410	<0.0050	-
TC1	9-Oct-24	-	-	660	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.33	0.32	<0.0050	0.32	<0.050	0.0099	86	52	0.0073	<0.0010	<0.00010	0.0060	160	76	8.8	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	51	340	<0.0050	-
TC1	13-Nov-24	-	-	690	<5.0	0.0076	0.034	<0.0050	<0.020	0.52	0.20	0.0083	0.53	<0.050	0.0053	120	67	0.0076	<0.0010	<0.00010	0.0024	200	87	10	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	25	340	0.33	-
TC1	1-Dec-24	8.04	283.0	430	7.0	0.015	0.066	<0.0050	<0.020	0.15	0.15	0.017	0.17	<0.050	<0.0050	45	28	0.0097	<0.0010	<0.00010	0.056	80	39	6.8	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	41	220	<0.0050	28.6
TC1	8-Jan-25	7.87	487.0	490	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.29	0.28	<0.0050	0.29	<0.050	<0.0050	61	37	0.0020	<0.0010	<0.00010	0.034	84	35	7.9	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	52	280	<0.0050	34.2
TC1	9-Feb-25	-	-	410	9.5	<0.0050	<0.020	<0.0050	<0.020	0.15	0.14	<0.0050	0.15	<0.050	<0.0050	54	34	0.0011	<0.0010	<0.00010	0.0031	76	33	7.2	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	47	260	<0.0050	-
TC1	26-Mar-25	-	-	560	<5.0	0.017	0.077	<0.0050	<0.020	0.20	0.18	0.018	0.21	<0.050	0.018	83	49	0.0059	<0.0010	<0.00010	0.16	120	56	9.9	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	59	350	0.012	-
TC1	10-Apr-25	-	-	560	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.21	0.21	<0.0050	0.21	<0.050	0.0063	78	45	<0.0010	<0.0010	<0.00010	0.063	81	36	8.4	<0.0010	0.035	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	53	320	<0.0050	-
TC1	18-May-25	-	-	550	5.0	<0.0050	<0.020	<0.0050	<0.020	0.17	0.16	<0.0050	0.17	<0.050	<0.0050	95	54	0.0091	<0.0010	<0.00010	0.020	150	63	8.7	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	52	350	<0.0050	-
TC1	7-Jun-25	-	-	600	5.0	<0.0050	<0.020	<0.0050	<0.020	0.12	0.12	0.0050	0.13	<0.050	<0.0050	89	54	0.0012	<0.0010	<0.00010	<0.0010	170	71	8.3	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	57	360	<0.0050	-
TC1	5-Jul-25	-	-	670	<5.0	0.020	0.087	<0.0050	<0.020	0.10	0.10	0.021	0.13	<0.050	0.0060	91	55	0.0016	<0.0010	<0.00010	0.0018	200	86	7.7	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	56	370	<0.0050	-
TC1	27-Aug-25	-	-	700	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.16	0.16	<0.0050	0.16	<0.050	<0.0050	100	70	0.0070	<0.0010	<0.00010	0.0072	190	79	8.4	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	53	420	<0.0050	-
TC1	11-Sep-25	-	-	680	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.17	0.17	<0.0050	0.18	<0.050	<0.0050	100	60	0.0060	<0.0010	<0.00010	0.0037	180	76	8.6	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	44	360	<0.0050	-
TS	9-Oct-24	-	-	740	<5.0	0.046	0.20	0.0060	<0.020	0.38	0.38	0.052	0.43	<0.050	0.0091	160	49	0.0075	<0.0010	<0.00010	0.047	190	87	6.2	<0.0010	<0.01	<0.0010	0.0011	<0.000050	<0.0010	<0.0010	33	280	0.0072	-
TS	13-Nov-24	-	-	780	<5.0	<0.050	<0.20	<0.050	<0.20	0.19	0.17	<0.050	0.24	<0.050	0.0074	190	50	0.011	<0.0010	<0.00010	0.029	200	94	5.9	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	28	280	0.019	-
TS	1-Dec-24	8.23	298.0	420	<5.0	0.044	0.19	<0.0050	<0.020	0.14	0.13	0.046	0.19	<0.050	<0.0050	62	30	0.0014	<0.0010	<0.00010	0.013	94	44	6.5	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	38	220	0.016	28.9
TS	8-Jan-25	7.67	551.0	610	<5.0	0.013	0.058	<0.0050	<0.020	0.20	0.20	0.014	0.22	<0.050	<0.0050	95	40	0.0094	<0.0010	<0.00010	0.0091	120	54	7.4	<0.0010	<0.01	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	45	280	0.0079	32.0
TS	9-Feb-25	-	-	370	12	<0.0050	<0.020	<0.0050	<0.020	0.25	0.25	<0.0050	0.26	<0.050	0.026	70	28	0.0096	<0.0010	<0.00010	0.021	89	43	5.9	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	36	210	<0.0050	-
TS	26-Mar-25	-	-	680	<5.0	0.024	0.10	<0.0050	<0.020	0.17	0.17	0.024	0.19	<0.050	0.0075	120	49	0.0017	<0.0010	<0.00010	0.0035	170	80	8.2	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	50	330	<0.0050	-
TS	10-Apr-25	-	-	710	5.0	0.010	0.046	<0.0050	<0.020	0.54	0.54	0.012	0.55	<0.050	0.0054	130	48	0.0012	<0.0010	<0.00010	0.087	120	55	8.1	<0.0010	0.093	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	46	310	<0.0050	-
TS	18-May-25	-	-	730	<5.0	0.0065	0.029	<0.0050	<0.020	0.23	0.23	0.0092	0.24	<0.050	<0.0050	170	53	0.0071	<0.0010	<0.00010	0.014	210	97	7.1	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	42	320	<0.0050	-
TS	7-Jun-25	-	-	720	6.5	<0.0050	<0.020	<0.0050	<0.020	0.17	0.16	<0.0050	0.17	<0.050	<0.0050	150	51	0.0013	<0.0010	<0.00010	0.0030	210	98	6.6	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	40	310	<0.0050	-
TS	5-Jul-25	-	-	800	6.5	<0.0050	<0.020	<0.0050	<0.020	0.25	0.25	<0.0050	0.26	<0.050	<0.0050	160	54	0.0019	<0.0010	<0.00010	0.0032	270	130	6.5	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	40	320	<0.0050	-
TS	27-Aug-25	-	-	770	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.36	0.36	<0.0050	0.36	<0.050	<0.0050	160	55	0.0056	<0.0010	<0.00010	0.0084	230	97	6.3	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	34	310	<0.0050	-
TS	11-Sep-25	-	-	740	<5.0	<0.0050	<0.020	<0.0050	<0.020	0.18	0.17	<0.0050	0.18	<0.050	<0.0050	170	53	0.0055	<0.0010	<0.00010	0.0037	220	94	6.7	<0.0010	<0.010	<0.0010	<0.0010	<0.000050	<0.0010	-	30	290	<0.0050	-

Note:
Grey text Indictates result below EQL
Bold text Indictates result above EQL

Licence: L6131/1990/13
Form: WR5
Name: Monitoring of ambient sediment quality

Licence Holder: Pilbara Managanese Pty Ltd
Period: Quarterly from 1st of October 2024 to 30th of September 2025

		Chlorophyll a (sediment)	Phaeophytin a (sediment)
		mg/m2	mg/m2
EQL		2	2
Location	Date		
CG1	09 Oct 2024	316	250
CG1	13 Nov 2024	16	33
CG1	01 Dec 2024	71	107
CG1	08 Jan 2025	279	387
CG1	18 May 2025	114	209
CG1	07 Jun 2025	138	295
CG1	05 Jul 2025	176	151
CG1	27 Aug 2025	594	228
CG1	11 Sep 2025	90	154
OC	09 Oct 2024	277	190
OC	13 Nov 2024	206	108
OC	01 Dec 2024	21	23
OC	08 Jan 2025	19	8
OC	09 Feb 2025	52	21
OC	26 Mar 2025	13	11
OC	10 Apr 2025	<2	2
OC	18 May 2025	1,509	262
OC	07 Jun 2025	119	28
OC	05 Jul 2025	138	57
OC	27 Aug 2025	2,683	634
OC	11 Sep 2025	181	87
TC1	09 Oct 2024	88	72
TC1	13 Nov 2024	23	46
TC1	01 Dec 2024	53	70
TC1	08 Jan 2025	118	114
TC1	09 Feb 2025	551	3,555
TC1	26 Mar 2025	44	61
TC1	10 Apr 2025	25	18
TC1	18 May 2025	85	75
TC1	07 Jun 2025	15	14
TC1	05 Jul 2025	17	13
TC1	27 Aug 2025	441	210
TC1	11 Sep 2025	90	75
TS	09 Oct 2024	271	226
TS	13 Nov 2024	118	127
TS	01 Dec 2024	25	92
TS	08 Jan 2025	87	81
TS	09 Feb 2025	119	104
TS	26 Mar 2025	115	143
TS	10 Apr 2025	477	545
TS	18 May 2025	300	1,830
TS	07 Jun 2025	95	39
TS	05 Jul 2025	42	123
TS	27 Aug 2025	58	118
TS	11 Sep 2025	198	173

Note:
Grey text Indictates result below EQL
Bold text Indictates result above EQL

Licence: L6131/1990/13
Form: GR1
Name: Monitoring of ambient groundwater

Licence Holder: Pilbara Managanese Pty Ltd
Period: Monthly from 1st of October 2024 to 30th of September 2025

		Standing Water Level	pH (Field)	Total Dissolved Solids (Field)	Total Dissolved Solids (Lab)	Nitrogen (Total)	Arsenic (filtered)	Copper (filtered)	Molybdenum (filtered)	Selenium (filtered)	Uranium (filtered)	Chromium (hexavalent)
		mbgl	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					5	0.1	0.001	0.001	0.001	0.001	0.001	0.001
Licence: L6131/1990/13		<6										
Location Code	**Date**											
HPTSFMB01	**27 Nov 2024**	**98.92**	**8.2**	**494**	**650**	**16**	<0.0010	<0.0010	**0.01**	**0.0019**	**0.0017**	0.0048
HPTSFMB01	**23 Feb 2025**	**99.93**	**7.4**	**506**	**14000**	**8.1**	<0.0010	<0.0010	**0.0017**	**0.0088**	**0.011**	<0.0010
HPTSFMB01	**21 May 2025**	**100.44**	**8.3**	**558**	**600**	**10**	<0.0010	<0.0010	**0.018**	**0.0021**	**0.0012**	**0.0052**
HPTSFMB01	**10 Aug 2025**	**101.17**	**8.2**	**544**	**640**	**12**	<0.0010	<0.0010	**0.016**	**0.0019**	**0.0014**	**0.0048**
HPTSFMB03	**27 Nov 2024**	**31.85**	**8**	**548**	**730**	**9.6**	**0.0016**	<0.0010	**0.0081**	**0.0023**	**0.0016**	**0.017**
HPTSFMB03	**23 Feb 2025**	**35.67**	**7.7**	**575**	**750**	**15**	**0.0016**	<0.0010	**0.0075**	**0.0022**	**0.0015**	**0.011**
HPTSFMB03	**21 May 2025**	**39.69**	**7.8**	**625**	**700**	**14**	**0.0014**	<0.0010	**0.0085**	**0.002**	**0.0018**	**0.0043**
HPTSFMB03	**10 Aug 2025**	**42.37**	**7.6**	**537**	**720**	**44**	**0.002**	0.0012	**0.0076**	**0.0025**	**0.0017**	**0.0042**
TDMB1	**27 Nov 2024**	**14.55**	**7.5**	**550**	**15000**	**8.1**	<0.0010	<0.0010	**0.083**	**0.009**	**0.0013**	<0.0010
TDMB1	**23 Feb 2025**	**14.45**	**8.5**	**9828**	**620**	**11**	<0.0010	<0.0010	**0.013**	**0.0019**	**0.0016**	0.0051
TDMB1	**21 May 2025**	**13.18**	**7.5**	**10980**	**10,980**	**11**	<0.0010	<0.0010	0.0011	**0.0082**	**0.011**	<0.0010
TDMB1	**10 Aug 2025**	**13.9**	**7.1**	**8375**	**15000**	**8.5**	<0.0010	0.0018	**0.0013**	**0.0089**	**0.012**	<0.0010

Note:

Grey text	Indicates result below EQL
Bold text	Indicates result above EQL
Blue Cell	Indicates result exceeds licence limit

Water sample taken using hydrasleeves as per AS/NZS 5667.4 and analysed by a NATA accredited laboratory.

ConsMin

Licence: L6131/1990/13
Form: LR1
Name: Monitoring of emissions to land

Licence Holder: Pilbara Managanese Pty Ltd
Period: Quarterly from 1st of October 2024 to 30th of September 2025

		Parameters					
		>C10-C16 Fraction (F2)	>C10-C16 Fraction (F2 minus Naphthalene)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)	TRH
		µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
EQL		50	50	100	100	50	0.05
Licence Limit : L6131/1990/13						15,000	15
Location Code	**Date**						
L1	**09 Oct 2024**	**240**	**240**	**460**	<100	**700**	**0.7**
L1	**29 Jan 2025**	**80**	**80**	**1,700**	**<100**	**1,800**	**1.8**
L1	**02 Apr 2025**	**92**	**92**	**2,200**	**220**	**2,500**	**2.5**
L1	**27 Aug 2025**	**320**	**320**	**3,300**	650	**4,300**	**4.3**

Note:

Grey text	Indictates result below EQL
Bold text	Indictates result above EQL
Blue Cell	Indicates result exceeds licence limit

Licence: L6131/1990/13
Form LR2. Monitoring of Emissions to Land
Name: Volume (cumulative) recycled for on-site irrigation (L2 spray fields)

Licence Holder: Pilbara Manganese Pty Ltd
Period: Monthly from 1st of October 2024 to 30th of September 2025

Emission point	Parameter	Limit	Result	Averaging period	Method
L2	Load of Total Nitrogen (TN)	480 kg/ha/year	118.3 kg/ha/year	Annual reporting period	Average annual nitrogen calculated from quarterly monitoring events (14.76mg/L)
	Load of Total Phosphorus (TP)	120 kg/ha/year	42.44 kg/ha/year	Annual reporting period	Average annual Phosphorus calculated from quarterly monitoring events (5.3mg/L)
	Total Dissolved Solids (TDS)	2000 mg/L	1248 mg/L	Annual reporting period	Average annual TDS calculated from quarterly monitoring events also displayed in Form LR3

Size of L2 irrigation area = 7ha
Annual volume of water irigated = 56059 kL

Water sample taken as per AS/NZS 5667.6 and analysed by a NATA accredited laboratory.

Licence: L6131/1990/13
Form LR3-A
Name: Wastewater emissions to land from L2 (sprayfields)

Licence Holder: Pilbara Managanese Pty Ltd
Period: Quarterly from 1st of October 2024 to 30th of September 2025

		Parameters						
		E. Coli	Total Dissolved Solids	pH (Field)	Biochemical Oxygen Demand (5-day test)	Nitrogen (Total)	Total Phosphorus (Organic Phosphate)	Total Suspended Solids (Lab)
		cfu/100 ml	mg/L	pH units	mg/L	mg/L	mg/L	mg/L
EQL		1			5	0.1	0.05	5
Licence: L6131/1990/13			2,000					
Location Code	**Date**							
L2b	**13 Oct 2024**	<10	**1300**	**7.94**	13	**8.6**	**5.4**	**<5.0**
L2b	**29 Jan 2025**	<10	**1600**	**8.02**	12	**-**	**4.4**	**<5.0**
L2b	**02 Apr 2025**	<10	**-**	**8.1**	9.7	**8.7**	**3.1**	**-**
L2b	**06 Apr 2025**	-	**1400**		-	**-**	**-**	**<5.0**
L2b	**06 Jul 2025**	<10	**690**	**7.7**	**7.2**	**27**	**8.3**	**<5.0**

Note:

Grey text	Indicates result below EQL
Bold text	Indicates result above EQL
Blue Cell	Indicates result exceeds licence limit

Licence: L6131/1990/13
Form: LR3-B
Name: Volume (cumulative) recycled for on-site irrigation (L2 sprayfields)

Licence Holder: Pilbara Managanese Pty Ltd
Period: Monthly from 1st of October 2024 to 30th of September 2025

Month	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25
L2 Irrigation area Volume (m3)	4569	5213	5290	5886	4083	4552	4591	4424	5311	3816	5001	3323
L2 Annual Total (m3)	56059											

Appendix D Vegetation Health Monitoring

Jul-25

Brumby Creek Crossing (V1)	Absent (0)	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☐	☑	☐	☐	☐	4
Recruitment	☐	☐	☐	☑	☐	☐	☐	☐	3
Health - General	☐	☐	☐	☐	☑	☐	☐	☐	4
Death of key species	☐	☐	☐	☐	☐	☐	☐	☑	5
Surface stability	☐	☐	☐	☐	☑	☐	☐	☐	4
Leaf litter	☐	☐	☐	☑	☐	☐	☐	☐	3
Weeds linked to disturbance	☐	☐	☐	☐	☐	☐	☐	☑	5
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	5
Disease in main species	☐	☐	☐	☑	☐	☐	☐	☐	3
Insect damage	☐	☐	☐	☐	☐	☐	☐	☑	5
Nutrient Cycling	☐	☐	☑	☐	☐	☐	☐	☐	2
Pollutants - input nutrients and other	☐	☐	☐	☐	☐	☐	☑	☐	5
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	3
Total Score: (out of 100)	54								
Weather Conditions:									
Notes:									

Lower Carawine Pool (V2)	Absent	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☑	☐	☐	☐	☐	3
Recruitment	☐	☐	☐	☑	☐	☐	☐	☐	3
Health - General	☐	☐	☐	☐	☑	☐	☐	☐	4
Death of key species	☐	☐	☐	☐	☑	☐	☐	☐	4
Surface stability	☐	☐	☐	☑	☐	☐	☐	☐	3
Leaf litter	☐	☐	☐	☐	☑	☐	☐	☐	4
Weeds linked to disturbance	☐	☐	☐	☑	☐	☐	☐	☐	3
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	0
Disease in main species	☐	☐	☐	☑	☐	☐	☐	☐	3
Insect damage	☐	☐	☐	☑	☐	☐	☐	☐	3
Nutrient Cycling	☐	☐	☐	☐	☐	☐	☐	☑	0
Pollutants - input nutrients and other	☐	☐	☐	☑	☐	☐	☐	☐	3
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	15
Total Score: (out of 100)	51								
Weather Conditions:									
Notes:									

Muddauthera Crossing (V3)	Absent	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☐	☑	☐	☐	☐	4
Recruitment	☐	☐	☐	☐	☑	☐	☐	☐	4
Health - General	☐	☐	☐	☐	☑	☐	☐	☐	4
Death of key species	☐	☐	☐	☑	☐	☐	☐	☐	3
Surface stability	☐	☐	☐	☑	☐	☐	☐	☐	3
Leaf litter	☐	☐	☐	☐	☐	☐	☐	☑	5
Weeds linked to disturbance	☐	☐	☐	☐	☐	☐	☐	☑	5
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	5
Disease in main species	☐	☐	☐	☐	☑	☐	☐	☐	4
Insect damage	☐	☐	☐	☐	☑	☐	☐	☐	4
Nutrient Cycling	☐	☐	☐	☑	☐	☐	☐	☐	3
Pollutants - input nutrients and other	☐	☐	☐	☑	☐	☐	☐	☐	3
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	15
Total Score: (out of 100)	65								
Weather Conditions:									
Notes:									

Running Water Pool (V4)	Absent	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☐	☑	☐	☐	☐	4
Recruitment	☐	☐	☐	☐	☑	☐	☐	☐	4
Health - General	☐	☐	☐	☐	☑	☐	☐	☐	4
Death of key species	☐	☐	☐	☐	☐	☐	☐	☑	5
Surface stability	☐	☐	☐	☑	☐	☐	☐	☐	3
Leaf litter	☐	☐	☐	☑	☐	☐	☐	☐	3
Weeds linked to disturbance	☐	☐	☐	☐	☐	☐	☐	☑	5
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	5
Disease in main species	☐	☐	☐	☐	☐	☑	☐	☐	5
Insect damage	☐	☐	☐	☐	☑	☐	☑	☐	5
Nutrient Cycling	☐	☐	☐	☐	☑	☐	☐	☐	5
Pollutants - input nutrients and other	☐	☐	☐	☐	☐	☐	☐	☑	5
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	3
Total Score: (out of 100)	59								
Weather Conditions:									
Notes:									

Tooma Stockyards (V5)	Absent	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☑	☐	☐	☐	☐	3
Recruitment	☐	☐	☐	☑	☐	☐	☐	☐	3
Health - General	☐	☐	☐	☑	☐	☐	☐	☐	3
Death of key species	☐	☐	☐	☐	☑	☐	☐	☐	4
Surface stability	☐	☐	☐	☑	☐	☐	☐	☐	3
Leaf litter	☐	☐	☐	☑	☐	☐	☐	☐	2
Weeds linked to disturbance	☐	☐	☐	☐	☑	☐	☐	☐	4
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	5
Disease in main species	☐	☐	☐	☐	☑	☐	☐	☐	3
Insect damage	☐	☐	☐	☐	☐	☐	☑	☐	5
Nutrient Cycling	☐	☐	☐	☐	☐	☐	☑	☐	5
Pollutants - input nutrients and other	☐	☐	☑	☐	☐	☐	☐	☐	2
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	15
Total Score: (out of 100)	60								
Weather Conditions:									
Notes:									

Warri Warri Creek Crossing (V6)	Absent	Very degraded (1)	Degraded (2)	Good (3)	Very Good (4)	Excellent (5)	Present	N/a	Score
Vegetation structure	☐	☐	☐	☐	☑	☐	☐	☐	4
Recruitment	☐	☐	☐	☑	☐	☐	☐	☐	3
Health - General	☐	☐	☐	☐	☑	☐	☐	☐	4
Death of key species	☐	☐	☐	☐	☐	☐	☐	☑	5
Surface stability	☐	☐	☐	☐	☑	☐	☐	☐	4
Leaf litter	☐	☐	☐	☐	☐	☐	☐	☑	5
Weeds linked to disturbance	☐	☐	☐	☐	☐	☐	☑	☐	5
Feral animal evidence	☐	☐	☐	☐	☐	☐	☐	☑	5
Disease in main species	☐	☐	☐	☐	☐	☑	☐	☐	5
Insect damage	☐	☐	☐	☐	☐	☑	☐	☐	5
Nutrient Cycling	☐	☐	☐	☑	☐	☐	☐	☐	3
Pollutants - input nutrients and other	☐	☐	☐	☐	☐	☐	☐	☑	5
Health Tree Foliage (% score)		0-20%	21-40%	41-60%	61-80%	81-100%			3
Keighery Score (0-7)	0	1	2	3	4	5	6	7	
	0	5	10	15	20	25	30	35	15
Total Score: (out of 100)	71								
Weather Conditions:									
Notes:									

<table>
<tr><th colspan="2">Brumby Creek Crossing V1</th></tr>
<tr><th>January 2025</th><th>July 2025</th></tr>
<tr><td>

V1 – Tree Health Photo

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V1 – Tree Health Photo

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V1 – Photo 1

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V1 – Drone photo 1

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<tr><td>

V1 – Photo 2

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V1 – Drone photo 2

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</td><td>V1 – Drone photo 3
</td></tr>
<tr><td>V1 – Photo 4
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<tr><td>V1 – Photo 5
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<tr><td>V2 – Photo 7
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Lower Carawine Pool (V2)

January 2025	July 2025
V2 – Photo 8 	V2 – Drone photo 2 
V2 – Photo 9 	V2 – Drone photo 3 
V2 – Drone Photo 	

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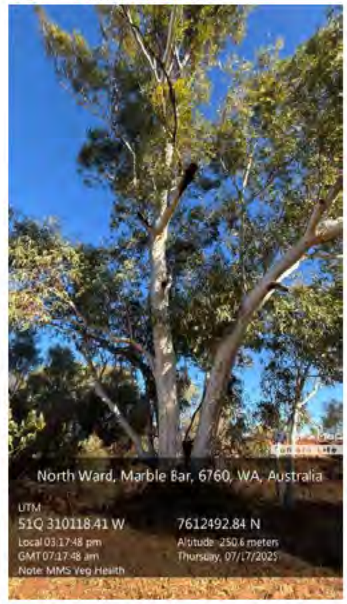
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</td><td>V3 – Health tree 2

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Muddauthera Crossing (V3)	
January 2025	**July 2025**
V3 – Photo 11 	**V3 – Drone photo 1** 
V3 – Photo 12 	**V3 – Drone photo 2** 
V3 – Photo 13 	**V3 – Drone photo 3** 

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<tr><th colspan="2">Muddauthera Crossing (V3)</th></tr>
<tr><th>January 2025</th><th>July 2025</th></tr>
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<tr><td>V3 – Drone photo
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<tr><th>January 2025</th><th>July 2025</th></tr>
<tr><td>V4 – Health Tree
</td><td>V4 – Health Tree

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<tr><td>V4 - Photo 15
</td><td>V4 – Health tree 2

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<tr><td>V4 - Photo 16
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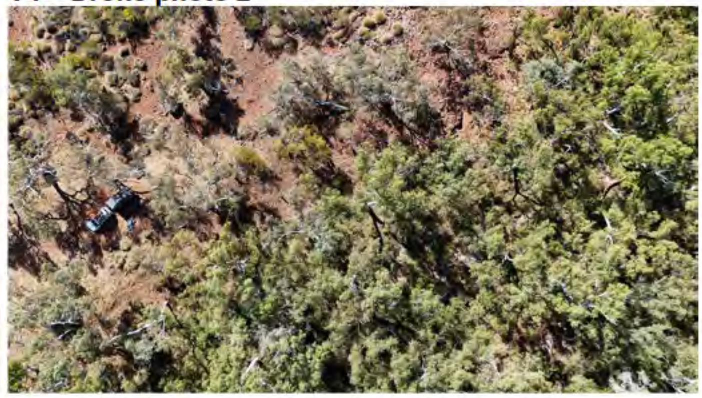
V4 - Photo 17 	**V4 – Drone photo 2** 
V4 - Photo 18 	**V4 – Drone photo 3** 
V4 – Drone Photo 	

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</td></tr>
<tr><td>V5 - Photo 20
</td><td>V5 – Drone photo 1
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<tr><td>V5 - Photo 21
</td><td>V5 – Drone photo 2
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Tooma Stockyards (V5)	
January 2025	**July 2025**
V5 – Drone Photo 	**V5 – Drone photo 3** 

Warri Warri Creek Crossing (V6)	
January 2025	**July 2025**
V6 – Health Tree 	**V6 – Health Tree** 

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<tr><th colspan="2">Warri Warri Creek Crossing (V6)</th></tr>
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<tr><td>V6 – Photo 23
</td><td>V6 – Drone photo 2
</td></tr>
<tr><td>V6 – Photo 24
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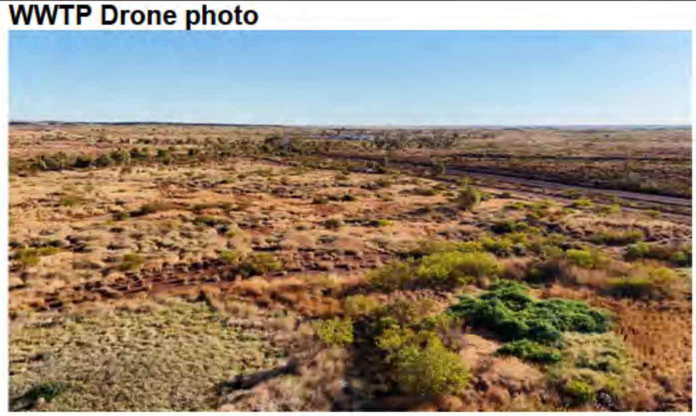
Warri Warri Creek Crossing (V6)	
January 2025	July 2025
V6 – Drone photo 	

WWTP Irrigation Area	
January 2025	July 2025
WWTP Photo 28 (NW) 	WWTP Drone photo 
WWTP Photo 29 (NE) 	WWTP Drone photo 1 

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<tr><td></td><td>WWTP Drone photo 4
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<tr><td></td><td>WWTP Drone photo 5
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Appendix E TSF Audit

CONSOLIDATED MINERALS

TETRA TECH COFFEY

Consolidated Minerals

2025 Tailings Storage Facilities Annual Audit

Woodie Woodie Operations

Reference: 754-PERGE389748

18 November 2025

WOODIE WOODIE OPERATIONS

2025 Tailings Storage Facilities Annual Audit

Report reference number: 754-PERGE389748
18 November 2025

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ANCOLD	Australian National Committee on Large Dams
A1PTSF	Area 1 In-Pit tailings storage facility
ConsMin	Consolidated Minerals Pty Ltd
Coffey	Tetra Tech Coffey Pty Ltd
CEPTSF	Camp East In-Pit tailings storage facility
DAPTSF	Dartmoor In-Pit tailings storage facility
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety
DEPTSF	Demon In-Pit tailings storage facility
DMPE	Department of Mines, Petroleum and Exploration
DWER	Department of Water and Environmental Regulation
FoS	Factor of Safety
HPTSF	Homestead In-Pit tailings storage facility
IPTSF / PTSF	In-pit tailings storage facility
L&MGSPL	Land & Marine Geological Services Pty Ltd
LoM	Life of Mine
MPTSF	Malta In-Pit tailings storage facility
PMI	Process Minerals International Pty Ltd
PPTSF	Paystar In-Pit tailings storage facility
RL	Reduced Level
RPTSF	Rhodes In-Pit tailings storage facility
TSF	Tailings storage facility
TSDS	Tailings Storage Data Sheet
WWO	Woodie Woodie Operations

1. INTRODUCTION

This report presents the findings of an annual tailings storage facility (TSF) audit and management review of the In-Pit TSFs at Woodie Woodie Operations (WWO). Woodie Woodie Manganese Mine is in the Pilbara Region, approximately 100km east of Telfer, Western Australia. The audit was undertaken by Tetra Tech Coffey Pty Ltd (Coffey) on behalf of Consolidated Minerals Pty Ltd (ConsMin).

The TSFs included in the audit are the currently active Homestead In-Pit TSF (HPTSF), and inactive Area 1 Pit TSF (A1PTSF), Malta Pit TSF (MPTSF), Dartmoor Pit TSF (DaPTSF) and Demon Pit TSF (DePTSF).

This TSF audit and management review was carried out in general accordance with the requirements of the Department of Mines, Petroleum and Exploration (DMPE), (formerly DEMIRS) (2013)[1] '*Code of practice: tailings storage facilities in Western Australia*' and DMPE (2015)[2] '*Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs)*'.

A site visit was undertaken for the audit on 16 October 2025, by Tetra Tech Coffey Pty Ltd (Coffey) geotechnical engineer, Simon Basson. This audit covers the reporting period between October 2024 and September 2025 and was commissioned by ConsMin via Purchase Order Number 712580.

2. BACKGROUND

2.1 GENERAL

ConsMin has been owner and operator of the WWO since 1991. The mine currently has the capacity to process up to 5.0Mtpa of ore subject to market requirements. WWO consists of a manganese beneficiation facility by heavy media separation, with manganese ore sourced from multiple open pits. Mined ore is processed by blending, crushing, screening and washing at the process plant before being put through a heavy media separation plant with a drum separator to produce lump manganese and a cyclone to produce fines manganese.

Fines waste produced is retreated to remove any remaining manganese before being deposited into an active in-pit TSF. The quantities of waste are dependent on the grade of the plant feed and product yield. The site predominantly uses in-pit facilities for tailings storage, with two inactive above-ground facilities that have not been used since 2008 effectively no longer existing.

The mine was under care and maintenance from July 2016 to January 2017, and no production occurred over this period. Production was recommenced in January 2017.

2.2 TSF HISTORY

Manganese was first discovered in the Woodie Woodie district in 1949, and the initial mining operation was south of the existing process plant and pits. Operations started at the current location with tailings deposited into the Rhodes In-Pit TSF (RPTSF) and subsequently into an above-ground tailings storage facility, TSF1, encompassing RPTSF. TSF1 was the primary tailings storage facility for the mine until mid-2004, when TSF2 was commissioned. TSF2 was decommissioned in August 2008 and a series of In-Pit TSFs (IPTSFs) were then commissioned and operated.

Almost all the tailings were recovered from TSF1 and TSF2 and re-processed by Process Minerals International Pty Ltd (PMI) from 2006, with reprocessing tailings continuing to 2014. After reprocessing to remove 'super fines', PMI subsequently discharged tailings into in-pit TSFs. The above-ground TSF 1/2 facilities were used as a waste dump and the full footprint is now entirely covered. Dry tailings were used to form bunds around the pit perimeter.

The IPTSFs comprise:

i) Camp East Pit TSF (CEPTSF) operated from August 2008 to November 2009. The pit was expanded by removing the tailings from this pit and the pit expanded to form the Homestead Pit Tailings Storage Facility (HPTSF). CEPTSF no longer exists and now forms part of the western portion of the HPTSF.

ii) Homestead Pit TSF (HPTSF) is currently the only active TSF. Operation commenced in February 2017 and supernatant water being recycled to the process plant commencing in December 2019. The pit has a large supernatant pond with a relatively small, exposed tailings beach area. At the end of 2019 no water was recovered from the pit and returned to the plant. Water for dust suppression was being removed prior to January 2019.

iii) Area 1 Pit TSF (A1PTSF) is an in-pit facility, which is near-filled and there are no plans for further deposition of tailings into this pit in the short term. An estimated remaining storage volume of 0.18Mm^3 is available for topping up prior to closure and rehabilitation. Approximately 3,162,505t of tailings were deposited into the facility.

iv) Malta Pit TSF (MPTSF) including Malta North Pit TSF (MNPTSF) in-pit facilities, were decommissioned with no further planned deposition of tailings. An estimated remaining storage volume of 0.07Mm^3 is available for topping-up prior to closure and rehabilitation.

v) Dartmoor Pit TSF (DaPTSF) in-pit facility is not filled but was decommissioned with no further plans for depositing tailings. An estimated remaining storage volume of 0.05Mm^3 is available for topping-up prior to closure and rehabilitation.

vi) Demon Pit TSF (DePTSF) in pit facility is not filled but was decommissioned with no further plans for tailings deposition. An estimated remaining storage volume of 3.75Mm^3 is available for topping-up prior to closure and rehabilitation. Approximately 1,211,052t of tailings were deposited into the facility.

2.3 TAILINGS PROPERTIES

Testing of tailings samples during a geotechnical investigation by L&MGSPL (2024)[3] indicated the tailings material is classified as a low-plasticity, sandy silt with fines content (passing 75µm) of 71.8%. The material was assessed to have an average in-situ dry density of 1.55t/m^3.

One undrained settling test was performed by E-Precision Pty Ltd on samples retrieved by ConsMin from the tailings discharge pipe on site in March 2024. The results indicated a settled dry density of 1.56 and 1.66t/m^3 on tailings of 23% solids.

Tailings have the following geochemical properties, presented in MBS Environmental Works Approval (2012)[4]:

- Extremely low potential for acid generation;
- Non-existent or slight enrichments in minor elements;
- Significant lead enrichment however these are expected to be present in stable forms associated with clays, sesquioxides, and primary-silicates;
- Alkaline pH (pH 8.2);
- Low salinity, and
- Slighted elevated levels of elements associated with neutral and alkaline mine drainage, notably molybdenum, selenium and uranium.

3. INFORMATION PROVIDED

3.1 GENERAL

The following data was supplied to Coffey by ConsMin and reviewed as part of the audit:

- Department of Water and Environmental Regulation (DWER) Licence Number L6131/1990/13;
- DMPE tenement conditions for Woodie Woodie Manganese Project;
- Surveys and aerial photos;
- Monthly piezometer data;
- Daily log sheet example; and
- Deposited tailings details.

3.2 LICENSE AND LEASE CONDITIONS

HPTSF is covered by DWER Licence Number L6131/1990/13, with a commencement date of 1 October 2013 and expiry date of 30 September 2028. A copy of the licence is in Appendix A.

The TSFs are located within mining leases M45/431, M45/432, M45/517, M45/600, M45/637 and M45/638. A copy of DMPE tenement conditions relevant to the TSFs is in Appendix B.

3.3 TAILINGS PRODUCTION

Tailings production data for material discharged to the TSFs was provided by ConsMin from 2008 to September 2024 and is presented in Table 1. The annual production rate of 3.204 Mtpa for the 2024-25 reporting period was less than the rated production of 5.0 Mtpa prescribed in the DWER licence.

Production statistics and water accounting information supplied by ConsMin indicated the average tailings density was 16.4% solids by weight. The ore produced fines that were discharged as the solids in tailings were 602,342t, and water in slurry was 2,718,639kL, resulting in 3,680,216t of slurry discharged to HPTSF.

Table 1: Tailings production data

Year	ConsMin (dtpa)	PMI (dtpa)	Total (dtpa)
2008	596,422	224,173	820,595
2009		965,066	965,066
2010		1,016,302	1,016,302
2011		1,255,318	1,255,318
2012		943,402	943,402
2013		932,806	932,806
2014	507,379	314,189	821,568
2015	831,552		831,552
2016	**Project on care and maintenance**		
2017	772,062		772,062
2018	819,458		819,458
2019	780,597		780,597
2020	859,730		859,730
2021	608,137		608,137
2022	668,917		668,917
2023	402,976		402,976
2024	627,242		627,242
09/2025	602,342		602,342

4. TSF REVIEW

4.1 GENERAL

The status of the TSFs at the time of the site visit is summarised as follows:

- HPTSF was the only active TSF; and
- A1PTSF, MPTSF, DaPTSF, and DePTSF were inactive TSFs with limited remaining capacity.

As part of compliance to audit protocols, a site visit was undertaken by a Coffey Engineer on 16 October 2025 to review the TSFs and collect relevant data. A visual assessment of the facilities was undertaken under escort by ConsMin personnel.

A Woodie Woodie Mine site location map, a WWO general site layout plan and an HPTSF general arrangement plan are included as Figures 1 to 3. Tailings storage data sheets (TSDS) for the active and inactive TSFs with explanatory notes are included as Figures 4 to 9. A selection of photographs taken during the site visit is in Appendix C.

4.2 HPTSF

HPTSF was commissioned in February 2017 and at the time of the site visit was the only active facility. HPTSF is nominally 8.5ha in area at the crest with a pit depth of approximately 100m. The available freeboard at the time of the site visit was approximately 1.95m.

Original tailings discharge into HPTSF from the western end of the pit via a single point discharge, was adjusted to provide two discharge points further east onto the tailings beach. Point discharges along the northern and southern extent were provided, with active deposition from the southern perimeter at the time of the site visit. The previous operation for discharge to a central position on the tailings beach had been terminated.

Prolonged deposition from the original single discharge point developed a flat beach from the western extent and expanded deposition from the north caused slurry to settle towards the southern tailings beach area. Depositional flow was directed east towards the supernatant pond by formation of a bund with tailings material.

Localised erosion of the pit wall where surface runoff flows into the pit along the southeast perimeter had undercut the perimeter at the point of entry. Placement of a safety cone with signage to delineate no access or a restricted area is recommended.

No significant pit wall failures were observed during the audit. However, it is understood there was evidence of development of a slip adjacent to the ramp at the end of mining. This slip has since been covered by tailings within the pit and the likelihood of movement due to the horizontal loadings has reduced.

4.2.1 Pipework and perimeter access roads

The in-pit TSF access roads around site were in adequate condition. Based on the site reconnaissance (by vehicle) the tailings delivery and return water pipework appeared to be adequately bunded to prevent spills to the environment and to allow for clean-up if needed. It is understood that the pipework is contained within an additional pipe and buried underground near creek lines or underneath access roads.

4.2.2 Rehabilitation

No rehabilitation works have yet been undertaken for the active HPTSF or any of the inactive IPTSFs. Decommissioned facilities should be assessed for rehabilitation. It is understood that a closure plan for the mine was updated in 2020.

4.3 FREEBOARD

In accordance with DMPE requirements for in-pit TSFs, a minimum total freeboard of 0.820m from the lowest pit crest is required to be maintained at all times, plus 0.404m for the design rainfall event of a 1:100 AEP, 72-hour rainfall event. The total freeboard requirement is therefore 1.224m.

Table 2 shows freeboard details for the HPTSF as per survey data provided. The HPTSF was compliant with the freeboard requirements as set by the DMPE. Freeboard nomenclature is included in Figure 10.

Table 2: Freeboard details

DMPE Total Freeboard (m)	1:100 AEP, 72-hr Rainfall Event (m)	Minimum Operating Freeboard (m)	HPTSF Freeboard from WWO Survey (m)
0.820	0.404	1.224	1.750

4.4 RECONCILIATION OF IN-SITU TAILINGS DENSITY

A report prepared by L&MGSPL (2020)[7] presented a summary of the in-situ dry density of the tailings from all data sources as reproduced in Table 3.

Table 3: TSFs in-situ dry density

TSF	Data source	In-situ dry density (t/m^3)
CEPTSF	CPT1 (3.50 - 4.00 m)	1.52
CEPTSF	CPT1 (8.50 – 9.00 m)	1.89
CEPTSF	CPT2 (7.50 – 8.00 m)	1.83
CEPTSF	CPT3 (4.50 – 5.00 m)	1.25
CEPTSF	CPT3 (8.00 – 8.50 m)	1.50
CEPTSF	CPT3 (9.00 – 9.50 m)	1.60
CEPTSF	CPT3 (11.00 – 11.50 m)	1.98
A1PTSF	TSDS estimate	1.87
A1PTSF	Calculated from tonnes and actual survey volumes	2.02
MPTSF and MNPTSF	Estimate based on actual survey volume and average of all data	1.70
DaPTSF	TSDS estimate	1.50
DePTSF	TSDS estimate considered to be extraordinarily low	1.00
HPTSF	Bathymetric survey, 2023[5]	1.34

5. PIT WALL STABILITY

Reviews of the Homestead Pit wall stability were carried out by SRK Consulting in 2015 following signs of distress on the northern wall of the pit near the main east access ramp. The instability at the time was thought to be associated with a near-vertical structure intersecting the pit wall in the area. For safety reasons, mining activities were discontinued in the pit in 2015, noting that Factor of Safety (FoS) values against wall failure were estimated to be around 1.0 to 1.1. It was noted that the SRK analyses were suitably conservative adopting reduced strength parameters compared to analyses by others prior to mining.

With a view to tailings storage in the Homestead Pit, SRK Consulting reviewed stability of the north wall and the effect of tailings/water on pit wall stability. The results of the stability assessment indicated the north wall would became progressively more stable with infill of tailings and water, as would be expected. The FoS was around 1.3 (recommended FoS) when the water/tailings level rose to around RL 250m. The water/tailings in the pit therefore provides horizontal pressure and allows for water recovery from the east ramp, provided that the water level is not dramatically reduced leading to rapid draw down conditions (i.e. inducing excess pore pressure in the wall leading to potential instability).

At the time of the site visit, the previously reported minor distress which was evident along the northern wall at the intersection between the tailings beach and the supernatant pond appeared unchanged. The rise and extended tailings beach appeared to provide structural support for the observed area. No further areas demonstrating signs of distress were identified.

Daily inspections of the HPTSF and future Paystar Pit TSF (PPTSF) must be undertaken during the life of the facilities, and should include visual assessment of pit walls, specifically noting observed changes in areas which previously demonstrated signs of distress. Assessment of pit wall stability is required as part of the audit and review of the active TSFs, provided by a geotechnical engineering specialist on a 6 monthly basis.

6. WATER BALANCE

A water balance for the active HPTSF is presented in Table 4, based on inflow and outflow data supplied by ConsMin for the period October 2024 to September 2025. Monitored values for volume of water in slurry, return water and water abstracted from the standpipe for dust suppression were provided.

The water balance calculations were based on the following assumptions:

- Monthly rainfall for the period and mean monthly evaporation figures for Telfer Aerodrome were obtained from the Bureau of Meteorology (BOM);
- Tailings area of approximately 9.0ha;
- A supernatant pond over the entire tailings area;
- No running beaches;
- Evaporation pan factor of 0.75;
- Average moisture content retained in tailings of 35%;
- Tailings slurry density of 16.4%;
- Tailings production of 602,342t; and
- Permeability of pit floor and deposited tailings for seepage approximately 10^{-7}m/s.

The HPTSF water balance calculation presented in Appendix D assessed the annual average water return as a percentage of slurry water inflow at approximately 63.5% for the reporting period October 2024 to September 2025. The water balance indicated that the facility has retained a similar volume of water on the facility throughout the reporting period. The water level in HPTSF has risen by 1.32 m to approximate RL 277.70m.

Table 4: TSF water balance

Inflows (m^3)		Outflows (m^3)	
Site Rainfall	89,674 m^3	Evaporation	363,421 m^3
Slurry Water	2,718,638 m^3	Evapotranspiration	1,725 m^3
Seepage Recovery	-	Standpipe Water	98,350 m^3
		Seepage	497,218 m^3
		Retention	120,468 m^3
		Return Water	1,727,130 m^3
Total Inflow	**2,808,312 m^3**	**Total Outflow**	**2,808,312 m^3**

7. GROUNDWATER MONITORING

As part of DWER licence (Appendix A) requirements, WWO is committed to monitoring groundwater conditions in the vicinity of its tailings storages. Groundwater monitoring bores exist around the TSFs to monitor groundwater quality and levels. Monitoring bore locations are shown in Table 5.

Groundwater monitoring data for HPTSF and DePTSF for the 2024-25 reporting period was provided to Coffey. Homestead Pit and HPTSFMB02 became dry during the 2018-19 reporting period. Monitoring bores at DaPTSF and MPTSF were reported to be dry.

Groundwater quality and groundwater level monitoring data is in Appendix F.

Table 5: TSF groundwater

Location ID	Monitoring Type	Northing (m)	Easting (m)	Ground (RL m)	Installation	Facility
DePTSFMB01	Monitoring Bore	7,608,928	316,416	Dry	November 2012	DePTSF
DePTSFMB02	Monitoring Bore	7,608,727	316,537	Dry	November 2012	DePTSF
DePTSFMB04	Monitoring Bore	7,609,249	317,301	282.25	November 2012	DePTSF
HPTSFMB01	Monitoring Bore	7,605,608	318,376	286.47	November 2012	HPTSF
HPTSFMB02	Monitoring Bore	7,605,780	318,695	286.32	December 2013	HPTSF
HPTSFMB03	Monitoring Bore	7,605,780	318,727	282.61	December 2013	HPTSF
HOMESTEAD	Pit Level	7,605,580	318,666	282.83	April 2024	HPTSF

7.1 GROUNDWATER QUALITY

Groundwater quality data for HPTSF (HPTSFMB01, HPTSFMB03) and TSF2 (TDMB1) monitoring bore locations was reviewed by Coffey. Groundwater quality was monitored quarterly in accordance with DWER licence requirements.

The current DWER licence (Table 3.6.3) provides no guideline acceptable limits for groundwater quality and previous audit reports referred to DWER licence amended in 2015 for indication of parameter limits. The only parameter indicating elevated levels based on historic limits was Total Dissolved Solids (>1,500mg/L) at TSF2. The pH was generally at acceptable levels in all locations.

Groundwater quality monitoring data is in Appendix F.

7.2 GROUNDWATER LEVELS

Groundwater level data for HPTSF (HPTSFMB01, HPTSFMB03) and TSF2 (TDMB1) monitoring bore locations was reviewed by Coffey. Groundwater levels were initially monitored monthly, which exceeded the required quarterly frequency specified in the DWER licence (Table 3.6.3).

Recorded water levels for the 2024-25 reporting period were below the 4m below ground level (mbgl) Standing Water Level (SWL) limit, and below the 6mbgl trigger limit for commencement of recovery. Groundwater levels were typically 13.57 to 101.17mbgl. The most elevated groundwater levels were recorded at TSF2 (TDMB1).

Groundwater level monitoring data is in Appendix F.

8. COMPLIANCE

8.1 DWER LICENSE CONDITIONS

The DWER Conditions of Licence (Appendix A), Licence Number L6131/1990/13, with a commencement date of 1 October 2013 and expiry date of 30 September 2028 were provided for review. Compliance against conditions relevant to the TSFs was assessed based on the site visit and document reviews, with comments given in Table 6.

Table 6: DWER license conditions

DWER License Condition	Compliance			Comments
	Full	Partial	Non	
Condition 1.3.1	√			Tailings delivery and water return pipework appear to be adequately bunded and sumps were provided along the pipeline corridor for containment of spills. Minor clean-out of localised areas along the corridor was required.
Condition 1.3.1 Table 1.3.1 (TSFs)	√			Total freeboard for HPTSF, A1PTSF, DaPTSF, DePTSF and MAPTSF exceeded 820mm.
Condition 1.3.2	√			HPTSF decant system was operated such that the supernatant pond on the active IPTSF was minimised.
Condition 1.3.3	√			Annual water balance prepared for HPTSF.
Condition 1.3.4 and Table 1.3.2	√			Inspections were undertaken and daily logs are completed for the active HPTSF for both day and night shifts. Coffey sighted completed logs.
Condition 1.3.5	√			Groundwater levels within the zone of influence at HPTSF complied with the 4mbgl Standing Water Level (SWL) limit. Monitoring bores at inactive IPTSFs have been dry for an extended period.
Condition 1.3.6	√			SWLs did not rise above 6mbgl trigger level within monitoring bores.
Condition 3.1.1	√			ConsMin confirmed that sampling was undertaken in compliance with the appliable standards.
Condition 3.1.2	√			Data provided for the reporting period indicated compliance with this condition.
Condition 3.1.3	√			ConsMin confirmed that monitoring equipment used on the Premises was calibrated in accordance with the manufacturer's specification.
Condition 3.5.1	√			Volumes of tailings deposited and water recovered from HPTSF was monitored monthly.
Condition 3.5.1 and Table 3.5.1	√			Process monitoring data provided included volumes of tailings deposited and water recovered from HPTSF.
Condition 3.6.1 and Table 3.6.3	√			Ambient groundwater quality and SWL data provided indicate compliance with this condition.

8.2 DMPE LEASE CONDITIONS

Tenement conditions (Appendix B) upon which the HPTSF (active) and A1PTSF, MPTSF, DaPTSF and DePTSF (in-active) are located were provided by WWO. The comments in Tables 7 to 11 are made regarding conditions relevant to the facility.

Table 7: Lease conditions M45/431 (DePTSF)

Lease M45/431	Compliance			Comments
	Full	Partial	Non	
27	√			Inactive TSF was monitored for possible dust generation from drying tailings surfaces. No dust generation observed.
29	√			No deposition into DePTSF for this reporting period. Daily logs completed for the active TSF for both day and night shifts. Coffey sighted completed logs.
30	√			This document satisfies the requirement for completion of an annual TSF audit.
31	√			Geotechnical review will be presented prior to planned rehabilitation of facility. Not relevant at this time.
24 & 32	√			Mine Closure Plan is developed, including assessment of settlement, topping-up procedures, and rehabilitation.

Table 8: Lease conditions M45/432 (A1PTSF)

Lease M45/432	Compliance			Comments
	Full	Partial	Non	
20	√			No deposition into A1PTSF for this reporting period. Daily logs were completed for the active TSF for both day and night shifts. Coffey sighted completed logs.
22	√			Geotechnical review will be presented prior to planned rehabilitation of facility. Not relevant at this time.
25	√			This document satisfies the requirement for completion of an annual TSF audit.
28 & 33	√			Mine Closure Plan is developed, including assessment of settlement, topping-up procedures, and rehabilitation.
31	√			Inactive TSF is monitored for possible dust generation from drying tailings surfaces. No dust generation observed.

Table 9: Lease conditions M45/517 (A1PTSF, DaPTSF and MPTSF)

Lease M45/517	Compliance			Comments
	Full	Partial	Non	
19 & 20	√			No deposition into A1PTSF, DaPTSF and MPTSF for this reporting period. Daily logs were completed for the active TSF for day and night shifts. Coffey sighted completed logs.
21	√			This document satisfies the requirement for completion of an annual TSF audit.
22	√			Geotechnical review will be presented prior to planned rehabilitation of facility. Not relevant at this time.
24 & 25	√			Inactive TSF is monitored for possible dust generation from drying tailings surfaces. No dust generation observed.
26	√			Mine Closure Plan is developed, including assessment of settlement, topping-up procedures, and rehabilitation.

Table 10: Lease conditions M45/637 (DaPTSF)

Lease M45/637	Compliance			Comments
	Full	Partial	Non	
21	√			No deposition into DaPTSF for this reporting period. Daily logs were completed for the active TSF for day and night shifts. Coffey sighted completed logs.
23	√			Geotechnical review will be presented prior to planned rehabilitation of facility. Not relevant at this time.
24	√			This document satisfies the requirement for completion of an annual TSF audit.
29 & 36	√			Mine Closure Plan is developed, including assessment of settlement, topping-up procedures, and rehabilitation.
32	√			Inactive TSF is monitored for possible dust generation from drying tailings surfaces. No dust generation observed.

Table 11: Lease conditions M45/638 (HPTSF)

Lease M45/638	Compliance			Comments
	Full	Partial	Non	
11	√			HPTSF was generally being operated in accordance with the Mining Proposal.
19	√			Daily logs were completed for the active TSF for day and night shifts. Coffey sighted completed logs.
20	√			This document satisfies the requirement for completion of an annual TSF audit. Audit and review of active TSF was conducted on 6-monthly basis.
21	√			Geotechnical review will be presented prior to planned rehabilitation of facility. Not relevant at this time.
22	√			No dust generation observed.
29	√			Mine Closure Plan is developed, including assessment of settlement, topping-up procedures, and rehabilitation.

9. MANAGEMENT OF FACILITIES

9.1 GENERAL

As part of ongoing management of the TSFs, the following observations and recommendations are made:

- Coffey reviewed daily inspection log sheets provided by WWO (Appendix E). Daily inspections and monitoring of the TSF should be continued.
- The groundwater monitoring program for bores around the TSF was maintained (Appendix F). WWO should continue with hydrogeological assessment and follow recommendations provided in Rockwater (2023)[8] (Appendix G).
- The Mining Proposal and Works Approval Application were approved and infrastructure developments have been completed for the operation of Paystar Pit TSF (PPTSF).
- HPTSF is approaching the freeboard limit at the lowest point of the pit rim along the southern perimeter near the tailings beach and supenatant pond interface, and WWO is advised to plan for imminent transition of operation to PPTSF.

9.2 STORAGE LIFE

Based on the 30 October 2025 survey data, the estimated storage volume available for HPTSF was approximately 46,956 m^3, providing for estimated safe storage life until the end of November 2025.

The remaining storage life calculation is based on the annual audit period production rate of 602,342tpa, the adopted tailings density of 1.34t/m^3, and the approximate remaining freeboard of 0.526m to the minimum operating feeboard requirement of 1.224m.

WWO should prepare for imminent transition of tailings deposition from the HPTSF and commencement of PPTSF operation from the end of November 2025.

9.3 COMMENTS ON PREVIOUS AUDIT RECOMMENDATIONS

As per audit report from L&MGSPL (2023)[5] the following recommendations were made in previous audits:

1) (2021-22) Geotechnical assessment/observations of the northern and southern walls of the HPTSF should continue, with the frequency of the assessment to be determined by the relevant specialist technical personnel, since the risk of small-scale pit wall failure decreases as tailings rise. These recommendations have been executed and will be ongoing whilst the HPTSF continues to be operated.

2) (2019-20) The recommendation from the geotechnical review executed in August 2020 was to use a drone, with associated control points and software to:

   - Verify the storage and infiltration capacity of the depressed surface of the inactive TSFs.
   - Enable the surface of each facility to be mapped in detail and assist in development of closure plans.
   - Assess post-closure settlement, monitor any settlement with time.
   - Establish priorities for closure works. IPTSFs with little or no further settlement predicted, can be covered with mine waste and shaped to a final surface with minimal risk of rework.
   - Monitor the finished surface to manage and reduce the risk of erosion.
   - Monitor the progress of rehabilitation works.
   - Determine the extent of remedial works where erosion is identified, to assist with implementing localised erosion protection/remedial works, as required.

   The recommendation for employing drone technology for geotechnical review has been implemented to an extent and further incorporation of drone functionalities is recommended to improve frequent assessments and support associated reporting.

3) (2018-19) The following recommendations were made:

   - Water recovery from HPTSF should be commenced as soon as possible. Water recovery from the pit will increase tailings in-situ densities and hence increase storage capacity. This will also increase consolidation during operations, which should reduce the time required before the storage can be covered. Some distress may occur in the pit walls as the water is drawn down. This recommendation was implemented in 2019 and continued through the 2023-24 audit period.
   - As the beach on HPTSF develops, tailings discharge points should be extended around the south side of the pit, this will optimise the storage capacity within the pit. The spigot points have been moved during the 2023-24 audit period to allow for deposition further east onto the tailings beach.

10. CONCLUSIONS AND RECOMMENDATIONS

TSFs were adequately managed during the 2024-25 audit period, and the following conclusions and recommendations are made:

- WWO should prepare for imminent transition of tailings deposition from the HPTSF and commencement of PPTSF operation from the end of November 2025.
- WWO should place a safety cone with signage to delineate no access or a restricted area on the HPTSF perimeter between the access track and the pit rim, where erosion undercuts the perimeter.
- WWO should continue all inspection and monitoring practices in accordance with DWER and DMPE requirements.
- WWO is required to conduct audit and review of active TSFs on a 6-monthly basis for Tenement M45/638 as per DMPE Condition No. 20.

11. BIBLIOGRAPHY

1. Department of Mines and Petroleum (2013). *'Code of practice: tailings storage facilities in Western Australia'*.
2. Department of Mines and Petroleum (2015), '*Guide to Departmental requirements for the management and closure of tailings storage facilities (TSFs)*'.
3. Land and Marine Geological Services Pty Ltd (L&MGSPL, 2024), Woodie Woodie Paystar In-Pit Tailings Storage Facility, Geotechnical Assessment Report – 2024, Ref. Geotechnical Assessment Paystar Rev 1 dated 7 May 2024.
4. Martinick Bosch Sell Pty Ltd (MBS Environmental) (2013), '*Works Approval Application In-Pit Tailings Storage Woodie Woodie Manganese Operations East Pilbara, Western Australia'*, dated May 2012.
5. CMW Geosciences (2019), Annual Audit and Management review in-pit TSFs – 2018/2019, Consolidated Minerals Limited, Ref. PER2019-0290AB Rev0 dated 1 November 2019.
6. Land and Marine Geological Services Pty Ltd (L&MGSPL, 2023), Woodie Woodie Tailings Storage Facility Geotechnical Review – 2023, Ref. TSF Geotechnical Review Rev 0 dated 6 November 2023.
7. Land and Marine Geological Services Pty Ltd (L&MGSPL, 2020), Closure Settlements of Woodie Woodie In-Pit TSFs – 2020, Ref. In-Pit TSF Closure Settlements Rev 0 dated 22 November 2020.
8. Rockwater Hydrological and Environmental Consultants (Rockwater, 2023), Detailed Hydrological Assessment and Modelling report, Consolidated Minerals Ltd, Report No. 150.2/23/04, August 2023.

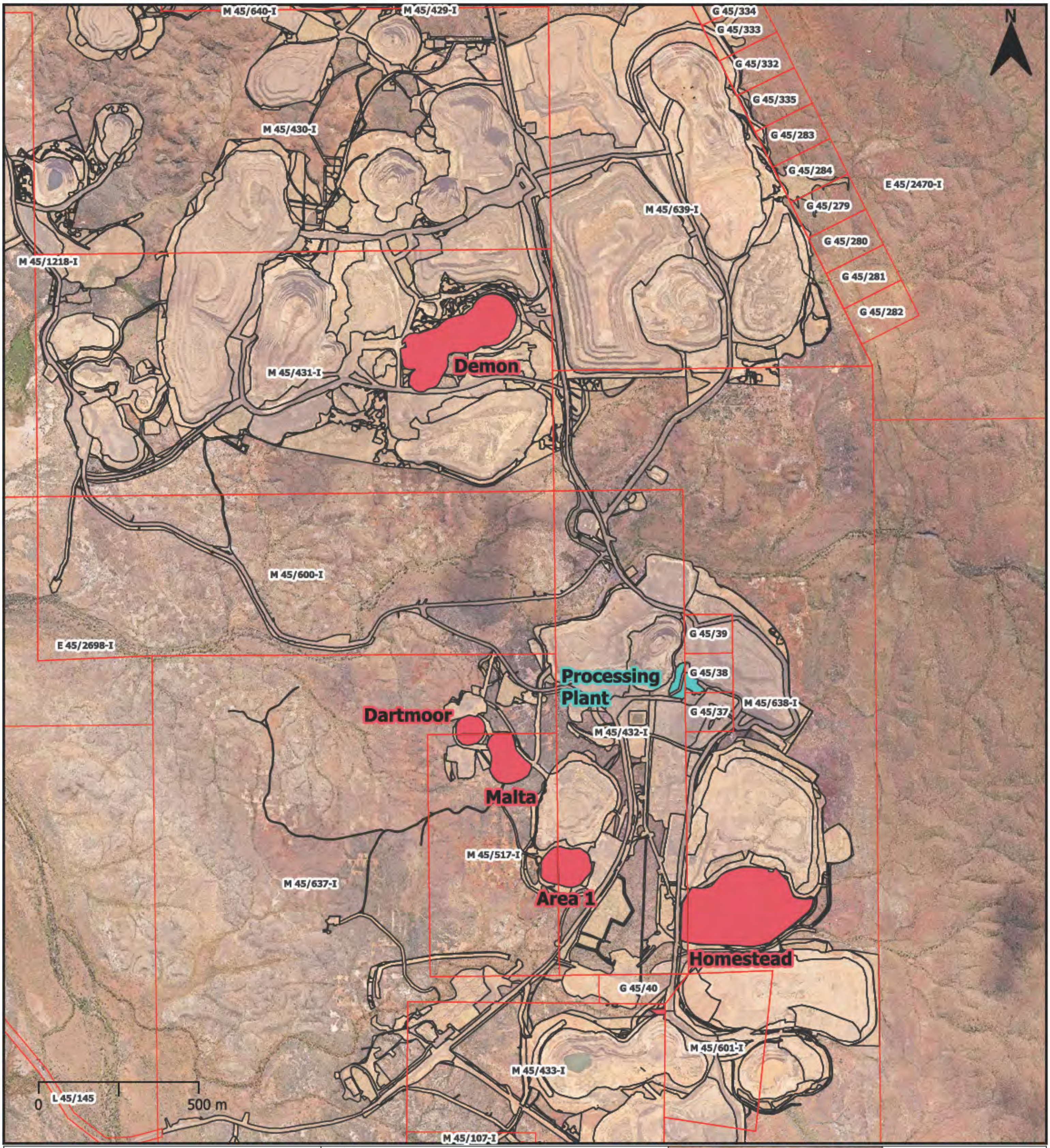
0 20 40 60 80 100 km

1:2 000 000

NOTE: IMAGE SOURCED FROM: MBS ENVIRONMENTAL, CONSOLIDATED MINERALS WOODIE WOODIE MANGANESE OPERATIONS REPORT, FIGURE 1, LOCATION PLAN.

DRAWN:	[redacted]	CLIENT:	CONSOLIDATED MINERALS PTY LTD
DESIGNED:	-	PROJECT:	WOODIE WOODIE OPERATIONS ANNUAL TSF AUDIT AND REVIEW 2025
APPROVED:	[redacted]		
DATE:	10/11/2025	TITLE:	WOODIE WOODIE MINE SITE LOCATION
SCALE:	NOT TO SCALE		
ORIGINAL SIZE:	A4	PROJECT NO: 754-PERGE389748	DWG NO: FIGURE 1 REV: A

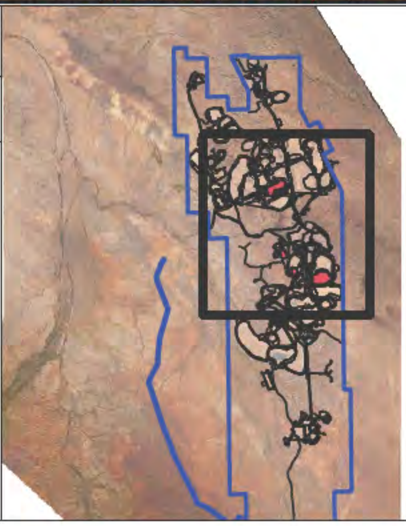
TETRA TECH COFFEY



ConsMin

PROJECT: Woodie Site Plan 2024

DATE:	CREATED BY:	SCALE:
06/11/2024	[redacted]	1:62437

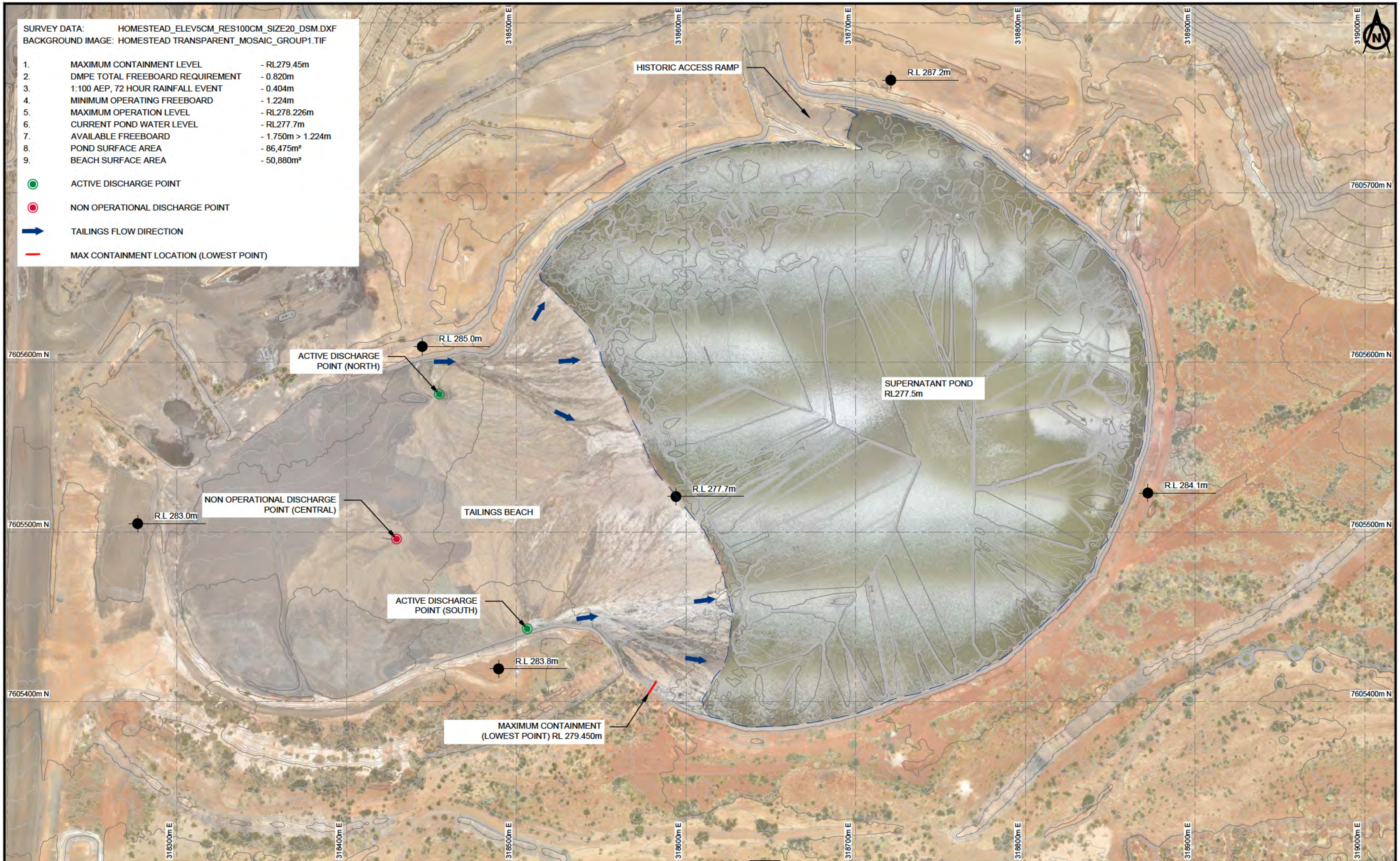


MAP LEGEND

- Woodie Tenements
- Woodie Existing Infrastructure

Woodie Infrastructure

- Processing Plant
- Tailings or residue storage facility (Class 2)



-	-	-	-	-	DRAWN:	[redacted]
-	-	-	-	-	DESIGNED:	
-	-	-	-	-	APPROVED:	
-	-	-	-	-	DATE:	10/11/2025
A	ISSUED WITH BIENNIAL AUDIT REPORT 2025	10/11/2025	RG	SPB	SCALE:	1:2,000
REV.	REVISION DESCRIPTION	DATE	DRAWN	APPROVED	ORIGINAL SIZE:	A3

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CLIENT:	CONSOLIDATED MINERALS PTY LTD
PROJECT:	WOODIE WOODIE OPERATIONS ANNUAL TSF AUDIT AND REVIEW 2025
TITLE:	HOMESTEAD PIT TSF LAYOUT PLAN
PROJECT NO: 754-PERGE389748	DWG NO: FIGURE 3 — REV: A

DWG: F:\PROJECTS OCT 2016 ONWARDS\Consolidated Minerals\754-PERGE389748 - Woodie Woodie TSF Audits 2025\8. Reports\8.2 Audit 2\Figures\Drawings (Audit 2)\00Drawings\Figure 3.dwg

TAILINGS STORAGE DATA SHEET

Please answer all questions, with separate sheets for cells of different ages.		Coffey Job No.:	754-PERGE389748
		Ref No.:	754-PERGE389748

1 PROJECT DATA

1.1	Project Name:	Woodie Woodie Operations	1.2	Date:	October 2025
1.3	TSF Name:	Homestead Pit TSF (HPTSF)	1.4	Commodity:	Manganese
1.5	Name of Data Provider:*	ConsMin / Coffey	1.6	Phone:*	+61 8 9460 7117
1.7	TSF Centre Co-ordinates (GDA 2020/MGA Zone 51):			7,605,550 m North	318,650 m East
1.8	Lease Numbers:	M45/638			

2. TSF DATA

2.1 TSF Status: Proposed ☐ Current ☒ Disused ☐ Rehabilitated ☐

2.2	Type of TSF:[1]	In-pit	2.2.1	Number of cells:[2]	1
2.3	Hazard Rating:[3]	Low	2.4	TSF Category:[4]	3
2.5	Catchment Area:[5]	14.0 ha	2.6	Nearest Watercourse:	None nearby
2.7	Date Deposition Started (mm/yy):	February 2017	2.7.1	Date Deposition Completed (mm/yy):	Current
2.8	Tailings Discharge Method:[6]	Single spigot	2.8.1	Water Recovery Method:[7]	Floating pump
2.9	Bottom of Facility Sealed or Lined?:	No	2.9.1	Type of Seal or Liner:[8]	N/A
2.10	Depth to Original Groundwater Level:	95 m	2.10.1	Original Groundwater TDS:	<1,000 mg/L
2.11	Ore Process:[9]	Heavy media beneficiation	2.12	Material Storage Rate:[10]	0.71×10^6 tpa
2.13	Impoundment Volume (present):	4.583×10^6 m^3	2.13.1	Expected Maximum:	4.630×10^6 m^3
2.14	Mass of Solids Stored (present):	6.141 Mt	2.14.1	Expected Maximum:	6.204 Mt

3. ABOVE GROUND FACILITIES

3.1	Foundation Soils:	N/A	3.1.1	Foundation Rocks:	N/A
3.2	Starter Bund Construction Materials:[11]	N/A	3.2.1	Wall Lifting by:[12]	Upstream ☐ Downstream ☐ Centre line ☐
3.3	Wall Construction by:	Mechanically ☐ Hydraulically ☐	3.3.1	Wall Lifting Material:[13]	N/A
3.4	Present Maximum Wall Height:[14]	N/A	3.4.1	Expected Maximum:	N/A
3.5	Crest Length (present):	N/A	3.5.1	Expected Maximum:	N/A
3.6	Impoundment Area (present):	N/A	3.6.1	Expected Maximum:	N/A

4. BELOW GROUND / IN-PIT FACILITIES – N/A

4.1	Initial Pit Depth (maximum):	115 m	4.2	Area of Pit Base:	973 m^2
4.3	Thickness of Tailings (present):	99 m (estimated)	4.3.4	Expected Maximum:	114 m
4.4	Current Surface Area of Tailings:	10.9 ha	4.5	Final Surface Area of Tailings:	12 ha

5. PROPERTIES OF TAILINGS

5.1	TDS:	<1,000 mg/L	5.2	pH:	7.8
5.3	Solids Content:	23.0%	5.4	Deposited Density:	1.34 t/m^3
5.5	WAD CN:	N/A	5.6	Total CN:	N/A
5.7	Potentially Hazardous Substances:[15]	none			
5.8	Any Other NPI Listed Substances in the TSF?[16]	No			

Not to be recorded in the database; for 1, 2, 3 etc. see explanatory notes on Figure 9.

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TAILINGS STORAGE DATA SHEET					
Please answer all questions, with separate sheets for cells of different ages.			Coffey Job No.:	754-PERGE389748	
			Ref No.:	754-PERGE389748	
1 PROJECT DATA					
1.1	Project Name:	Woodie Woodie Operations	1.2	Date:	October 2025
1.3	TSF Name:	Area 1 Pit TSF (A1PTSF)	1.4	Commodity:	Manganese
1.5	Name of Data Provider:*	ConsMin / Coffey	1.6	Phone:*	+61 8 9460 7117
1.7	TSF Centre Co-ordinates (GDA 2020/MGA Zone 51):		7,607,370 m North		315,660 m East
1.8	Lease Numbers:	M45/432 and M45/517			
2. TSF DATA					
2.1	TSF Status:	Proposed ☐ Current ☐ Disused ☒ Rehabilitated ☐			
2.2	Type of TSF:[1]	In-pit	2.2.1	Number of cells:[2]	1
2.3	Hazard Rating:[3]	Low	2.4	TSF Category:[4]	3
2.5	Catchment Area:[5]	6.1 ha	2.6	Nearest Watercourse:	None nearby
2.7	Date Deposition Started (mm/yy):	December 2009	2.7.1	Date Deposition Completed (mm/yy):	N/A
2.8	Tailings Discharge Method:[6]	None	2.8.1	Water Recovery Method:[7]	None
2.9	Bottom of Facility Sealed or Lined?:	No	2.9.1	Type of Seal or Liner:[8]	N/A
2.10	Depth to Original Groundwater Level:	27 m	2.10.1	Original Groundwater TDS:	900 mg/L
2.11	Ore Process:[9]	Heavy media beneficiation	2.12	Material Storage Rate:[10]	0 tpa
2.13	Impoundment Volume (present):	1.65 x 10^6 m^3	2.13.1	Expected Maximum:	1.83 x 10^6 m^3
2.14	Mass of Solids Stored (present):	3.1 Mt	2.14.1	Expected Maximum:	3.8 Mt
3. ABOVE GROUND FACILITIES					
3.1	Foundation Soils:	N/A	3.1.1	Foundation Rocks:	N/A
3.2	Starter Bund Construction Materials:[11]	N/A	3.2.1	Wall Lifting by:[12]	Upstream ☐ Downstream ☐ Centre line ☐
3.3	Wall Construction by:	Mechanically ☐ Hydraulically ☐	3.3.1	Wall Lifting Material:[13]	N/A
3.4	Present Maximum Wall Height:[14]	N/A	3.4.1	Expected Maximum:	N/A
3.5	Crest Length (present):	N/A	3.5.1	Expected Maximum:	N/A
3.6	Impoundment Area (present):	N/A	3.6.1	Expected Maximum:	N/A
4. BELOW GROUND / IN-PIT FACILITIES – N/A					
4.1	Initial Pit Depth (maximum):	48 m	4.2	Area of Pit Base:	<400 m^2
4.3	Thickness of Tailings (present):	34 m (estimated)	4.3.4	Expected Maximum:	38.5 m
4.4	Current Surface Area of Tailings:	1.76 ha	4.5	Final Surface Area of Tailings:	5.7 ha
5. PROPERTIES OF TAILINGS					
5.1	TDS:	<1,000 mg/L	5.2	pH:	7.8
5.3	Solids Content:	23.0%	5.4	Deposited Density:	1.87 t/m^3
5.5	WAD CN:	N/A	5.6	Total CN:	N/A
5.7	Potentially Hazardous Substances:[15]	none			
5.8	Any Other NPI Listed Substances in the TSF?[16]	No			

Not to be recorded in the database; for 1, 2, 3 etc. see explanatory notes on Figure 9.

FIGURE 5

TAILINGS STORAGE DATA SHEET

Please answer all questions, with separate sheets for cells of different ages.		Coffey Job No.:	754-PERGE389748
		Ref No.:	754-PERGE389748

1 PROJECT DATA

1.1 Project Name:	Woodie Woodie Operations	1.2 Date:	October 2025
1.3 TSF Name:	Malta Pit TSF (MPTSF)	1.4 Commodity:	Manganese
1.5 Name of Data Provider:*	ConsMin / Coffey	1.6 Phone:*	+61 8 9460 7117
1.7 TSF Centre Co-ordinates (GDA 2020/MGA Zone 51):		7,607,375 m North	315,660 m East
1.8 Lease Numbers:	M45/638		

2. TSF DATA

2.1 TSF Status: Proposed ☐ Current ☐ Disused ☒ Rehabilitated ☐

2.2 Type of TSF:[1]	In-pit	2.2.1 Number of cells:[2]	1
2.3 Hazard Rating:[3]	Low	2.4 TSF Category:[4]	3
2.5 Catchment Area:[5]	2.2 ha	2.6 Nearest Watercourse:	None nearby
2.7 Date Deposition Started (mm/yy):	December 2012	2.7.1 Date Deposition Completed (mm/yy):	December 2013
2.8 Tailings Discharge Method:[6]	None	2.8.1 Water Recovery Method:[7]	None
2.9 Bottom of Facility Sealed or Lined?:	No	2.9.1 Type of Seal or Liner:[8]	N/A
2.10 Depth to Original Groundwater Level:	40 m	2.10.1 Original Groundwater TDS:	900 mg/L
2.11 Ore Process:[9]	Heavy media beneficiation	2.12 Material Storage Rate:[10]	0 tpa
2.13 Impoundment Volume (present):	0.28×10^6 m^3	2.13.1 Expected Maximum:	0.35×10^6 m^3
2.14 Mass of Solids Stored (present):	0.165 Mt	2.14.1 Expected Maximum:	0.55 Mt

3. ABOVE GROUND FACILITIES

3.1 Foundation Soils:	N/A	3.1.1 Foundation Rocks:	N/A
3.2 Starter Bund Construction Materials:[11]	N/A	3.2.1 Wall Lifting by:[12]	Upstream ☐ Downstream ☐ Centre line ☐
3.3 Wall Construction by:	Mechanically ☐ Hydraulically ☐	3.3.1 Wall Lifting Material:[13]	N/A
3.4 Present Maximum Wall Height:[14]	N/A	3.4.1 Expected Maximum:	N/A
3.5 Crest Length (present):	N/A	3.5.1 Expected Maximum:	N/A
3.6 Impoundment Area (present):	N/A	3.6.1 Expected Maximum:	N/A

4. BELOW GROUND / IN-PIT FACILITIES – N/A

4.1 Initial Pit Depth (maximum):	30 m	4.2 Area of Pit Base:	15 m^2
4.3 Thickness of Tailings (present):	29 m	4.3.4 Expected Maximum:	29 m
4.4 Current Surface Area of Tailings:	1.158 ha	4.5 Final Surface Area of Tailings:	1.158 ha

5. PROPERTIES OF TAILINGS

5.1 TDS:	<1,000 mg/L	5.2 pH:	7.8
5.3 Solids Content:	23.0%	5.4 Deposited Density:	1.7 t/m^3
5.5 WAD CN:	N/A	5.6 Total CN:	N/A
5.7 Potentially Hazardous Substances:[15]	none		
5.8 Any Other NPI Listed Substances in the TSF?[16]	No		

Not to be recorded in the database; for 1, 2, 3 etc. see explanatory notes on Figure 9.

FIGURE 6

TETRA TECH COFFEY

TAILINGS STORAGE DATA SHEET

Please answer all questions, with separate sheets for cells of different ages.		Coffey Job No.:	754-PERGE389748
		Ref No.:	754-PERGE389748

1 PROJECT DATA

1.1	Project Name:	Woodie Woodie Operations	1.2	Date:	October 2025
1.3	TSF Name:	Dartmoor Pit TSF (DaPTSF)	1.4	Commodity:	Manganese
1.5	Name of Data Provider:*	ConsMin / Coffey	1.6	Phone:*	+61 8 9460 7117
1.7	TSF Centre Co-ordinates (GDA 2020/MGA Zone 51):			7,605,550 m North	318,650 m East
1.8	Lease Numbers:	M45/517 and M45/637			

2. TSF DATA

2.1	TSF Status:	Proposed ☐ Current ☐ Disused ☒ Rehabilitated ☐			
2.2	Type of TSF:[1]	In-pit	2.2.1	Number of cells:[2]	1
2.3	Hazard Rating:[3]	Low	2.4	TSF Category:[4]	3
2.5	Catchment Area:[5]	2.5 ha	2.6	Nearest Watercourse:	None nearby
2.7	Date Deposition Started (mm/yy):	December 2012	2.7.1	Date Deposition Completed (mm/yy):	N/A
2.8	Tailings Discharge Method:[6]	N/A	2.8.1	Water Recovery Method:[7]	None
2.9	Bottom of Facility Sealed or Lined?:	No	2.9.1	Type of Seal or Liner:[8]	N/A
2.10	Depth to Original Groundwater Level:	40 m	2.10.1	Original Groundwater TDS:	900 mg/L
2.11	Ore Process:[9]	Heavy media beneficiation	2.12	Material Storage Rate:[10]	0 tpa
2.13	Impoundment Volume (present):	0.2×10^6 m^3	2.13.1	Expected Maximum:	0.25×10^6 m^3
2.14	Mass of Solids Stored (present):	0.3 Mt	2.14.1	Expected Maximum:	0.38 Mt

3. ABOVE GROUND FACILITIES

3.1	Foundation Soils:	N/A	3.1.1	Foundation Rocks:	N/A
3.2	Starter Bund Construction Materials:[11]	N/A	3.2.1	Wall Lifting by:[12]	Upstream ☐ Downstream ☐ Centre line ☐
3.3	Wall Construction by:	Mechanically ☐ Hydraulically ☐	3.3.1	Wall Lifting Material:[13]	N/A
3.4	Present Maximum Wall Height:[14]	N/A	3.4.1	Expected Maximum:	N/A
3.5	Crest Length (present):	N/A	3.5.1	Expected Maximum:	N/A
3.6	Impoundment Area (present):	N/A	3.6.1	Expected Maximum:	N/A

4. BELOW GROUND / IN-PIT FACILITIES – N/A

4.1	Initial Pit Depth (maximum):	40 m	4.2	Area of Pit Base:	10 m^2
4.3	Thickness of Tailings (present):	38.15 m	4.3.4	Expected Maximum:	38.15 m
4.4	Current Surface Area of Tailings:	<1.0 ha	4.5	Final Surface Area of Tailings:	<1.0 ha

5. PROPERTIES OF TAILINGS

5.1	TDS:	<1,000 mg/L	5.2	pH:	7.8
5.3	Solids Content:	23.0%	5.4	Deposited Density:	1.5 t/m^3
5.5	WAD CN:	N/A	5.6	Total CN:	N/A
5.7	Potentially Hazardous Substances:[15]	none			
5.8	Any Other NPI Listed Substances in the TSF?[16]	No			

Not to be recorded in the database; for 1, 2, 3 etc. see explanatory notes on Figure 9.

FIGURE 7

TAILINGS STORAGE DATA SHEET

Please answer all questions, with separate sheets for cells of different ages.		Coffey Job No.:	754-PERGE389748
		Ref No.:	754-PERGE389748

1 PROJECT DATA

1.1 Project Name:	Woodie Woodie Operations	1.2 Date:	October 2025
1.3 TSF Name:	Demon Pit TSF (DePTSF)	1.4 Commodity:	Manganese
1.5 Name of Data Provider:*	ConsMin / Coffey	1.6 Phone:*	+61 8 9460 7117
1.7 TSF Centre Co-ordinates (GDA 2020/MGA Zone 51):		7,609,100 m North	316,800 m East
1.8 Lease Numbers:	M45/638		

2. TSF DATA

2.1 TSF Status:	Proposed ☐ Current ☐ Disused ☒	Rehabilitated ☐	
2.2 Type of TSF:[1]	In-pit	2.2.1 Number of cells:[2]	1
2.3 Hazard Rating:[3]	Low	2.4 TSF Category:[4]	3
2.5 Catchment Area:[5]	21.1 ha	2.6 Nearest Watercourse:	None nearby
2.7 Date Deposition Started (mm/yy):	May 2014	2.7.1 Date Deposition Completed (mm/yy):	N/A
2.8 Tailings Discharge Method:[6]	None	2.8.1 Water Recovery Method:[7]	None
2.9 Bottom of Facility Sealed or Lined?:	No	2.9.1 Type of Seal or Liner:[8]	N/A
2.10 Depth to Original Groundwater Level:	85.53 m	2.10.1 Original Groundwater TDS:	900 mg/L
2.11 Ore Process:[9]	Heavy media beneficiation	2.12 Material Storage Rate:[10]	0 tpa
2.13 Impoundment Volume (present):	0.08×10^6 m^3	2.13.1 Expected Maximum:	3.83×10^6 m^3
2.14 Mass of Solids Stored (present):	0.12 Mt	2.14.1 Expected Maximum:	5.75 Mt

3. ABOVE GROUND FACILITIES

3.1 Foundation Soils:	N/A	3.1.1 Foundation Rocks:	N/A
3.2 Starter Bund Construction Materials:[11]	N/A	3.2.1 Wall Lifting by:[12]	Upstream ☐ Downstream ☐ Centre line ☐
3.3 Wall Construction by:	Mechanically ☐ Hydraulically ☐	3.3.1 Wall Lifting Material:[13]	N/A
3.4 Present Maximum Wall Height:[14]	N/A	3.4.1 Expected Maximum:	N/A
3.5 Crest Length (present):	N/A	3.5.1 Expected Maximum:	N/A
3.6 Impoundment Area (present):	N/A	3.6.1 Expected Maximum:	N/A

4. BELOW GROUND / IN-PIT FACILITIES – N/A

4.1 Initial Pit Depth (maximum):	99 m	4.2 Area of Pit Base:	<50 m^2
4.3 Thickness of Tailings (present):	35 m (estimated)	4.3.4 Expected Maximum:	79 m
4.4 Current Surface Area of Tailings:	<1.0 ha	4.5 Final Surface Area of Tailings:	16.3 ha

5. PROPERTIES OF TAILINGS

5.1 TDS:	<1,000 mg/L	5.2 pH:	7.8
5.3 Solids Content:	23.0%	5.4 Deposited Density:	1.0 t/m^3
5.5 WAD CN:	N/A	5.6 Total CN:	N/A
5.7 Potentially Hazardous Substances:[15]	none		
5.8 Any Other NPI Listed Substances in the TSF?[16]	No		

Not to be recorded in the database; for 1, 2, 3 etc. see explanatory notes on Figure 9.

EXPLANATORY NOTES FOR COMPLETING TAILINGS STORAGE DATA SHEET

The following notes are provided to assist the proponent to complete the tailings storage data sheet.

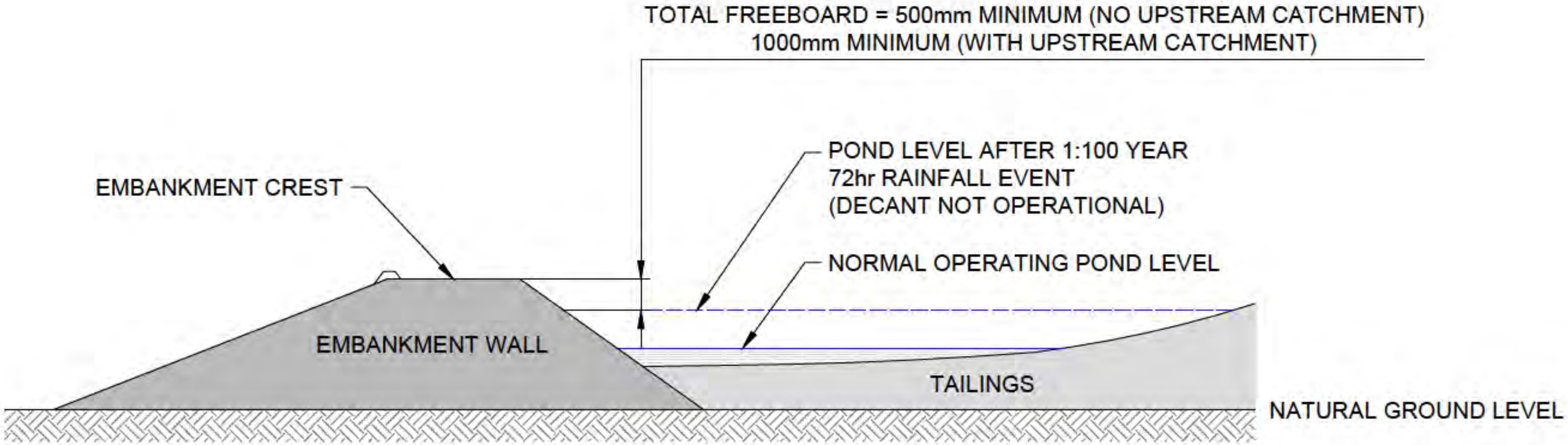
1. Paddock (ring-dyke), cross-valley, side-hill, in-pit, depression, waste fill etc.
2. Number of cells operated using the same decant arrangement.
3. See Table 1 in the Guidelines.
4. See Figure 1 in the Guidelines
5. Internal for paddock (ring-dyke) type, internal plus external catchment for other facilities.
6. End of pipe (fixed), end of pipe (movable), single spigot, multi-spigots, cyclone, CTD (Central Thickened Discharge) etc.
7. Gravity feed decant, pumped decant, floating pump etc.
8. Clay, synthetic etc.
9. See list below for ore process method.
10. Tonnes of solids per year
11. Record only the main material(s) used for construction eg: clay, sand, silt, gravel, laterite, fresh rock, weathered rock, tailings, clayey sand, clayey gravel, sandy clay, silty clay, gravelly clay, etc or any combination of these materials.
12. Wall lifting method during the reporting period, if raised.
13. If the wall has been raised during the reporting period, the wall lifting material used. Is it tailings or any other (or combination of) material(s) listed under item 11 above.
14. Maximum wall height above the ground level (not AHD or RL).
15. Arsenic, Asbestos, Caustic soda, Copper sulphide, Cyanide, Iron sulphide, Lead, Mercury, Nickel sulphide, Sulphuric acid, Xanthates etc.
16. NPI – National Pollution Inventory. Contact Dept of Environmental Protection for information on NPI listed substances.

ORE PROCESS METHODS

The ore process methods may be recorded as follows:

Atmospheric Acid Leaching	Atmospheric Alkali Leaching
Bayer process	Becher process
BIOX	CIL/CIP
Crushing and screening	Flotation
Gravity separation	Heap Leaching
Magnetic separation	Ore sorters
Pressure Acid leaching	Pressure Alkali leaching
Pyromets	SX/EW (Solvent Extraction/Electro Wining)
Vat leaching	Washing and screening

FIGURE 9



NOTE: FOR CASE WHERE POND IS NORMALLY LOCATED AGAINST PERIMETER EMBANKMENTS

DRAWN:	[redacted]
DESIGNED:	
APPROVED:	
DATE:	10/11/2025
SCALE:	NTS
ORIGINAL SIZE:	A4

TETRA TECH COFFEY

CLIENT:	CONSOLIDATED MINERALS PTY LTD		
PROJECT:	WOODIE WOODIE OPERATIONS ANNUAL TSF AUDIT AND REVIEW 2025		
TITLE:	FREEBOARD NOMENCLATURE FROM DMPE		
PROJECT NO: 754-PERGE389748	DWG NO: FIGURE 6	REV: A	

DWG: F:\PROJECTS OCT 2016 ONWARDS\Consolidated Minerals\754-PERGE389748 - Woodie Woodie TSF Audits 2025\8. Reports\8.2 Audit 2\Figures\Drawings (Audit 2)\00Drawings\Figure 6.dwg

APPENDIX A: DWER LICENSE

Licence

Licence Number	L6131/1990/13
Licence Holder	Pilbara Manganese Pty Ltd
ACN	074 106 577
Registered business address	L2/24 Outram Street WEST PERTH WA 6005
File Number	DER2013/001337-1
Duration	01/10/2013 to 30/09/2028
Date of amendment	29 July 2020
Premises	Woodie Woodie Manganese Project Mining tenements: G45/332, G45/333, G45/334, G45/335, G45/336, G45/37-40, G46/4-5, L46/29, M45/107, M45/429-433, M45/517, M45/600-602, M45/637-641, M45/1218, M46/92-93, M46/108, M46/137, M46/150, M46/161-162, M46/383, M46/384, G45/279-284 MARBLE BAR WA 6760
Prescribed Premises	Category 5: Processing or beneficiation of metallic or non-metallic ore Category 6: Mine dewatering Category 54: Sewage facility Category 73: Bulk storage of materials Category 89: Putrescible landfill site As defined in Schedule 2

This Licence amendment is granted to the Licence Holder, subject to the following conditions, on 29 July 2020 by:

Lauren Fox
A/MANAGER – RESOURCE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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Introduction

This Introduction is not part of the Licence conditions.

DWER's industry licensing role

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

DWER has responsibilities under Part V of the *Environmental Protection Act 1986* (the Act) for the licensing of prescribed premises. Through this process, DWER regulates to prevent, control and abate pollution and environmental harm to conserve and protect the environment. DWER 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/Licence Holder 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 instruments. Legislation can be accessed through the State Law Publisher website using the following link: https://www.legislation.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

Pilbara Manganese Pty Ltd (PMPL) owns and operates the Woodie Woodie Manganese Project (Woodie Woodie) located approximately 400 kilometres south east of the town of Port Hedland in the Pilbara region. The site consists of a number of leases and covers an area of 10,110 hectares.

The site has the capacity to process up to 5,000,000 tonnes of ore per year from a variety of pits at any one time. The mined ore is transported to a centrally located beneficiation plant where it is blended, crushed, screened and washed before being put through a heavy media separation plant. Lump manganese is produced via a drum separator and fines manganese via a cyclone separator.

Tailings from mining operation are piped to one of five in-pit tailings storage facilities. The pits are areas previously mined and range in capacity from 250,000 m^3 to 8,520,000 m^3.

The site undertakes dewatering to enable mining to occur and has the capacity to discharge 55,188,000 tonnes of water per year. The dewatering water is pumped via in pit sumps and ex-pit bores. Ex-pit bores discharge via the W12 discharge location. In pit sumps are pumped to sedimentation ponds before being discharged to one of three ephemeral creek systems.

Associated infrastructure includes a wastewater treatment plant (WWTP), which services the accommodation and offices buildings and is capable of treating up to 150 m^3 of effluent per day, and putrescible landfills which are located within a disused pit or approved waste rock dumps and are capable of receiving 1,950 tonnes of waste per year.

Licence summary

This Licence was amended in November 2015 as a result of an amendment sought by the Licence Holder to:

- add an additional sampling point at the extended WWTP irrigation area;
- addition of the Topvar dewatering pipeline and discharge location into Brumby Creek (W5821/2015/1); and
- allow dewatering of a new pit within the Hunter Pit extension project, Hunter SE, through an existing sedimentation pond (Cracker sedimentation pond, W1) which is adjacent to the Hunter pits. The Cracker sedimentation pond is within the same creek system (Muddauthera Creek) as where dewater from Hunter is currently approved for discharge.

Other changes made in the November 2015 amendment by DWER included:

- improvement conditions relating to upgrades to the WWTP and permeability investigations of the bioremediation facility were met and therefore removed from the Licence during the amendment;
- a new date for completion of the Bioremediation Facility was agreed and updated; and
- due to Departmental reform at the time, a number of changes were made to the Licence that were justified in the Decision Document. These changes included removing targets, whilst retaining limits on a risk basis.

The January 2016 amendment added a number of mining tenements to the licence, included the Greensnake landfill constructed under works approval W5832/2015/1 and removed improvement conditions for the bioremediation facility.

The April 2016 amendment was due to the site going into Care and Maintenance. The Licence Holder requested that the tailings inspections be reduced from daily to weekly when the facilities were inactive. The Licence Holder also requested that the weather stations at Telfer be used to measure site rainfall and evaporation rather than the site weather stations, which would be decommissioned (this did not result in an amendment to the licence as the weather stations were not specified in the Licence).

Amendment April 2020

The CEO initiated an amendment to the type and style of the licence during April 2020 and issued a revised licence consolidating changes made under Amendment Notices issued between 2016 to 2019 (as detailed in the instrument log below), where relevant. The obligations of the Licence Holder have not changed in making this amendment. During the consolidation of this amendment, DWER has not undertaken any additional risk assessment of the Premises.

In consolidating the licence, the CEO has:

- updated the format and appearance of the Licence;
- deleted the redundant AACR form set out in schedule 1 of the previous licence and advised the Licence Holder to obtain the form from the Department's website;
- revised licence condition numbers, removed any redundant conditions and realigned condition numbers for numerical consistency; and
- corrected clerical mistakes and unintentional errors.

The licences and works approvals issued for the Premises since 1/10/2004 are:

Instrument log		
Instrument	**Issued**	**Description**
L6131/1990/9	1/10/2004	Licence reissue.
L6131/1990/9	28/4/2006	Licence amendment.
L6131/1990/10	28/09/2006	Licence reissue.
W4369/2007/1	20/9/2007	Works approval. In pit tailing storage.
L6131/1990/11	18/9/2008	Licence reissue. Added category 54 and 89 to the licence.
L6131/1990/12	30/9/2010	Licence reissue. Added conditions for WWTP monitoring, landfill management and targets for dewatering monitoring.
L6131/1990/12	29/3/2012	Proponent amendment: Additional conditions for tyre disposal, bioremediation facility management, changes annual period and update monitoring sites.
W5216/2012/1	12/8/2012	Works approval. In pit tailing storage.
L6131/1990/13	26/09/2013	Licence reissue and REFIRE conversion.
L6131/1990/13	30/04/2015	Proponent requested licence amendment.
L6131/1990/13	26/11/2015	Proponent requested licence amendment.
L6131/1990/13	25/02/2016	Licence amended to add tenements, include the Greensnake landfill and remove improvement conditions for the bioremediation facility.
L6131/1990/13	29/04/2016	Department initiated amendment in accordance with section 59(1)(k) of the Act to amend the duration of the licence date month year.
L6131/1990/13	30/06/2016	Licence amended as the mine went in Care and Maintenance and to reduce the frequency of TSF inspections from daily to weekly and converting back to the Telfer's weather stations for weather records.
L6131/1990/13	22/12/2016	Amendment Notice: Licence Holder advised that the mine will resume operation and TSF inspections revert back to daily. Condition 4.3.1 was amended to reduce the required period of notice.
L6131/1990/13	31/03/2017	Amendment Notice 2: a Licence Holder initiated amendment to include the Homestead In-Pit tailing storage and its groundwater monitoring bores that were approved via works approval W5821/2015/1. Additional parameters for mine dewatering discharge were added and ambient surface water quality respectively have been updated to include chloride, sulfate, sodium, potassium, cobalt, iron, nickel, selenium, mercury, chromium(VI) and total chromium to fully assess the potential impacts of discharging dewatering effluent to rivers near the mine site.
L6131/1990/13	1/11/2017	Amendment Notice 3: on 21 August 2017 the Licence Holder applied for the following changes: • Change in treatment methods for the licensed WWTP; and • To allow dewatering water from Hunter pit to be discharged into Cracker Sedimentation Pond, prior to discharge to Muddauthera Creek.
L6131/1990/13	2/05/2018	Amendment Notice 4: on 19 December 2017 the Licence Holder applied for the following amendments to the licence: • Construction and operation of a new bioremediation area on top of the Greensnake Western Waste Dump; and

Instrument log		
Instrument	**Issued**	**Description**
		• Disposal of waste tyres within the Chutney/Vespa Waste Dump. On 1 March 2017 an application for additional amendment received for the following: • An increase to the approved throughput for Category 89 from 1,650 tonnes per annum (tpa) to 1,950 tpa.
L6131/1990/13	30/01/2019	Amendment Notice 5: on 25 October 2018 the Licence Holder applied for the following amendment in the licence: • Dispose waste tyres within the Paystar Waste Dump; • Dispose waste tyres within the Bells West Pit; • Extend the Greensnake Landfill footprint; • Dispose dewatering discharge from Extension Cord pit into Paystar pit; and • Dispose dewatering discharge from Topvar Pit into Cracker (W1) sedimentation pond, which discharges to Muddauthera Creek.
L6131/1990/13	29/07/2020	DWER initiated amendment to consolidate/ amalgamate separately issued Licence amendment notices in the main Licence.

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:

'AACR' means Annual Audit Compliance Report, a report in a format approved by the CEO as presented by the Licence Holder or as specified by the CEO from time to time and published on the Department's website and a copy of the AACR form is accessible from the Department's website.

'ACN' means Australian Company Number;

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

'Anniversary Date' means 30 September of each year;

'Annual Period' means the inclusive period from 1 October until 30 September in the following year;

'ANZECC (2000)' means the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) produced by Australian and New Zealand Environment and Conservation Council and the Agricultural and Resources Management Council of Australia and New Zealand;

'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 5667.9' means the Australian Standard AS/NZS 5667.9 *Water Quality - Sampling Guidance on sampling from marine waters;*

'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;

'bioremediation' means the above-ground remediation of soils to reduce the concentrations of hydrocarbons through biodegradation. The process involves the stimulation of bacteria in the soil, which consume hydrocarbons as an energy source, releasing water and carbon dioxide as the ultimate breakdown products. This may include bioaugmentation of microbes to target specific contaminants;

'CEO' means Chief Executive Officer of the department;

'CEO' for the purpose of correspondence means:

Director General
Department Administering the *Environmental Protection Act 1986*
Locked Bag 10
JOONDALUP DC WA 6027
info@dwer.wa.gov.au

'clean fill' has the meaning defined in Landfill Definitions;

'cfu/100mL' means colony-forming unit per one hundred millilitres;

'controlled waste' has the definition in *Environmental Protection (Controlled Waste) Regulations 2004*;

'Department' means the department established under s.35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Division 3 Part V of the *Environmental Protection Act 1986*;

'DWER' means Department of Water and Environmental Regulation;

'environmentally hazardous material' means material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, byproducts and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm. Note: Environmentally hazardous materials include dangerous goods where they are stored in quantities below placard quantities. The storage of dangerous goods above placard quantities is regulated by the Department of Mines and Petroleum;

'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 Definitions 1996 (as amended 2018)" published by the CEO of the Department, as amended from time to time;

'Licence' means this Licence numbered L6131/1990/13 and issued under the Act;

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

'kg/ha' means kilogram per hectare (application rate);

'm^3' means cubic meters;

'mg/L' means milligram per litre;

'mg/m^2' means milligram per square metre;

'mm' means millimetre;

'**mgbl'** means metres below ground level;

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

'NATA accredited/accreditation' 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;

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

'putrescible' has the meaning defined in Landfill Definitions;

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

'rehabilitation' means the completion of the engineering of a landfill cell and includes capping and/or final cover;

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

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

'Schedule 3' means Schedule 3 of this Licence unless otherwise stated;

'six monthly' means the 2 inclusive periods from 1 October to 31 March and 1 April to 30 September in the following year;

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

'TSF' means tailing storage facility;

'µg/L' means micrograms per litre;

'WWTP' means wastewater treatment plant, and

'zone of influence' means the area of a receiving environment with the potential to be altered or changed as a result of an emission or discharge.

1.1.3 Any reference to an Australian or other standard in the Licence means the relevant parts of 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 Licence Holder shall immediately recover, or remove and dispose of spills of environmentally hazardous materials outside an engineered containment system.

1.3 Premises operation

1.3.1 The Licence Holder shall ensure that all pipelines containing environmentally hazardous materials are either:
(a) equipped with telemetry system and pressure sensors along pipelines to allow the detection of leaks and failures; or
(b) equipped with automatic cut-outs in the event of a pipe failure; or
(c) provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections.

The Licence Holder shall ensure that waste materials are only stored/treated within vessels or compounds provided with the infrastructure detailed in Table 1.3.1 and identified on the Premises map in Schedule 1.

Table 1.3.1: Containment infrastructure

Containment point reference	Material	Specification
Demon Pit TSF (DEPTSF) Dartmoor Pit TSF (DAPTSF) Malta Pit TSF (MAPTSF) Area 1 Pit TSF (A1PTSF) Homestead TSF (HPTSF)	Tailings	A minimum total freeboard of 820 mm from the top of the pit crest is maintained at all times
Process Water Pond	TSF return water and mine dewater	A minimum total freeboard of 500 mm or a 1 in 100 year/72 hour storm event (whichever is greater) from the top of the embankment is maintained at all times. Methods of operation minimise the likelihood of erosions of the embankment by wave action.
Bioremediation Facility	Hydrocarbon contaminated waste	Base and bunding clay lined. Stormwater runoff diverted so as not to flow onto the treatment facility.

1.3.2 The Licence Holder shall manage each TSF detailed in Table 1.3.1 such that the supernatant pond on the TSF is minimised as far as practicable.

1.3.3 The Licence Holder shall undertake an annual water balance for each TSF detailed in Table 1.3.1. The water balance shall as a minimum consider the following:
(a) site rainfall;
(b) evaporation;
(c) decant water recovery volumes;
(d) seepage recovery volumes; and
(e) volumes of tailings deposited.

1.3.4 The Licence Holder shall:
(a) undertake inspection as detailed in Table 1.3.2;
(b) where any inspection identifies that an appropriate level of environmental protection is not being maintained, take corrective action to mitigate adverse environmental consequences as soon as practicable; and
(c) maintain record of all inspections undertaken.

Table 1.3.2: Inspection of infrastructure

Scope of inspection	Type of inspection	Frequency of inspection
Tailings pipelines	Visual integrity and leak assessment	Daily when the facilities are active Weekly when the facilities are inactive
Tailings return water lines		
Embankment freeboards of containment infrastructure listed in Table 1.3.1	Visual to confirm required freeboard capacity is available	

1.3.5 The Licence Holder shall ensure groundwater levels within the zone of influence at monitoring bores detailed in Table 3.6.3 and shown in Schedule 1, does not exceed the limit specified in Table 1.3.3.

Table 1.3.3: Groundwater level controls

Parameter	Limit (mbgl)	Averaging Period
Groundwater	4	Spot Sample

1.3.6 The Licence Holder shall, when standing water levels rise higher than 6 mbgl within monitoring bores detailed in Table 3.6.3 and shown in Schedule 1, provide the CEO with the following information:
(a) the monitoring bore location;
(b) the root cause analysis for the exceedances; and
(c) a description of remedial measures taken or planned to be taken.

1.3.7 The Licence Holder shall ensure that where wastes produced on the Premises are not taken offsite for lawful use or disposal, they are managed in accordance with the requirements of Table 1.3.4.

Table 1.3.4: Management of Waste

Facility	Waste type	Processes	Requirements[1,2]
Kia landfill Greensnake landfill	Clean Fill	Storage and disposal of waste by landfilling	<u>All waste types</u> No more than 1,950 tonnes per year of all waste types cumulatively shall be disposed of by landfilling.
	Putrescible Waste		
	Inert Waste Type 1		

Table 1.3.4: Management of Waste			
Facility	**Waste type**	**Processes**	**Requirements[1,2]**
Greensnake Tyre Disposal Facility Vespa/Chutney Waste Dump Paystar Waste Dump Bells West Pit	Inert Waste Type 2		Disposal of waste by landfilling shall only take place within the Kia landfill, Greensnake landfill, Paystar Waste Dump, Bells West Pit, Greensnake Tyre Disposal Facility and Vespa Waste Dump shown on the Premises map in Schedule 1. The separation distance between the base of the landfill and the highest groundwater level shall be not less than 3 metres. <u>Tyres (Inert Waste Type 2)[2]</u> Tyres shall only be landfilled within the Greensnake Tyre Disposal Facility, Vespa Waste Dump, Paystar Waste Dump and Bells West Pit shown on the Premises map in Schedule 1. Tyres shall consist of batches of no more than 1,000 tyres or 40 m^3 of tyre pieces. Batches must be separated from each other by at least 100 mm of soil. <u>Conveyor Belt (Inert Waste Type 2)[2]</u> No more than 600 tonnes of conveyor belts shall be disposed of by landfilling. Disposal of conveyor belts can only take place within the Greensnake Tyre Disposal Facility shown on the Premises map in Schedule 1. Conveyor belts shall be batched in volumes of 40 m^3 or less with batches separated by 100 mm or more of soil. The disposal site of tyres and conveyor belts must be surveyed and recorded for location and relative level.
Wastewater treatment plant	Sewage	Biological, physical and chemical treatment.	No more than 150 m^3 per day.

Note 1: Requirements for landfilling tyres are set out in Part 6 of the Environmental Protection Regulations 1987.
Note 2: Additional requirements for the acceptance and landfilling of controlled waste (including asbestos and tyres) are set out in the Environmental Protection (Controlled Waste) Regulations 2004.

1.3.8 The Licence Holder shall manage the landfilling activities to ensure:
  (a) waste is placed and compacted to ensure all faces are stable and capable of retaining rehabilitation material; and
  (b) rehabilitation of a cell or phase takes place within 6 months after disposal in that cell or phase has been completed.

1.3.9 The Licence Holder shall ensure that cover is applied and maintained on landfilled wastes in accordance with Table 1.3.5 and that sufficient stockpiles of cover are maintained on site at all times.

Table 1.3.5: Cover requirements[1]			
Waste Type	**Material**	**Depth**	**Timescales**
Inert Waste Type 1	No cover required		
Putrescible Waste	Type 1 Inert waste or soil	300 mm	Weekly or as soon as practicable after deposit.
Inert Waste Type 2		500 mm	As soon as practical following the achievement of final waste levels in the area(s) in which tyres are deposited.

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

1.3.10 The Licence Holder shall take all reasonable and practical measures to ensure that no wind-blown waste escapes from the Premises and that wind-blown waste is collected on at least a weekly basis and returned to the tipping area.

1.3.11 The Licence Holder shall manage the irrigation of treated wastewater such that:
- (a) no irrigation generated run-off, spray drift or discharge occurs beyond the boundary of the defined irrigation area(s);
- (b) treated wastewater is evenly distributed over the irrigation area;
- (c) no soil erosion occurs;
- (d) irrigation does not occur on land that is waterlogged; and
- (e) vegetation cover is maintained over the irrigation area.

1.3.12 The Licence Holder shall construct the Hunter, Extension Cord and Topvar dewatering pipelines in accordance with the requirements specified in the infrastructure requirements detailed in Table 1.3.6. The Licence Holder must not depart from the requirements specified in Table 1.3.6 except:
- (a) where such departures are minor in nature and do not materially change or affect the infrastructure; or
- (b) where such departure improves the functionality of the infrastructure and does not increase the risks to public health, public amenity or the environment;

and all other conditions in this Licence are still satisfied.

Table 1.3.6: Infrastructure requirements	
Infrastructure	**Requirements (design and construction)**
Extension Cord / Chutney pipeline	• Constructed of high density polyethylene • Pipeline contained within windrows, constructed from inert material • Flow meters installed to record volume of all water discharged into the Paystar pit
Topvar pipeline	• Constructed of high density polyethylene • Pipeline contained within windrows, constructed from inert material • Flow meters installed to record volume of all water discharged into the Cracker Sedimentation Pond

1.3.13 The Licence Holder shall operate the Hunter, Extension Cord and Topvar pits dewatering pipelines in accordance with the conditions of this Licence, following submission of the construction compliance document required under condition 4.3.1.

2 Emissions

2.1 General

2.1.1 The Licence Holder 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 Licence Holder 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	Emission point reference	Description	Source including abatement
W1	Cracker (CK1)	Discharge to Muddauthera Creek	Sedimentation Pond originating from dewatering at Austin, Big Mack, Lucy Mack, Demon, Hunter SE, Hunter and Topvar pits.
W2	Hunter (H2)		Sedimentation Pond originating from dewatering at Hunter pit.
W3	Radio Hill (RH1)		Sedimentation Pond originating from dewatering at Radio Hill pit.
W4	Sardine (SD1)		Sedimentation Pond originating from dewatering at Dhufish pit.
W5	Greensnake (GS1)	Discharge to Warri Warri Creek	Sedimentation Pond originating from dewatering at Greensnake pit.
W6	Lox (LX1)		Sedimentation Pond originating from dewatering at Lox pit.
W7	Airport (AP1)	Discharge to Brumby Creek	Sedimentation Pond originating from dewatering at Airport pit.
W8	Chris D (CD1)		Sedimentation Pond originating from dewatering at Chris D pit.
W9	Chutney (CT1)		Sedimentation Pond originating from dewatering at Chutney/Extension cord pits and Paystar.
W10	Homestead (HS1)		Sedimentation Pond originating from dewatering at Homestead pit.
W11	Rhodes (RD)		Sedimentation Pond originating from dewatering at Rhodes pit.
W12	Topvar (TD)		Dewatering from Big Mack pit and the Topvar Hub Dewatering Bores
W13	Paystar	Evaporate and reinfiltrate into the unconfined aquifer	Dewatering from Chutney/Extension Cord pit

2.2.2 The Licence Holder shall not cause or allow point sources emissions to surface water greater than the limits listed in Table 2.2.2.

Table 2.2.2: Point source emission limits to surface water			
Emission point reference	**Parameter**	**Limit (including units)**	**Averaging period**
W1- W12	Total Suspended Solids	80 mg/L	Spot sample

2.3 Emissions to land

2.3.1 The Licence Holder shall ensure that where waste is emitted to land from the emission points in Table 2.3.1 and identified on the maps of emission points in Schedule 1 it is done so in accordance with the conditions of this licence.

Table 2.3.1: Emissions to land			
Emission point reference on Maps of emission points	**Emission point reference**	**Description**	**Source including abatement**
L1	Storage pond	Pipe from oily water separator into unlined storage pond	Treated wastewater from oil water separator originating from Greensnake workshop and wash down area
L2 – L2a or L2b (dependent on disposal pattern)	Irrigation area	Effluent from accommodation camp wastewater treatment plant to on-site irrigation area	Treated effluent from wastewater treatment plant

2.3.2 The Licence Holder shall not cause or allow emissions to land greater than the limits listed in Table 2.3.2.

Table 2.3.2: Emissions limits to land			
Emission point reference	**Parameter**	**Limit (including units)**	**Averaging period**
L1	Total Recoverable Hydrocarbon	15 mg/L	Spot sample
L2 – L2a or L2b (dependent on disposal pattern)	Load of Total Nitrogen (TN)	480 kg/ha	Annual
	Load of Total Phosphorus (TP)	120 kg/ha	

3 Monitoring

3.1 General Monitoring

3.1.1 The Licence Holder shall ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1 unless otherwise indicated in the relevant table;
(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 unless indicated otherwise in the relevant table.

3.1.2 The Licence Holder shall ensure that:
(a) monthly monitoring is undertaken at least 15 days apart;
(b) quarterly monitoring is undertaken at least 45 days apart; and
(c) six monthly monitoring is undertaken at least 5 months apart.

3.1.3 The Licence Holder 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.

3.1.4 The Licence Holder 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 Licence Holder shall undertake the monitoring of emission points in Table 3.2.1 at locations identified on the map of monitoring points in Schedule 1 according to the specifications in that table.

Table 3.2.1: Monitoring of point source emissions to surface water

Emission point reference	Parameter	Units	Frequency
W1 W2 W3 W4 W5 W6 W7 W8 W9 W10 W11 W12 W13	Volume (cumulative)	m^3	Continuous
	pH[1]	pH units	Monthly
	Total Dissolved Solids	mg/L	
	Nitrate and Nitrite Nitrogen	mg/L	
	Total Kjeldahl Nitrogen	mg/L	
	Total Nitrogen	mg/L	
	Filterable Reactive Phosphorus	mg/L	
	Total Phosphorus	mg/L	
	Sodium	mg/L	
	Magnesium	mg/L	
	Zinc[2]	mg/L	
	Lead[2]	mg/L	
	Cadmium[2]	mg/L	
	Manganese	mg/L	
	Chloride	mg/L	
	Sulfate	mg/L	
	Potassium	mg/L	
	Cobalt	mg/L	
	Iron	mg/L	
	Nickel	mg/L	
	Selenium	mg/L	
	Mercury	mg/L	
	Chromium (VI)	mg/L	
	Total Chromium	mg/L	

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: With adjustments for hardness as per ANZECC (2000) guidelines

3.3 Monitoring of emissions to land

3.3.1 The Licence Holder shall undertake the monitoring of emission points in Table 3.3.1 at locations identified on the maps of monitoring points in Schedule 1 according to the specifications in the table.

Table 3.3.1: Monitoring of emissions to land			
Emission point reference	**Parameter**	**Units**	**Frequency**
L1	Total Recoverable Hydrocarbon	mg/L	Quarterly
L2a or L2b (dependent on disposal pattern)	pH[1]	pH units	
	Biochemical Oxygen Demand	mg/L	
	Total Suspended Solids	mg/L	
	Total Nitrogen	mg/L	
	Total Phosphorus	mg/L	
	E.coli	cfu/100mL	

Note 1: In-field non-NATA accredited analysis permitted.

3.4 Monitoring of inputs and outputs

3.4.1 The Licence Holder shall undertake the monitoring in Table 3.4.1 according to the specification is that table.

Table 3.4.1: Monitoring of inputs and outputs				
Input/ Output	**Parameter**	**Units**	**Averaging Period**	**Frequency**
Treated Wastewater	Volume (cumulative) recycled for on-site irrigation	m^3	Monthly	Continuous
Waste Inputs	Inert Waste Type 1, Inert Waste Type 2, Putrescible Waste, and Clean Fill	tonnes or m^3	N/A	Each load disposed

3.5 Process monitoring

3.5.1 The Licence Holder shall undertake the monitoring in Table 3.5.1 according to the specifications in that table.

Table 3.5.1: Process monitoring				
Process description	**Parameter**	**Units**	**Averaging Period**	**Frequency**
Tailings deposition	Volume of tailings deposited into each TSF	m^3	Monthly	None specified
	Volume of water recovered from each TSF			

3.6 Ambient environmental quality monitoring

3.6.1 The Licence Holder shall undertake the monitoring of monitoring points in Tables 3.6.1, 3.6.2, 3.6.3 and 3.6.4 at locations identified on the map of monitoring points in Schedule 1 according to the specifications in those tables.

Table 3.6.1: Monitoring of ambient surface water quality				
Monitoring point reference and location	**Parameter**	**Units**	**Averaging period**	**Frequency**
Downstream sites: Muddauthera Creek (MMS) Warri Warri (WWMS) Brumby Creek (BMS)	pH[1]	pH units	Spot sample	Monthly
	Total Dissolved Solids	mg/L		
	Total Suspended Solids			
	Nitrate and Nitrite Nitrogen			
	Total Kjeldahl Nitrogen			
	Total Nitrogen			
	Filterable Reactive Phosphorus			
	Total Phosphorus			
	Sodium			
	Magnesium			
	Zinc[2]			
	Lead[2]			
	Cadmium[2]			
	Manganese			
	Chloride			
	Sulfate			
	Potassium			
	Cobalt			
	Iron			
	Nickel			
	Selenium			
	Mercury			
	Chromium (VI)			
	Total Chromium			
Background site: Lower Carawine Gorge Pool (CG1) Tooma Stockyard (TS) Tooncoonaragee Pool (TC1) Oakover Crossing (OC)	pH[1]	pH units	Spot sample	Monthly (when accessible)
	Total Dissolved Solids	mg/L		
	Total Suspended Solids			
	Nitrate and Nitrite Nitrogen			
	Total Kjeldahl Nitrogen			
	Total Nitrogen			
	Filterable Reactive Phosphorus			
	Total Phosphorus			
	Sodium			
	Magnesium			
	Zinc[2]			
	Lead[2]			
	Cadmium[2]			
	Manganese			
	Chloride			
	Sulfate			
	Potassium			
	Cobalt			
	Iron			
	Nickel			
	Selenium			
	Mercury			
	Chromium (VI)			
	Total Chromium			
	Chlorophyll-a	µg/L		
	Phaeophytin			

Note 1: In-field non-NATA accredited analysis permitted.
Note 2: With adjustments for hardness as per ANZECC (2000) guidelines.

Table 3.6.2: Monitoring of sediment quality				
Monitoring point reference and location	**Parameter**	**Units**	**Averaging period**	**Frequency**
Background site: Lower Carawine Gorge Pool (CG1) Tooma Stockyard (TS) Tooncoonaragee Pool (TC1) Oakover Crossing (OC)	Chlorophyll-a	mg/m^2	Spot sample	Monthly (when accessible)
	Phaeophytin	mg/m^2		

Table 3.6.3: Monitoring of ambient groundwater quality				
Monitoring point reference and location	**Parameter**	**Units**	**Averaging period**	**Frequency**
Demon Pit TSF DEPTSFMB01 DEPTSFMB02 DEPTSFMB04 TSF2 TDMB1 Dartmoor TSF DAPTSFMB01 DAPTSFMB02 Malta TSF MAPTSFMB01 Homestead TSF HPTSFMB01 HPTSFMB02 HPTSFMB03	Standing water level	mbgl	Spot sample	Quarterly
	pH[1]	pH units		
	Total Dissolved Solids	mg/L		
	Total Nitrogen	mg/L		
	Arsenic	mg/L		
	Copper	mg/L		
	Molybdenum	mg/L		
	Selenium	mg/L		
	Uranium	mg/L		
	Hexavalent Chromium	mg/L		

Note 1: In-field non-NATA accredited analysis permitted.

Table 3.6.4: Monitoring of vegetation health			
Monitoring point reference and location	**Parameter**	**Averaging period**	**Frequency**
Brumby Creek Crossing (V1) Lower Carawine Pool (V2) Muddauthera Crossing (V3) Running Water Pool (V4) Tooma Stockyards (V5) Warri Warri Creek Crossing (V6)	Visually estimate the average foliage cover of the species *Eucalyptus camaldulensis* and *Melaleuca argentea*	Visual inspection	Six monthly
	Score the health condition of the species *Eucalyptus camaldulensis* and *Melaleuca argentea*		
	General environmental description of the site and record any changes since previous monitoring		
	Take replicate photographs of foliage density and shadow areas beneath trees		

3.6.2 The Licence Holder shall take the relevant action in the case of an event in Table 3.6.5.

Table 3.6.5: Management Action			
Monitoring point reference	**Event/action reference**	**Event**	**Management action**
V1 – V6	EA1	20% reduction in the average foliage density from previous monitoring at the same site	Undertake an investigation to determine if the impacts are attributable to dewatering at the premises. Include details of the investigation in the Annual Environmental Report and if attributable to dewatering include an outline of corrective action taken or planned to mitigate adverse environmental impacts and management measures to prevent a recurrence of the event.
	EA2	A 2 point reduction in the health condition from the previous monitoring at the same site.	

4 Information

4.1 Records

4.1.1 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 4.1.1(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.

4.1.2 The Licence Holder must submit to the CEO within 90 days after the Anniversary Date, an Annual Audit Compliance Report indicating the extent to which the Licence Holder has complied with the Conditions in this Licence for the Annual Period.

4.1.3 The Licence Holder 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.

4.2 Reporting

4.2.1 The Licence Holder shall submit to the CEO an Annual Environmental Report by 30 November each year. The report shall contain the information listed in Table 4.2.1 in the format or form specified in that table.

Table 4.2.1: 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
1.3.4	Water balance	None specified

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	**Parameter**	**Format or form[1]**
Table 2.2.2	Monitoring of point source emissions to surface water results – Total Suspended Solids (Limit)	WR1
Table 2.3.2	Total Recoverable Hydrocarbon	LR1
	Loading of Total Nitrogen and Total Phosphorus	LR2
Table 3.2.1	Monitoring of point source emissions to surface water results – pH, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese, Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium	WR2
Table 3.3.1	Monitoring of emissions to land	LR1
Table 3.4.1	Volume (cumulative) recycled for on-site irrigation	LR3
Table 3.4.1	Inert Waste Type 1, Inert Waste Type 2, Putrescible Waste and Clean Fill	None specified
Table 3.5.1	Process Monitoring: volume of tailings deposited and volume of water recovered.	None specified
Table 3.6.1	Downstream sites: pH, Total Suspended Solids, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium	WR3
	Background sites: pH, Total Suspended Solids, Total Dissolved Solids, Nitrate and Nitrite Nitrogen, Total Kjeldahl, Total Nitrogen, Filterable Reactive Phosphorus, Total Phosphorus, Sodium, Magnesium, Zinc, Lead, Cadmium, Manganese, Chloride, Sulfate, Potassium, Cobalt, Iron, Nickel, Selenium, Mercury, Chromium (VI) and Total Chromium, Chlorophyll-a and Phaeophytin	WR4
Table 3.6.2	Sediment - Chlorophyll-a and Phaeophytin	WR5
Table 3.6.3	Groundwater: Standing water level, pH, Total Dissolved Solids, Total Nitrogen, Arsenic, Copper, Molybdenum, Selenium, Uranium, Hexavalent Chromium	GR1
Table 3.6.4	Average foliage, health score and general environmental description	None specified
	Identical photographs of foliage density and shadow areas beneath trees	Photographs
Table 3.6.5	Management actions EA1 and EA2	None specified
4.1.2	Compliance	Annual Audit Compliance Report
4.1.3	Complaints summary	None specified

Note 1: Forms are in Schedule 3

4.2.2 The Licence Holder shall ensure that the Annual Environmental Report also contains an assessment of the information contained within the report against previous monitoring results and Licence limits.

4.2.3 The Licence Holder shall submit the information in Table 4.2.2 to the CEO according to the specifications in that table.

Table 4.2.2: Non-annual reporting requirements				
Condition or table (if relevant)	**Parameter**	**Reporting period**	**Reporting date (after end of the reporting period)**	**Format or form**
-	Copies of original monitoring reports submitted to the Licence Holder by third parties	Not Applicable	Within 14 days of the CEOs request	As received by the Licence Holder from third parties

4.3 Notification

4.3.1 The Licence Holder shall ensure that the parameters listed in Table 4.3.1 are notified to the CEO in accordance with the notification requirements of the table.

Table 4.3.1: Notification requirements			
Condition or table (if relevant)	**Parameter**	**Notification requirement[1]**	**Format or form[2]**
-	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
-	Recommencing start-up of operations (after a period of care and maintenance)	At least 21 days prior to recommencing production	None specified
1.3.7	Standing Water Level exceeding 6 mbgl	Within 7 calendar days of becoming aware of Standing Water Levels exceeding 6 mbgl	None specified
1.3.14	The Licence Holder shall submit a construction compliance document to the CEO, following construction of the Hunter, Extension Cord and Tovar dewatering pipelines. The compliance document shall: (a) Clearly detail how the Hunter, Extension Cord and Topvar dewatering pipelines have been constructed to meet the infrastructure requirements of condition 1.3.13 and identify any departures; (b) Be certified by a qualified professional engineer stating that the infrastructure specified in Table 1.3.6 has been constructed in accordance with the conditions of the Licence with no material defects; and (c) Be signed by a person authorised to represent the Licence Holder and contain the printed name and position of that person within the company.	Within 7 days after the completion of construction	None specified
3.1.4	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 3

Schedule 1: Maps

Figure 1 - Premises map

The Premises and key infrastructure is shown in the map below. The black line depicts the Premises boundary.

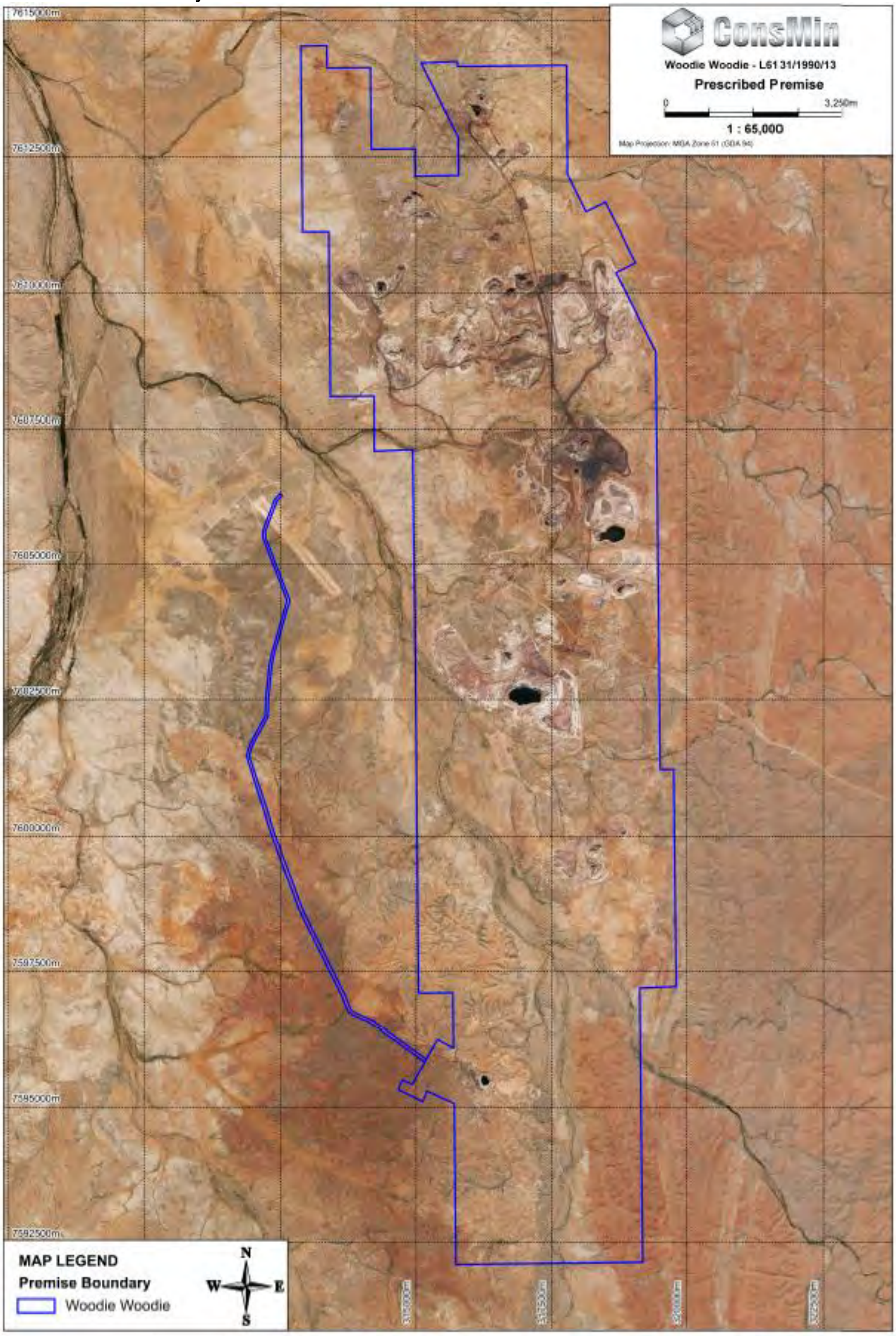

Figure 2 – Containment Infrastructure and Monitoring of Ambient Groundwater Quality

The locations of containment infrastructure as per Table 1.3.1 and monitoring of ambient groundwater quality as per Table 3.6.3.

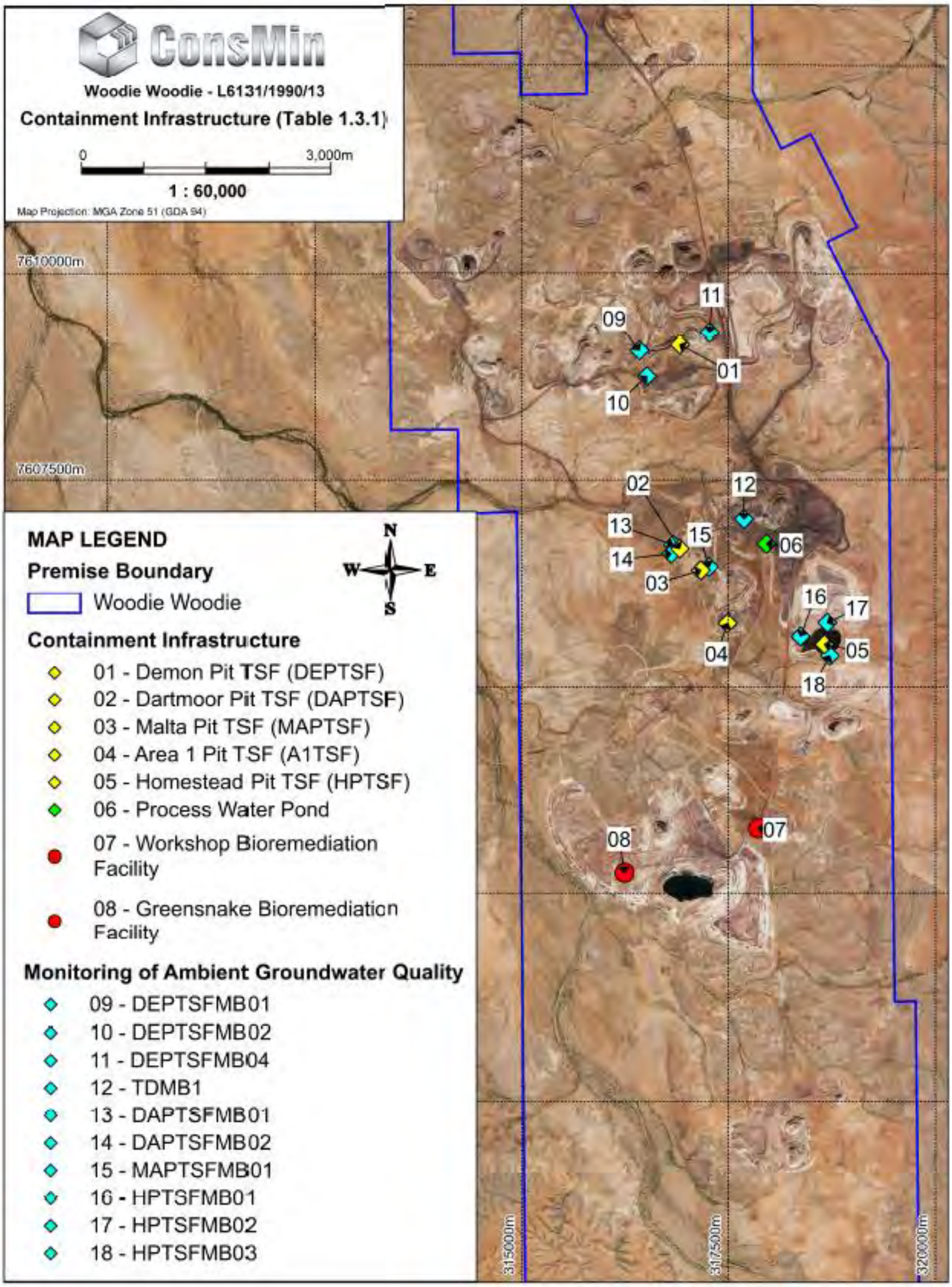

Figure 3 – Emission Points to Surface Water

The locations of emission points to surface water as per Table 2.2.1.

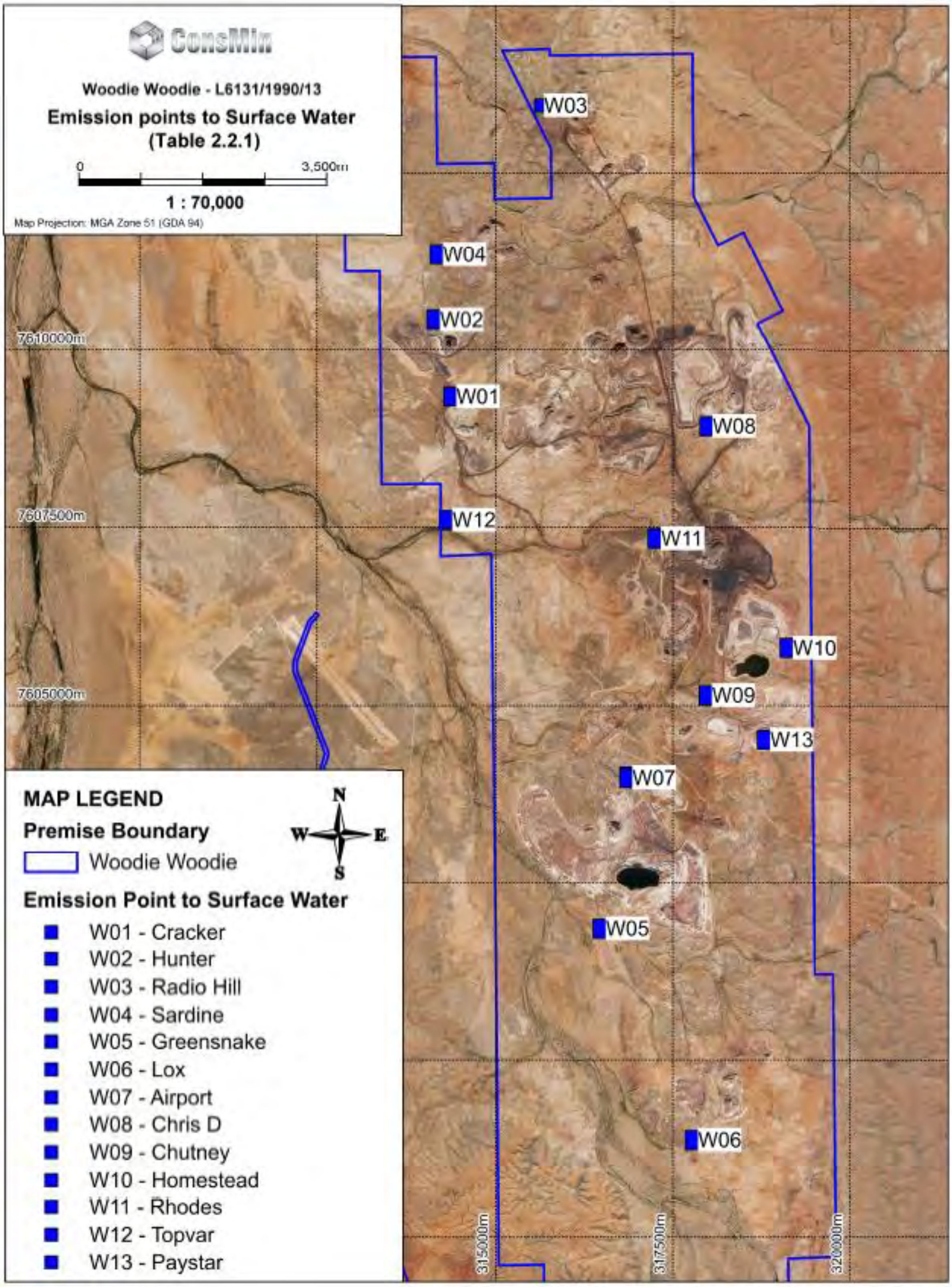

Figure 4 – Off-site Monitoring Locations

Off-site monitoring locations as per Table 3.6.1, 3.6.2 and 3.6.4.

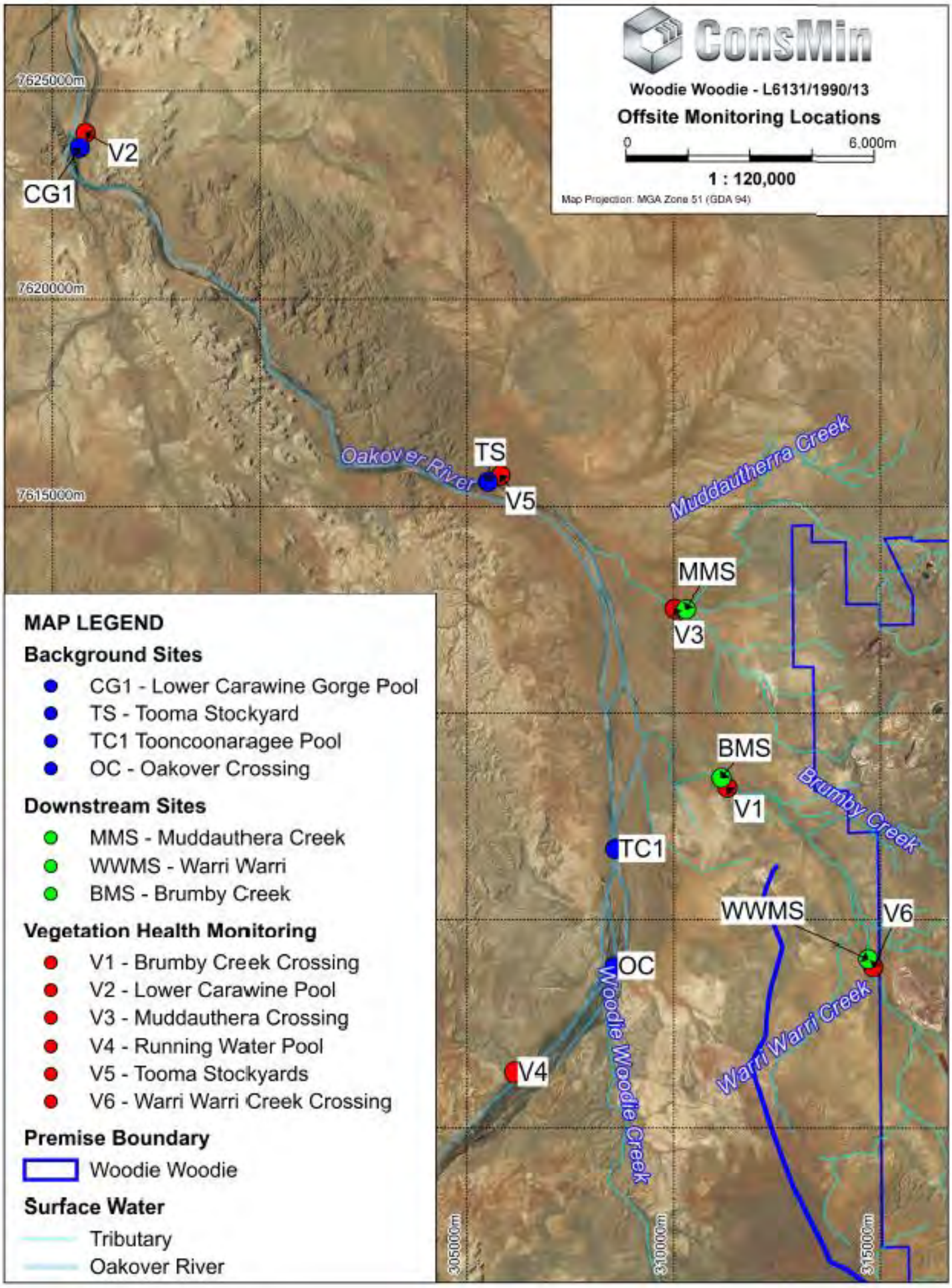

Figure 5 – Management of Waste

Waste management infrastructure as per Table 1.3.4 are shown below.

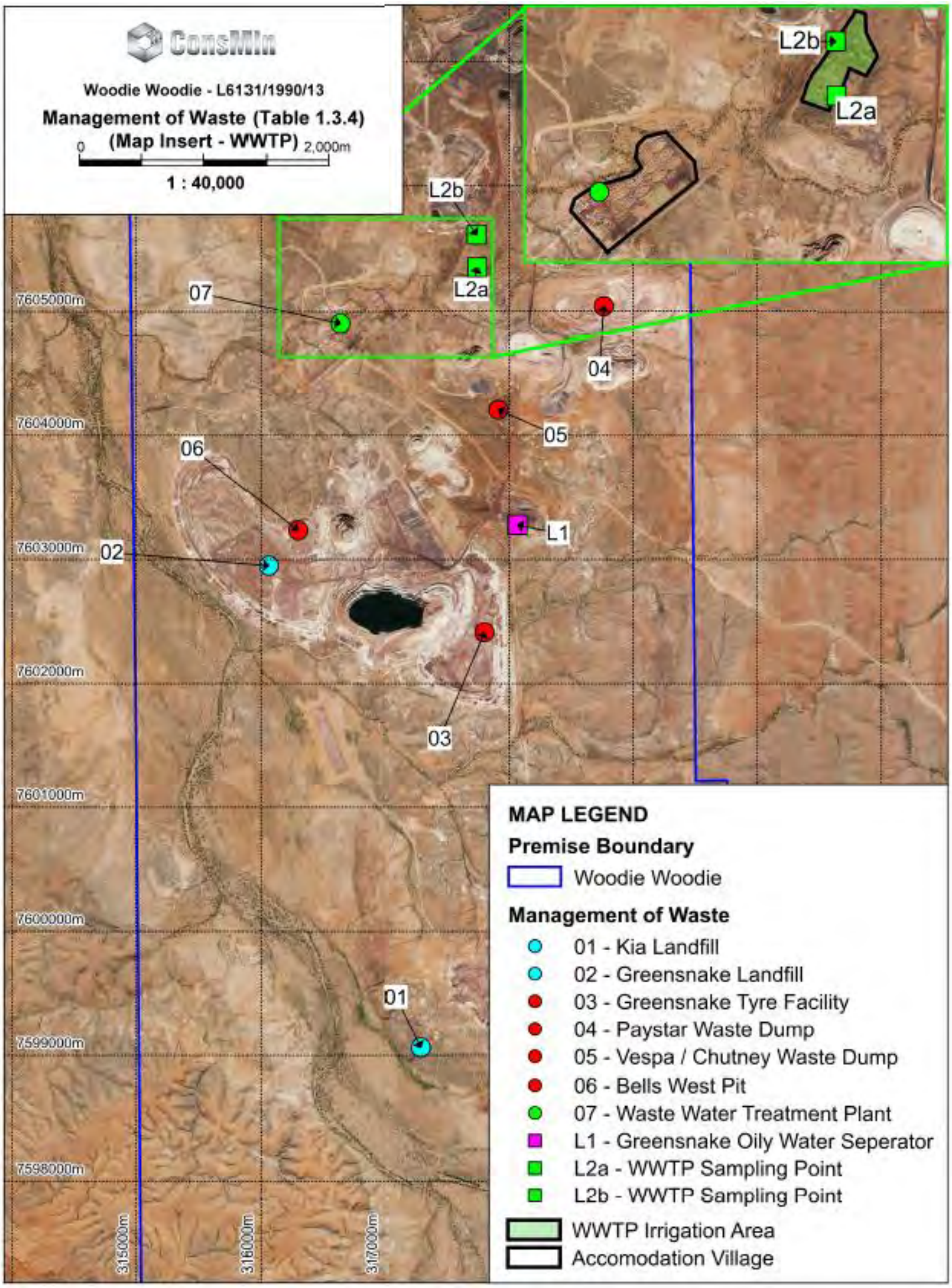

Figure 6 – Wastewater Treatment Plant Sampling Points

The locations of the monitoring points L2a and L2b defined in Table 3.3.1 are shown in the map below.

Schedule 2: Prescribed Premises Categories

The Premises prescribed categories under schedule 1 of *Environmental Protection Regulation 1987*

Prescribed Premises categories

Category number	Category Description	Category production or design capacity	Approved Premises production or design capacity
5	Processing or beneficiation of metallic or nonmetallic ore	50,000 tonnes or more per year	5,000,000 tonnes per annual period
6	Mine dewatering	50,000 tonnes or more per year	55,188,000 tonnes per annual period
54	Sewage facility	100 cubic metres or more per day	150 cubic metres per day
73	Bulk storage of chemicals	1,000 cubic metres in aggregate	2,144 cubic metres in aggregate
89	Putrescible landfill site	More than 20 but less than 5,000 tonnes per year	1,950 tonnes per annual period

Schedule 3: Notification & Forms

Licence: L6131/1990/13
Form: WR1
Name: Monitoring of point source emissions to surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form WR1: Monitoring of point source emissions to surface water							
Emission point	**Parameter**	**Limit**	**Unit**	**Result**	**Averaging period**	**Method**	**Sample date & times**
W1 – W12	Total Suspended Solids	80mg/L	m^3/day		Spot Sample		

Signed on behalf of Pilbara Manganese Pty Ltd: ………………………………………….. Date: ……………………..

Licence: L6131/1990/13 Licence Holder: Pilbara Manganese Pty Ltd
Form: WR2 Period:
Name: Monitoring of point source emissions to surface water

Form WR2: Monitoring of point source emissions to surface water

Emission point	Parameter	Units	Results	Averaging period	Method	Sample date & times
W1 – W13	Volume (cumulative) dewatering water	m^3/day		Continuous		
	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl Nitrogen	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc	mg/L				
	Lead	mg/L				
	Cadmium	mg/L				
	Manganese	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				

	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				
	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………

Licence: L6131/1990/13
Form: WR3
Name: Monitoring of ambient downstream surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form WR3: Monitoring of surface water						
Emission point	**Parameter**	**Units**	**Result**	**Averaging period**	**Method**	**Sample date & times**
Downstream sites MMS, WWMS and BMS	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Total Suspended Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc	mg/L				
	Lead	mg/L				
	Cadmium	mg/L				
	Manganese	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				

	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				
	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………

Licence: L6131/1990/13
Form: WR4
Name: Monitoring of ambient surface water

Licence Holder: Pilbara Manganese Pty Ltd
Period:

Form WR4: Monitoring of surface water

Emission point	Parameter	Units	Result	Averaging period	Method	Sample date & times
Background sites CG1 TS TC1 OC	pH	pH units		Spot sample		
	Total Dissolved Solids	mg/L				
	Total Suspended Solids	mg/L				
	Nitrate and Nitrite Nitrogen	mg/L				
	Total Kjeldahl	mg/L				
	Total Nitrogen	mg/L				
	Filterable Reactive Phosphorus	mg/L				
	Total Phosphorus	mg/L				
	Sodium	mg/L				
	Magnesium	mg/L				
	Zinc[1]	mg/L				
	Lead[1]	mg/L				
	Cadmium[1]	mg/L				
	Manganese[1]	mg/L				
	Chloride	mg/L				
	Sulfate	mg/L				
	Sodium	mg/L				
	Potassium	mg/L				
	Cobalt	mg/L				
	Iron	mg/L				
	Nickel	mg/L				
	Selenium	mg/L				

	Mercury	mg/L				
	Chromium (VI)	mg/L				
	Total Chromium	mg/L				
	Chlorophyll-a	mg/L				
	Phaeophytin	mg/L				

Note1: With adjustment for hardness as per ANZECC (2000) guidelines.

Signed on behalf of Pilbara Manganese Pty Ltd: ……………………………………….. Date: ……………………

Licence: L6131/1990/13
Form: WR5
Name: Monitoring of ambient sediment quality

Licence Holder: Pilbara Manganese Pty Ltd
Period:

Form WR5: Monitoring of sediment quality						
Emission point	**Parameter**	**Units**	**Result**	**Averaging period**	**Method**	**Sample date & times**
Background sites CG1 TS TC1 OC	Chlorophyll-a	mg/m^2		Spot sample		
	Phaeophytin	mg/m^2				

Signed on behalf of Pilbara Manganese Pty Ltd: .... **Date: ....**

Licence: L6131/1990/13 Licence Holder: Pilbara Manganese Pty Ltd
Form: GR1 Period :
Name: Monitoring of ambient groundwater

Form GR1: Monitoring of groundwater						
Emission point	**Parameter**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
Demon Pit TSF DEPTSFMB01 DEPTSFMB02 DEPTSFMB04 **TSF2** TDMB1 **Dartmoor** DAPTSFMB01 DAPTSFMB02 **Malta** MAPTSFMB01 **Homestead TSF** HPTSFMB01 HPTSFMB02 HPTSFMB03	Standing water level	mbgl		Spot Sample		
	pH	pH units				
	Total Dissolved Solids	mg/L				
	Total Nitrogen	mg/L				
	Arsenic	mg/L				
	Copper	mg/L				
	Molybdenum	mg/L				
	Selenium	mg/L				
	Uranium	mg/L				
	Hexavalent Chromium	mg/L				

Signed on behalf of Pilbara Manganese Pty Ltd: .... Date: ....

Licence: L6131/1990/13
Form: LR1
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land							
Emission point	**Parameter**	**Limit**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L1	Total Recoverable Hydrocarbon	15 mg/L	mg/L		Spot sample		

Signed on behalf of Pilbara Manganese Pty Ltd:.. Date: ....

Licence: L6131/1990/13
Form: LR2
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land							
Emission point	**Parameter**	**Limit**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L2	Load of Total Nitrogen (TN)	480 kg/ha/year	kg/ha/year		Annually		
	Load of Total Phosphorus (TP)	120 kg/ha/year	kg/ha/year				

Signed on behalf of Pilbara Manganese Pty Ltd:………………………………………….. Date: ……………………..

Licence: L6131/1990/13
Form: LR3
Name: Monitoring of emissions to land

Licence Holder: Pilbara Manganese Pty Ltd
Period :

Form LR1: Monitoring of emissions to land						
Emission point	**Parameter**	**Units**	**Results**	**Averaging period**	**Method**	**Sample date & times**
L2	Volume (cumulative) recycled for on-site irrigation	m^3		Monthly		
	pH	pH units		Spot sample		
	Biochemical Oxygen Demand	mg/L				
	Total Suspended Solids	mg/L				
	Total Nitrogen	mg/L				
	Total Phosphorus	mg/L				
	E.coli	cfu/100mL				

Signed on behalf of Pilbara Manganese Pty Ltd:... Date: ....

Notification of detection of the breach of a limit.

These pages outline the information that the operator must provide.
Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

Part A

Licence Number	
Name of operator	
Location of Premises	
Time and date of the detection	

Notification requirements for the breach of a limit	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Part B

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident.	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission.	
The dates of any previous N1 notifications for the Premises in the preceding 24 months.	

Name	
Post	
Signature on behalf of Pilbara Manganese Pty Ltd	
Date	

APPENDIX B: DMPE TENEMENT CONDITIONS

Consolidated Minerals:
Woodie Woodie Mine Site
Tenement Conditions

	A	B	C	D	E	F	G	H
1	**Tenement**	**Granted**	**Expiry**	**Holder**	**No.**	**Version**	**Condition**	**Start date**
372	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	1	1	Survey.	9/03/1989
373	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	2	1	Compliance with the provisions of the Aboriginal Heritage Act, 1972 to ensure that no action is taken which is likely to interfere with or damage any Aboriginal site.	9/03/1989
374	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	3	1	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe after completion.	9/03/1989
375	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	4	2	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DoIR). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DoIR.	12/08/2005
376	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	5	1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration program.	9/03/1989
377	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	6	2	Unless the written approval of the Environmental Officer, DoIR is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface clearing or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	12/08/2005
378	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	7	2	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DoIR for assessment; and until his written approval has been obtained.	12/08/2005
379	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	8	1	Mining on any road or road reserve being confined to below a depth of 15 metres from the natural surface.	9/03/1989
380	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	9	31	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the documents titled: " Notice of Intent Pilbara Manganese Project, Woodie Woodie Development " dated August 1991 except where superceded by "Additional No.1 Information for Cracker" dated 25 September 1991, retained on Department of Minerals and Energy File No.1090/91. "Proposed Mining Operations at Woodie Woodie " dated 3 December 1992 and retained on Department of Minerals and Energy File No.2331/92. " Area 1 and Austin Pit, Woodie Woodie" dated 15 December 1992 and retained on Department of Minerals and Energy File No.2331/92. " Cracker and Area 1 Pits Environmental Management Plan " dated 8 January 1993 and retained on Department of Minerals and Energy File No.2331/92. " Pilbara Manganese Project - Woodie Woodie, Proposed Revised Mining Operations at Austin Tenement M45/431" dated 10 March 1993 and retained on Department of Minerals and Energy File No.2331/92. " Notice of Intent for Diety and Geraldine Deposits" dated December 1996, and letter dated 9 January 1997 from Wolf Martinik and Associates, retained on Department of Minerals and Energy File No. 2003/97. " Notice of Intent: To mine the Lisa Manganese Orebody" dated July 2000 and retained on Department of Minerals and Energy File No.4207/00. "Notice of Intent: To mine the Lewis Manganese Orebody" dated December 200 and retained on Department of Minerals and Energy File No. 4273/00. "Subject: Notice of Intent to FCommence Mining - Double 8" dated 1 May 2002 (NOI 3978) and retained on Department of Mineral and Petroleum Resources File No. 4072/01. "Notice of Intent to commence mining - WHY" dated 7 May 2003 and retained on Department of Industry and Resources File No. 5209/02. "Mining Proposal MC272 Pit" dated 27 July 2007 (MP 5773 Part 1) and letter titled: "Additional Information for the MC272 Mining Proposal (MP 5773)" dated 17/12/2007 and signed by Michael Lundstrom (MP 5773 Part 2) and retained on Department of Industry and Resources File No. E0033/200409 "Mining Proposal for Eat Pit' (MP 5988) dated 29 February 2008, signed by Norman Galli and retained on Department of Industry and Resources File No. E0033/200409 "Mining Proposal for Austin Pit" (MP 19468) dated April 2008 signed by N. Galli of Consolidated Minerals pty Ltd and retained on Department of Industry and Resources File No. E0033/200410 "Mining Proposal for Big Mack South Pit" (MP 19482) dated 29 May 2008 signed by N. Galli of Consolidated Minerals Pty Ltd, and retained on Department of Industry and Resources File No. E0033/200411; "Mining Proposal for Crushing, Processing of Crushed Product and Tailings Deposition into TSF1 for PMI Tailings Treatment Recovery	17/04/2019
381	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	10	1	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.	14/11/1991
382	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	11	1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	14/11/1991

Consolidated Minerals:
Woodie Woodie Mine Site
Tenement Conditions

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
383	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	12	2	At the completion of operation all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR.	24/04/2008
384	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	13	1	All rubbish and scrap being progressively disposed of in a suitable manner.	14/11/1991
385	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	14	2	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment, DoIR.	24/04/2008
386	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	15	2	Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a program to safeguard the environment are submitted to the Director, Environment Division, DoIR for his assessment and until his written approval to proceed has been obtained.	24/04/2008
387	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	17	3	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
388	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	20	1	All obligations to restore and rehabilitate the land surface disturbed as a result of operations conducted during implementation of the Cracker Deposit proposal remaining in place until the written clearance of the State Mining Engineer has been given.	14/11/1991
389	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	21	1	The lessee within 30 days on the imposition of this condition, submitting a plan of ongoing mining and dewatering operations at the Cracker Pit and measures to safeguard the environment to the State Mining Engineer for his assessment and written approval.	12/01/1993
390	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	23	1	Following completion of mining at Diety - Geraldine Pits and emplacement of waste rock backfilled into Caves Pit, the following rehabilitation work be undertaken on the surface of the backfilled Caves Pit: Haulage access be defines to one haul road across the surface for subsequent waste rock dumping into Caves Pit; Wherever possible, the surface of the waste rock be rehabilitated where the rehabilitation work does not conflict with subsequent waste rock dumping processes required to complete filling of Caves Pit.	9/03/1989
391	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	24	1	On the completion of operations or progressively when possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-staining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.	1/09/2010
392	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	25	1	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or be within the zone instability.	23/09/2010
393	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	27	1	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.	19/10/2012
394	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	28	1	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles.	19/10/2012
395	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	29	1	The In-pit tailings storage facility shall be checked on a regular basis by site personnel during periods of deposition to ensure that appropriate levels of dewatering are occurring concurrently with tailings deposition and the facility is functioning (including open pit wall stability) as per the design intent.	19/10/2012
396	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	30	1	An engineer or geotechnical specialist shall audit and review the active in put tailings storage facility on an annual basis. The specialist shall review past performance, validate the design, examine tailings management, and review the results of monitoring. Any deficiencies noted in the audit and review report shall be suitably addressed and improved. The audit and review report shall be submitted to DMP and should be accompanied by a recent survey pick-up of the facility and an updated tailings storage data.	19/10/2012
397	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	31	1	At the time of decommissioning of the input tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist shall be submitted to DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	19/10/2012
398	M45/431	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	32	1	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIR's website: 2019.	11/10/2017

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
399	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	1	1	Survey.	9/03/1989
400	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	2	1	Compliance with the provisions of the Aboriginal Heritage Act, 1972 to ensure that no action is taken which is likely to interfere with or damage any Aboriginal site.	9/03/1989
401	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	3	1	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe after completion.	9/03/1989
402	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	4	2	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DoIR). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DoIR.	12/08/2005
403	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	5	1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration program.	9/03/1989
404	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	6	2	Unless the written approval of the Environmental Officer, DoIR is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface clearing or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	12/08/2005
405	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	7	2	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DoIR for assessment; and until his written approval has been obtained.	12/08/2005
406	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	8	1	Mining on any road or road reserve being confined to below a depth of 15 metres from the natural surface.	9/03/1989
407	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	9	35	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the documents titled: "A proposal for the Development of the Pilbara Manganese Project, Woodie Woodie Development " dated October 1990 and retained on Department of Minerals and Energy File No. 316/90 and additional information submitted on 6 February 1991 and retained on Department of Minerals and Energy File No.1641/90; "Woodie Woodie Manganese Project" proposed by D W Fox of C & D Minerals and Commodities in his covering letter dated 28 August 1989 and retained on Department of Minerals and Energy File No.1004/89; " Pilbara Manganese Project, Woodie Woodie Mine proposal for alterations to the existing process plant by the addition of a heavy medium beneficiation circuit " dated June 1992 and retained on Department of Minerals and Energy File No.2163/92; "Notice of Intent Pilbara Manganese Project, Woodie Woodie Development " dated August 1991 except where superceded by "Additional No.1 Information for Cracker" dated 25 September 1991, retained on Department of Minerals and Energy File No.1090/91. "Proposed Mining Operations at Woodie Woodie " dated 3 December 1992 and retained on Department of Minerals and Energy File No.2331/92. "Area 1 and Austin Pit, Woodie Woodie" dated 15 May 1992 and retained on Department of Minerals and Energy File No.2331/92. "Cracker and Area 1 Pits Environmental Management Plan " dated 8 January 1993 and retained on Department of Minerals and Energy File No.2331/92. "Addendum to Rhodes Pit Tailings Storage Facility Notice of Intent (June 2000)" dated July 2000 and retained on Department of Minerals and Energy File No. 4207/99; and "Rhodes Pit Tailings Storage Facility Notice of Intent" dated 23 August 2000 and retained on Department of Minerals and Energy File No.4207/00. "Addendum to Notice of Intent (November 2000) for Upgrade of the Rhodes Pit Tailings Storage Facility" dated November 2001 and retained on Department of Mineral and Petroleum Resources File No. 4072/01. "Addendum No.2 to Notice of Intent (November 2000) for Upgrade of the Woodie Woodie Manganese Mine Tailings Storage Facility" dated February 2003 and retained on Department of Industry and Resources File No. 5209/02. "Notice of Intent and Technical Documentation for a Works Approval Application for the Woodie Woodie Manganese Mine Tailings Storage Facility No. 2" dated January 2004 (NOI 4495) and retained on the Department of Industry and Resources File No. E0033/200401 "PMI - Tailings Retreatment Recovery Project" with "Low Impact Mining - Notice of Intent" dated 31 May 2004 (NOI 4671) and retained on Department of Industry and Resources File No. E0033/200401 "Re: Tailings Storage Facility 2 Woodie Woodie Manganese Mine" dated 28 February 2007 (MP 5661 Part 1), and letter "Re: Additional Information for TSF2 Design Modification Proposal" (MP 5661 Part 2) and retained on Department of Industry and Resources File No. E0033/200404	11/01/2019
408	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	10	1	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.	25/03/1991
409	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	11	1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	25/03/1991

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
410	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	12	3	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DoIR.	9/08/2007
411	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	13	1	All rubbish and scrap being progressively disposed of in a suitable manner.	25/03/1991
412	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	14	3	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR.	9/08/2007
413	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	16	1	The lessee submitting a report on tailings disposal, management and rehabilitation to the State Mining Engineer for his assessment and approval, prior to 1 January 1993.	25/03/1991
414	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	18	6	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
415	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	20	1	The tailings storage facility shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent.	8/01/2001
416	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	22	3	At the time of decommissioning of the tailings facility and prior to rehabilitation, a further review by a geotechnical/ engineering specialist will be required to be submitted to the Director, Environment Division, DoIR. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and address the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	9/08/2007
417	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	23	1	The construction of the tailings impoundment embankment shall be supervised by an engineering/geotechnical specialist.	1/05/2003
418	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	24	1	The construction details of any tailings storage embankment shall be documented by an engineering or geotechnical specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earthworks and pipework. A copy of the construction document shall be submitted to Department of Industry and Resources for its records.	3/02/2006
419	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	25	1	A complete audit and review of the active tailing storage facility shall be provided by an engineering/geotechnical specialist on an annual basis and submitted with the annual environmental review. The documentation shall be submitted to the Director, Environment, DoIR and shall review the past performance, validate the design, examine the tailings management, and present and review the results of all environmental monitoring. The annual audit should be accompanied by a recent survey pick-up of the facility, and updated tailings storage data sheets for each cell.	21/08/2007
420	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	26	2	Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the Director, Environment Division, Department of Industry and Resources for his assessment and until his written approval to proceed has been obtained.	13/11/2007
421	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	28	1	At the completion of operations or progressively where possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-sustaining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.	13/09/2010
422	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	29	1	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or within the zone of instability, to the satisfaction of an Environmental Officer, DMP.	13/09/2010
423	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	31	1	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.	19/10/2012
424	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	32	1	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles.	19/10/2012
425	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	33	2	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIRS's website: 2019.	11/10/2017
426	M45/432	9/03/1989	8/03/2031	Pilbara Manganese Pty Ltd	34	1	No backfilling activities of the Extension Cord, Chutney and Vespa pits are to commence until approval from the Executive Director, Resource Environmental Compliance, Department of Mines, Industry Regulation and Safety, is granted.	11/01/2019

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
447	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	1	1	Survey.	21/05/1992
448	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	2	1	Compliance with the provisions of the Aboriginal Heritage Act, 1972 to ensure that no action is taken which would interfere with or damage any Aboriginal site.	21/05/1992
449	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	3	2	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe immediately after completion.	22/12/2008
450	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	4	3	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Mines and Petroleum, (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP.	29/07/2010
451	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	5	1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration program.	21/05/1992
452	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	6	3	Unless the written approval of the Environmental Officer, DMP, is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	29/07/2010
453	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	7	3	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DMP for assessment; and until his written approval has been obtained.	29/07/2010
454	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	8	11	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the following documents; "Notice of Intent Pilbara Manganese Project, Woodie Woodie Development" dated August 1991 and retained on Department of Minerals and Energy File No: 1090/91. Proposed Mining Operations at Woodie Woodie" dated 3 December 1992 and retained on Department of Minerals and Energy File No: 2331/92. "Area 1 and Austin Pit, Woodie Woodie" dated 15 December 1992 and retained on Department of Minerals and Energy File No: 2331/92. "Cracker and Area 1 Pits Environmental Management Plan" dated 8 January 1993 and retained on Department of Minerals and Energy File No: 2331/92. "Mining Proposal for new mine camp on M45/433, M45/637 and M45/517 - Woodie Woodie Mine Site" dated 1 August 2008 (Reg ID 20009) and email with the following attachments: Figure 2 new pdf, plan and Shire of East Pilbara Approval. Email titled: "Reply to queries raised in Proposed new Camp MP (Reg ID 20009)" dated 29 August 2008 and signed by Norman Galli and retained on Department of Industry and Resources File No. E2572/200305; "Area 1 Pit TSF" (Reg ID 21340) dated 21 Aril 2009 signed by N Galli and retained on Department of Mines and Petroleum File No. 3026/00Vol13; "Area 1 Pit TSF Amendment" (Reg ID 24074) dated 3 September 2009 signed by N Galli and retained on Department of Mines and Petroleum File No. E0233/200901; "Mining Proposal for Dartmoor it on M45/517, M45/600 and M45/637" (Reg ID 25075) dated 19 January 2010 signed by Norman Galli, Environment Manager and retained on Department of Mines and Petroleum Fie No. E0025/201001; "Mining Proposal for Malta Project Woodie Woodie Operations East Pilbara, Western Australia Mining Tenements M45/517 and M45/637" (Reg ID 27251) dated 15 June 2010. Document signed by Mr Norman Galli and retained on Department of Mines and Petroleum File No. 732/91Vol01; (Reg ID 35383) "Mining Proposal for In-Pit Tailings Storage Woodie Woodie Manganese Operations" dated 11 May 2012 signed by Roy Francis and retained on Department of Mines and Petroleum File No. EARS-MP-35383; (MP Reg ID 54460) "Letter of Intent - Installation of Fire Break Surrounding Camp - M45/517 and M45/634" dated 9 April 2015 signed by Greg Yarrick - HSEC Manager and retained on Department of Mines and Petroleum File No. EARS-MP-54460 as Doc ID 3511678; (MCP Reg ID 64038) "Woodie Woodie Manganese Operations Mine Closure Plan WW-MCP-002" dated 14 December 2016 signed by John Abbott and retained on Department of Mines, Industry Regulation and Safety File No. EARS-MCP-64038 as Doc ID 4782683, 4856943, 4856944, 4856946 and 4856948; (MP Reg ID 72850) “Letter of Intent - Haul Road Widening to Accommodate Cat 785 Haul Trucks” dated 12 March 2018 signed by John Abbott and retained on Department of Mines, Industry Regulation and Safety File No. EARS-MP-72850 as Doc ID 5627255. Where a difference exists between the above documents and the following conditions, then the following conditions shall prevail;	3/05/2018
455	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	9	1	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.	6/05/1993

Consolidated Minerals:
Woodie Woodie Mine Site
Tenement Conditions

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
456	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	10	1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	6/05/1993
457	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	11	3	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Director, Environment Division, DMP.	29/07/2010
458	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	12	1	All rubbish and scrap being progressively disposed of in a suitable manner.	6/05/1993
459	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	13	3	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DMP.	29/07/2010
460	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	14	3	Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above documents not commencing until a plan of operations and a program to safeguard the environment are submitted to the Director, Environment Division, DMP for his assessment and until his written approval to proceed has been obtained.	29/07/2010
461	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	16	5	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
462	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	17	1	The construction of the tailings impoundment shall be supervised by an engineering or geotechnical specialist.	28/10/2009
463	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	18	1	The construction details of any tailings storage embankment shall be documented by an engineering or geotechnical specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earthworks and pipework. A copy of the construction document shall be submitted to DMP for its records.	28/10/2009
464	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	19	1	The tailings storage facility shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent.	28/10/2009
465	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	20	1	The in-pit tailings facility shall be checked on a regular basis by site personnel during periods of deposition to ensure that appropriate levels of dewatering are occurring concurrently with tailings deposition.	28/10/2009
466	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	21	1	A complete audit and review of the active tailing storage facility shall be provided by an engineering/geotechnical specialist on an annual basis and submitted with the annual environmental review. The documentation shall be submitted to the Director, Environment, DMP and shall review the past performance, validate the design, examine the tailings management, and present and review the results of all environmental monitoring. The annual audit should be accompanied by a recent survey pick-up of the facility, and updated tailings storage data sheets for each cell.	28/10/2009
467	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	22	1	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	28/10/2009
468	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	24	1	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.	19/10/2012
469	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	25	1	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles.	19/10/2012
470	M45/517	21/05/1992	20/05/2034	Pilbara Manganese Pty Ltd	26	1	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIR's website: 2019.	11/10/2017

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
471	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	1	1	Survey.	4/02/1994
472	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	2	1	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe after completion.	4/02/1994
473	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	3	2	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DoIR). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DoIR.	12/08/2005
474	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	4	1	All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration programme.	4/02/1994
475	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	5	2	Unless the written approval of the Environmental Officer, DoIR is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	12/08/2005
476	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	6	2	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DoIR for assessment; and until his written approval has been obtained.	12/08/2005
477	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	7	1	Mining on any road, road verge or road reserve being confined to below a depth of 15 metres from the natural surface.	4/02/1994
478	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	8	9	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the documents titled:- "Notice of Intent and Technical Documentation for a Works Approval Application for the Woodie Woodie Manganese Mine Tailings Storage Facility No. 2" dated January 2004 (NOI 4495) and retained on Department of Industry and Resources File No. E0033/200401; and "PMI - Tailings Retreatment Recovery Project" with "Low Impact Mining - Notice of Intent" dated 31 May 2004 (NOI 4671) and retained on Department of Industry and Resources File No. E0033/200401; "Mining Proposal for Dartmoor Pit on M45/517, M45/600 and M45/637" (Reg ID 25075) dated 19 January 2010 signed by Norman Galli, Environment Manager and retained on Department of Mines and Petroleum File No. E0025/201001; "Mining Proposal for Rhodes Pit Expansion" (Reg ID 26552) dated 6 April 2010 signed by Norman Galli, Group Environmental Manager and retained on Department of Mines and Petroleum File No. E0033/200419; "Further Information and Amendment for Rhodes Pit Expansion Mining Proposal" (Reg ID 26552) dated 13 July 2010 signed by Norman Galli, Group Environmental Manager and retained on Department of Mines and Petroleum File No. E0033/200419; "Amendment to Dewatering Sedimentation Pond Design for Rhodes Pit Expansion (Reg. ID 26552)" (Reg. ID 32733) dated 3 October 2011 signed by Enrico Chedid, Senior Environment Advisor and retained on Department of Mines and Petroleum file No. EARS-MP-32733; (Reg ID: 39403) "Mining Proposal for crushing, processing of crushed product and tailings deposition into PMPL tailings facility PMI - tailings treatment recovery project addendum to NOI 4671 on M45/432, M45/600, and M45/637" dated 18 December 2012 signed by David Geraghty, and retained on Department of Mines and Petroleum file No. EARS-MP-39403; (MP Reg ID 43513) "Letter of Intent - Woodie Woodie Road Widening, M45/430, M45/431, M45/600 and M45/1218" dated 2 October 2013 signed by Matt Collier and retained on Department of Mines and Petroleum File No. EARS-MP-43513; (MP Reg ID 53419) "Amendment - Letter of Intent - Woodie Woodie - Construction of Topvar Dewatering Pipeline Corridor - M45/430, M45/431 and M45/600" dated 25 February 2015 signed by Greg Yarrick and retained on Department of Mines and Petroleum File No. EARS-MP-53419 as Doc ID 3440550; (MCP Reg ID 64038) "Woodie Woodie Manganese Operations Mine Closure Plan WW-MCP-002" dated 14 December 2016 signed by John Abbott and retained on Department of Mines, Industry Regulation and Safety File No. EARS-MCP-64038 as Doc ID 4782683, 4856943, 4856944, 4856946 and 4856948. Where a difference exists between the above document(s) and the following conditions, then	11/10/2017
479	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	9	1	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.	3/02/2006
480	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	10	1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	3/02/2006
481	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	11	1	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Environmental Officer, Department of Industry and Resources	3/02/2006

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
482	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	12	1	All rubbish and scrap is to be progressively disposed of in a suitable manner.	3/02/2006
483	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	13	1	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Environmental Officer, Department of Industry and Resources.	3/02/2006
484	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	14	1	Any alteration or expansion of operations eithin the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the Environmental Officer, Department of Industry and Resources for his assessment and until his written approval to proceed has been obtained.	3/02/2006
485	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	16	4	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
486	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	17	1	The construction of the tailings impoundment embankment shall be supervised by an engineering/geotechnical specialist.	3/02/2006
487	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	18	1	The construction details of any tailings storage embankment shall be documented by an engineering or geotechnical specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earthworks and pipework. A copy of the construction document shall be submitted to Department of Industry and Resources for its records.	3/02/2006
488	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	19	1	The tailings storage facility shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent.	3/02/2006
489	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	20	1	An engineering or geotechnical specialist shall review the active tailings storage facility on an annual basis. The specialist shall review past performance, validate the design, examine tailings management and review the results of monitoring. Any deficiencies not in the review report shall be submitted to the State Mining Engineer with the annual environmental review, and should be accompanied by a recent survey pick-up of the facility and an updated tailings storage data sheet.	3/02/2006
490	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	21	1	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the State Mining Engineer. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	3/02/2006
491	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	22	1	At the completion of operations or progressively where possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-sustaining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.	13/09/2010
492	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	23	1	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or within the zone of instability, to the satisfaction of an Environmental Officer, DMP.	13/09/2010
493	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	25	1	The Lessee taking all responsible measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities;	8/07/2013
494	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	26	1	Where saline water is used for dust suppression all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles;	8/07/2013
495	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	27	1	All activities being carried out in such a manner so as to not have a detrimental effect on the natural water flow through the lease and surrounding areas to the satisfaction of the Environmental Officer, DMP.	8/07/2013
496	M45/600	4/02/1994	3/02/2036	Pilbara Manganese Pty Ltd	28	1	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIR's website: 2019.	11/10/2017

Consolidated Minerals:
Woodie Woodie Mine Site
Tenement Conditions

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
529	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	1	1	Survey	3/03/1995
530	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	2	2	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe immediately after completion.	22/12/2008
531	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	3	3	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Mines and Petroleum (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP.	12/01/2010
532	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	4	1	All waste material, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration programme.	3/03/1995
533	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	5	3	Unless the written approval of the Environmental Officer, DMP is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	12/01/2010
534	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	6	1	The lessee or transferee, as the case may be, shall, within thirty (30) days of receiving written notification of: the grant of the lease; or registration of a transfer introducing a new lessee. advise, by certified mail, the holder of any underlying pastoral lease details of the grant or transfer.	3/03/1995
535	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	7	3	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DMP for assessment; and until his written approval has been obtained.	12/01/2010
536	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	8	1	The rights of ingress to and egress from Miscellaneous Licence 45/74 being at all times preserved to the licensee and no interference with the purpose or installations connected to the licence.	3/03/1995
537	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	9	1	Mining on any road or road reserve being confined to below a depth of 15 metres from the natural surface.	3/03/1995

	A	B	C	D	E	F	G	H
1	**Tenement**	**Granted**	**Expiry**	**Holder**	**No.**	**Version**	**Condition**	**Start date**
538	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	10	22	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the document titled: "Notice of Intent to mine the Bells Manganese Orebody" dated March 2001 (NOI 3653) and retained on Department of Mineral and Petroleum Resources File No. 4072/01. Notice of Intent and Technical Documentation for a Works Approval Application for the Woodie Woodie Manganese Mine Tailings Storage Facility No. 2" dated January 2004 (NOI 4495) and retained on Department of Industry and Resources File No. E0033/200401 "PMI - Tailings Retreatment Recovery Project" with "Low Impact Mining - Notice of Intent" dated 31 May 2004 (NOI 4671) and retained on Department of Industry and Resources File No. E0033/200401 "Notice of Intent to Expand Greensnake Open Pit, Woodie Woodie Operations, East Pilbara Western Australia" dated January 2006 (NOI 5225 Part A) and letter titled "Re: Amendment to NOI 5225 - Greensnake" dated 4 October 2006 (NOI 5225 Part B) and retained on Department of Industry and Resources File No. E0033/200404 "Mining Proposal for new mine camp on M45/433, M45/637 and M45/517 - Woodie Woodie Mine Site" dated 1 August 2008 (Reg ID 20009) and email with the following attachments: Figure 2 new pdf, plan and Shire of East Pilbara Approval. Email titled: "Reply to queries raised in Proposed new Camp MP (Reg ID 20009)" dated 29 August 2008, signed by Norman Galli and retained on Department of Industry and Resources File No. E2572/200305; "Mining Proposal for Greensnake Sedimentation Pond on M46/92, M46/161 & M45/637 - Woodie Woodie Operations" dated 20 August 2008 signed by Norman Galli and retained on Department of Mines and Petroleum File No. E2572/200305; "Mining Proposal for Bells West Pit Woodie Woodie Operations East Pilbara, Western Australia Mining Tenement M45/637" dated 14 August 2008, signed by Norman Galli and retained on Department of Mines and Petroleum File No. E2574/200305; "Application for New Office Block-Woodie Woodie Mine Site" dated 20 October 2008, signed by Norman Galli and retained on Department of Mines and Petroleum File No. E2574/200305; "Mining Proposal for Greensnake Phase 2 Expansion Addendum to Greensnake Expansion NOI (5225 Woodie Woodie Operations East Pilbara, Western Australia Mining Tenements M45/107, M45/433, M45/637, M46/92, M46/108 and M46/137" dated 19 March 2009 and "Notification of proposed changes to Greensnake expansion phase 2 MP Registration ID 21472 on Mining Leases M45/107, M45/433, M45/637, M46/92, M46/108 and M46/137 - Woodie Woodie Mine Site" dated 7 April 2009. Both documents signed by Mr Norman Galli and retained on Department of Mines and Petroleum File No. E0033/200414; "Letter of Intent for the construction of a bypass road for use by road trains at Woodie on M45/637" dated 6 August 2009. Document signed by Mr Norman Galli and retained on Department of Mines and Petroleum File No. E2572/200306; "Mining Proposal for Dartmoor Pit on M45/517, M45/600 and M45/637" (Reg ID 25075) dated 19 January 2010 signed by Norman Galli, Environment Manager and retained on Department of Mines and Petroleum File No. E0025/201001 "Mining Proposal for Malta Project Woodie Woodie Operations East Pilbara, Western Australia Mining Tenements M45/517 and M45/637" (Reg ID 27251) dated 15 June 2010 Document signed by Mr Norman Galli and retained on Department of Mines and	11/01/2019
539	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	11	1	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.	3/02/2006
540	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	12	1	All topsoil being removed ahead of all mining operations from sites such as pit areas, waste disposal areas, ore stockpile areas, pipeline, haul roads and new access roads and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	3/02/2006
541	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	13	2	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Environmental Officer, Department of Mines and Petroleum.	12/01/2010
542	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	14	1	All rubbish and scrap is to be progressively disposed of in a suitable manner.	3/02/2006
543	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	15	2	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Environmental Officer, Department of Mines and Petroleum.	12/01/2010
544	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	16	2	Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the Environmental Officer, Department of Mines and Petroleum for his assessment and until his written approval to proceed has been obtained.	12/01/2010
545	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	18	5	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
546	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	19	1	The construction of the tailings impoundment starter embankment shall be supervised by an engineering/geotechnical specialist.	10/01/2007

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
547	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	20	2	The construction details of any tailings storage embankment shall be documented by an engineering or geotechnical specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earthworks and pipework. A copy of the construction document shall be submitted to DMP for its records.	12/01/2010
548	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	21	1	The tailings storage facility shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent.	10/01/2007
549	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	23	2	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DMP. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	12/01/2010
550	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	24	2	A complete audit and review of the active tailing storage facility shall be provided by an engineering/geotechnical specialist on an annual basis and submitted with the annual environmental review. The documentation shall be submitted to the Director, Environment, DMP and shall review the past performance, validate the design, examine the tailings management, and present and review the results of all environmental monitoring. The annual audit should be accompanied by a recent survey pick-up of the facility, and updated tailings storage data sheets for each cell.	12/01/2010
551	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	25	1	The construction of any sedimentation pond embarkment shall be supervised by an engineering/geotechnical specialist.	26/03/2009
552	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	26	1	The construction details of sedimentation pond embarkments shall be documented by an appropriate specialist and confirm that the construction satisfies the design intent. The construction document shall include the records of all construction quality control testing, the basis of any method specification adopted, and any significant modifications to the original design together with the reasons why the modifications were necessary. The construction document shall also present as-built drawings for the embankment earthworks. A copy of the construction document shall be submitted to DMP for its records.	26/03/2009
553	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	27	1	The sedimentation pond shall be checked on a routine daily basis by site personnel during periods of deposition to ensure that the facility is functioning as per the design intent and to determine the operational performance of the sedimentation pond to allow sufficient time to construct other sedimentation ponds as/if required. This daily inspection interval to be decreased over time to no less than once a month once the proponent is satisfied that the facility is operating as per the design intent and achieving a reduction in Total Dissolved Solids in accordance with Environmental Protection Act Licence L6131/1990/11.	26/03/2009
554	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	28	1	Any portions of the embankments and local soils affected by the mine-water and sediments stored in the sedimentation pond (that have not been appropriately encapsulated/isolated by the rehabilitation of the sedimentation pond) shall be removed at completion of the project and suitably rehabilitated.	26/03/2009
555	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	29	1	At the completion of operations or progressively where possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-sustaining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.	13/09/2010
556	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	30	1	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or within the zone of instability, to the satisfaction of an Environmental Officer, DMP.	13/09/2010
557	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	32	1	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities.	19/10/2012
558	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	33	1	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles.	19/10/2012
559	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	34	1	All activities being carried out in such a manner so as to not have a detrimental effect on the natural water flow through the lease and surrounding areas to the satisfaction of the Environmental Officer, DMP.	8/07/2013
560	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	36	1	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIR's website: 2019.	11/10/2017
561	M45/637	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	37	1	No backfilling activities of the Extension Cord, Chutney and Vespa pits are to commence until approval from the Executive Director, Resource Environmental Compliance, Department of Mines, Industry Regulation and Safety, is granted.	11/01/2019

Consolidated Minerals:
Woodie Woodie Mine Site
Tenement Conditions

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
562	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	1	1	Survey	3/03/1995
563	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	2	2	All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe immediately after completion.	23/12/2008
564	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	3	2	All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DoIR). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DoIR.	12/08/2005
565	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	4	1	All waste material, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration programme.	3/03/1995
566	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	5	2	Unless the written approval of the Environmental Officer, DoIR is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	12/08/2005
567	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	6	1	The lessee or transferee, as the case may be, shall, within thirty (30) days of receiving written notification of: the grant of the lease; or registration of a transfer introducing a new lessee advise, by certified mail, the holder of any underlying pastoral lease details of the grant or transfer.	3/03/1995
568	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	7	2	No developmental or productive mining or construction activity being commenced until the tenement holder has submitted a plan of the proposed operations and measures to safeguard the environment to the Director, Environment, DoIR for assessment; and until his written approval has been obtained.	12/08/2005
569	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	8	1	The rights of ingress to and egress from Miscellaneous Licence 45/74 being at all times preserved to the licensee and no interference with the purpose or installations connected to the licence.	3/03/1995
570	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	9	1	Mining on any road or road reserve being confined to below a depth of 15 metres from the natural surface.	3/03/1995
571	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	11	34	The construction and operation of the project and measures to protect the environment being carried out generally in accordance with the document titled: "Notice of Intent - To Mine the Lewis Manganese Orebody" (NOI 3560) dated December 2000 and retained on Department of Minerals and Energy File No. 4273/00. "Haul Road Realignment" dated 22 January 2001 and signed by Mr Ian Farris (NOI 3611) and retained on Department of Minerals and Energy File No. 4273/00. "Re: Notice of Intent to commence mining - Camp East" dated 29 January 2003 (NOI 4191) and retained on Department of Mineral and Petroleum Resources File No. 5209/02. "Notice of Intent to Expand Greensnake Open Pit, Woodie Woodie Operations, East Pilbara, Western Australia" dated January 2006 (NOI 5225 Part A) and letter titled "Re: Amendment to NOI 5225 - Greensnake" dated 4 October 2006 (NOI 5225 Part B) and retained on Department of Industry and Resources File No. E0033/200404 "Mining Proposal Camp East In-Pit Tailings Storage Facility Woodie Woodie Manganese Project" dated 25 June 2007 (MP 5735 Part 1) letter "Re: Mining Proposal Camp East In-Pit Tailings Storage Facility Woodie Woodie Manganese Project" dated 7 September and signed by Alistair Croll (MP 5735 Part 2) and letter "Re: Mining Proposal Camp East In-Pit Tailings Storage Facility" dated 16 November and signed by Alistair Croll (MP 5735 Part 3) and retained on Department of Industry and Resources File E0033/200408 "Addendum to NOI 4671, rejects and other solids recovery from Rhodes Pit" (MP 5994) dated 14 March 2008 signed by Norman Galli and retained on Department of Industry and Resources File No. E2572/200304 "Addendum to Greensnake MP5225 for a Re-location of the workshop on M45/433, M45/638 and M46/137 - Woodie Woodie Mine Site", dated 28 July 2008 (Reg ID 20106) and email with the following attachments: Workshop Plan.pdf; Tenements at Workshop.pdf. Email titled: "Reply on Comms tower (Reg ID 20126) and Workshop relocation (Reg ID 20106)" dated 29 August 2008, signed by Norman Galli and retained on Department of Industry and Resources File No. E2572/200305; "Mining Proosal for additional product stockpile area on tenement M45/638 Woodie Woodie Mine Site" dated 27 March 2009, signed by Mr Norman Galli and retained on Department of Mines and Petroleum File No. E0033/200414; "Stability Assessment Design (Addendum to Mining Proposal) by Consolidated Minerals Pty Ltd" (Reg ID 21421) dated December 2009 signed by Norman Galli, Environmental Manager and retained on Department of Mines and Petroleum File No. E0009/201001; "Mining Proposal for Homestead Pit" (Reg ID 27761) dated 30 July 2010 signed by N. Galli, Environmental Manager Consolidated Minerals Limited and retained on Department of Mines and Petroleum File No. E0033/200427; (Reg. ID: 31278) "Amendment to Mining Proposal for Demon Project, Woodie Woodie Manganese Operations, East Pilbara on M45/431 and M45/638 (Registration 26085)" dated 13 June 2011 signed by Richard Beasley, General Manager Technical Services and Corporate	17/04/2019
572	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	12	2	The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform, to the satisfaction of an Environmental Officer, DMP.	29/03/2011

	A	B	C	D	E	F	G	H
1	Tenement	Granted	Expiry	Holder	No.	Version	Condition	Start date
573	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	13	2	All topsoil and vegetation being removed ahead of all mining operations and being stockpiled appropriately for later respreading or immediately respread as rehabilitation progresses.	29/03/2011
574	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	14	3	At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of an Environmental Officer, DMP.	29/03/2011
575	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	15	2	All rubbish and scrap is to be progressively disposed of in a suitable manner, to the satisfaction of an Environmental Officer, DMP.	29/03/2011
576	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	16	2	At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DoIR.	23/12/2008
577	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	17	2	Any alteration or expansion of operations within the lease boundaries beyond that outlined in the above document(s) not commencing until a plan of operations and a programme to safeguard the environment are submitted to the Director, Environment, DoIR for his assessment and until his written approval to proceed has been obtained.	12/08/2005
578	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	18	3	The Lessee submitting to the Executive Director, Environment Division, DMP, a brief annual report outlining the project operations, minesite environmental management and rehabilitation work undertaken in the previous 12 months and the proposed operations, environmental management plans and rehabilitation programmes for the next 12 months. This report to be submitted each year in: December.	16/09/2011
579	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	19	1	The in-pit tailings facility shall be checked on a regular basis by site personnel during periods of deposition to ensure that appropriate levels of dewatering, tailings settlement and rate of rise of tailings are occurring concurrently with tailings deposition and the facility is functioning (including open pit wall stability) as per the design intent.	21/12/2007
580	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	20	1	A complete audit and review of the active tailing storage facility shall be provided by an engineering/geotechnical specialist on a 6 monthly basis. The documentation shall be submitted to the Director, Environment, DoIR and shall review the past performance, validate the design, examine the tailings management, and present and review the results of all environmental monitoring. The annual audit should be accompanied by a recent survey pick-up of the facility, and updated tailings storage data sheet. Any deficiencies noted in the audit and review report shall be suitably addressed and improbed.	21/12/2007
581	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	21	1	At the time of decommissioning of the tailings storage facility and prior to rehabilitation, a further review report by a geotechnical or engineering specialist will be required by the Director, Environment, DoIR. This report should review the status of the structure and its contained tailings, examine and address the implications of the physical and chemical characteristics of the materials, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.	21/12/2007
582	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	22	1	The lessee taking all reasonable measures to prevent or minimise the generation of dust from all materials handling operations, stockpiles, open areas and transport activities, to the satisfaction of an Environmental Officer, DMP.	29/03/2011
583	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	23	1	Where saline water is used for dust suppression, all reasonable measures being taken to avoid any detrimental effects to surrounding vegetation and topsoil stockpiles, to the satisfaction of an Environmental Officer, DMP.	29/03/2011
584	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	24	1	Placement of waste material must be such that the final footprint after rehabilitation will not be impacted upon by pit wall subsidence or be within the zone of instability.	29/03/2011
585	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	25	1	On the completion of operations or progressively when possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self-sustaining, functional ecosystems comprising suitable, local provenance species or an alternative agreed outcome to the satisfaction of an Environmental Officer, DMP.	29/03/2011
586	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	26	1	All parameters assumed for the stability analyses of the Homestead Pit are confirmed after the mining of each bench. Where variations between the geotechnical model and actual mining conditions exist, additional stability analyses are conducted. The process used for the confirmation of the geotechnical model and performance monitoring of pit walls is to be documented within a Ground Control Management Plan (GCMP) to the satisfaction of the Resources Safety Geotechnical Engineer.	29/03/2011
587	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	27	1	Prior to the Homestead Pit reaching 20m depth (262m AHD), additional geo-technical stability analyses are conducted to the satisfaction of the Resources Safety Geotechnical Engineer.	29/03/2011
588	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	29	2	A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMP. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMP's website: 2019.	11/10/2017
589	M45/638	3/03/1995	2/03/2037	Pilbara Manganese Pty Ltd	30	1	No backfilling activities of the Extension Cord, Chutney and Vespa pits are to commence until approval from the Executive Director, Resource Environmental Compliance, Department of Mines, Industry Regulation and Safety, is granted.	11/01/2019

APPENDIX C: SITE PHOTOGRAPHS

Photo 01: View of Homestead Pit - HSPTSF (active) from decant position, looking southwest.

Photo 02: HSPTSF (active) northern discharge location and tailings beach, looking southwest.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025
APPROVED:	GR			
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16
SCALE:	NOT TO SCALE			
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-01 — REV: A

Photo 03: HSPTSF (active) supernatant pond, from northern discharge location, looking southeast.

Photo 04: HSPTSF (active) from original discharge location on northwest perimeter, looking southeast.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025
APPROVED:	GR			
DATE:	2025/10/18			
SCALE:	NOT TO SCALE		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-02 REV: A

Photo 05: HSPTSF (active) tailings beach from southwest perimeter, looking northeast.

Photo 06: HSPTSF (active) supernatant pond, from southern discharge location, looking northeast.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.	PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-03	REV: A
ORIGINAL SIZE:	A4				

Photo 07: HSPTSF (active) tailings beach, from southern discharge location, looking northwest.

Photo 08: HSPTSF (active) from southeast perimeter, looking northwest.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD		
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025		
APPROVED:	GR					
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16		
SCALE:	NOT TO SCALE					
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-04	REV: A	

Photo 09: HSPTSF (active) tailings deposition from southern discharge location, looking southeast.

Photo 10: HSPTSF (active) tailings beach from southern discharge location, looking northwest.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.			
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-05	REV: A

Photo 11: HSPTSF (active) decant location and supernatant pond, looking south.

Photo 12: View of HSPTSF (active) from southeast perimeter, looking northwest.

DRAWN:	RG	CLIENT:	CONSOLIDATED MINERALS PTY LTD
DESIGNED:	SPB	PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025
APPROVED:	GR		
DATE:	2025/10/18	TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16
SCALE:	NOT TO SCALE	PROJECT NO:	754-PERGE389748
ORIGINAL SIZE:	A4	DWG NO:	APPENDIX C-06
		REV:	A

TETRA TECH COFFEY

Photo 13: View of Area 1 Pit – A1PTSF (in-active), looking south.

Photo 14: View of Area 1 Pit – A1PTSF (in-active), looking west.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.	PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-07	REV: A
ORIGINAL SIZE:	A4				

Photo 15: View of Area 1 Pit – A1PTSF (in-active), looking north.

Photo 16: View of Area 1 Pit – A1PTSF (in-active), looking east.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-08	REV: A
ORIGINAL SIZE:	A4				

Photo 17: View of Malta Pit – MPTSF (in-active), looking south.

Photo 18: View of Malta Pit – MPTSF (in-active), looking west.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE				
ORIGINAL SIZE:	A4	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.	PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-09	REV: A

Photo 19: View of Malta Pit – MPTSF (in-active), looking north.

Photo 20: View of Malta Pit – MPTSF (in-active), looking east.

DRAWN:	RG	CLIENT:	CONSOLIDATED MINERALS PTY LTD
DESIGNED:	SPB	PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025
APPROVED:	GR		
DATE:	2025/10/18	TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16
SCALE:	NOT TO SCALE	PROJECT NO:	754-PERGE389748
ORIGINAL SIZE:	A4	DWG NO:	APPENDIX C-10
		REV:	A

TETRA TECH COFFEY

Photo 21: View of Dartmoor Pit – DaPTSF (in-active), looking south.

Photo 22: View of Dartmoor Pit – DaPTSF (in-active), looking west.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD	
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025	
APPROVED:	GR				
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16	
SCALE:	NOT TO SCALE		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-11	REV: A
ORIGINAL SIZE:	A4				

Photo 23: View of Dartmoor Pit – DaPTSF (in-active), looking north.

Photo 24: View of Dartmoor Pit – DaPTSF (in-active), looking east.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD			
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025			
APPROVED:	GR						
DATE:	2025/10/18						
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.	TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16			
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO:	APPENDIX C-12	REV:	A

Photo 25: View of Demon Pit – DePTSF (in-active) eastern extent, looking southeast.

Photo 26: View of Demon Pit – DePTSF (in-active) eastern extent, looking southwest.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD		
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025		
APPROVED:	GR					
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16		
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.	PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-13	REV: A	
ORIGINAL SIZE:	A4					

Photo 27: View of Demon Pit – DePTSF (in-active) eastern extent, looking west.

Photo 28: View of Demon Pit – DePTSF (in-active) eastern extent, looking northwest.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD		
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025		
APPROVED:	GR					
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16		
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.				
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-14		REV: A

Photo 29: View of Demon Pit – DePTSF (in-active) south-western extent, looking north.

Photo 30: View of Demon Pit – DePTSF (in-active) western extent, looking east.

DRAWN:	RG	TETRA TECH COFFEY	CLIENT:	CONSOLIDATED MINERALS PTY LTD		
DESIGNED:	SPB		PROJECT:	WOODIE WOODIE OPERATIONS TAILINGS STORAGE FACILITIES ANNUAL AUDIT AND REVIEW 2025		
APPROVED:	GR					
DATE:	2025/10/18		TITLE:	PHOTGRAPHS TAKEN ON 2025/10/16		
SCALE:	NOT TO SCALE	THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF TETRA TECH. ANY MODIFICATIONS TO THE ORIGINAL BY OTHER THAN TETRA TECH PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. TETRA TECH WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.				
ORIGINAL SIZE:	A4		PROJECT NO: 754-PERGE389748	DWG NO: APPENDIX C-15	REV: A	

APPENDIX D: WATER BALANCE

PROJECT : ANNUAL TSF AUDIT AND MANAGEMENT REVIEW 2025

CLIENT : CONSOLIDATED MINERALS PTY LTD

LOCATION : WOODIE WOODIE MINE, WA

SUBJECT : WATER BALANCE ANALYSIS

TETRA TECH COFFEY

Date	17-Nov-25
Job No.	754-PERGE389748
Rev	A

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
	Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
INFLOWS	Days per month	31	28	31	30	31	30	31	31	30	31	30	31	365.0
RAINFALL														
Monthly Rainfall (mm)		50.2	289.2	0.2	0.4	0.0	6.8	2.4	0.0	0.0	32.8	11.8	160.6	554.4
Average Daily Rainfall (mm)		1.62	10.33	0.01	0.01	0.00	0.23	0.08	0.00	0.00	1.06	0.39	5.18	
Tailings Dam Storage Area (m2)		**133,500**	133,500	133,500	133,500	133,500	133,500	133,500	133,500	133,500	133,500	133,500	133,500	
Runoff Coefficient Tailings		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Catchment Area above Storage (m2)		**100,000**	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	100,000.0	
Runoff Coefficient Catchment		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
Pool Area (m2)		90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	90,000	
Running Beaches (m2)		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	
Rainfall Inflow Total Volume (m3/day)		261.9	1,670.6	1.0	2.2	0.0	36.7	12.5	0.0	0.0	171.1	63.6	838.0	
Rainfall Inflow Total Volume (m3/month)		8,119.9	46,778.1	32.4	64.7	0.0	1,099.9	388.2	0.0	0.0	5,305.4	1,908.7	25,977.1	**89,674.2**
SLURRY WATER														
Tonnes per year	602,342													
Operating hours per year														
Tailings tonnes per month		37,509.0	42,774.0	44,449.0	54,355.0	39,111.0	65,029.0	57,973.0	57,621.0	62,413.0	53,838.0	45,077.0	42,193.0	602,342.0
% Solids =	16.4%	16.2	16.2	16.2	17.0	17.0	16.2	15.0	17.0	17.0	17.0	16.2	16.2	
Tailings Output Solids (tpd)		1,210.0	1,527.6	1,433.8	1,811.8	1,261.6	2,167.6	1,870.1	1,858.7	2,080.4	1,736.7	1,502.6	1,361.1	
Volume of Water (m3/day)		5,551.2	7,008.7	6,578.3	7,846.6	5,463.9	9,944.9	9,350.5	8,049.8	9,009.9	7,521.3	6,893.6	6,244.5	
Volume of Water (m3/month)		172,088.0	196,243.0	203,928.0	235,399.0	169,381.0	298,347.0	289,865.0	249,543.0	270,297.0	233,160.0	206,809.0	193,578.0	**2,718,638.0**
TOTAL INFLOW (m3/day)		**5,813.2**	**8,679.3**	**6,579.4**	**7,848.8**	**5,463.9**	**9,981.6**	**9,363.0**	**8,049.8**	**9,009.9**	**7,692.4**	**6,957.3**	**7,082.4**	
TOTAL INFLOW (m3/month)		**180,207.9**	**243,021.1**	**203,960.4**	**235,463.7**	**169,381.0**	**299,446.9**	**290,253.2**	**249,543.0**	**270,297.0**	**238,465.4**	**208,717.7**	**219,555.1**	**2,808,312.2**
OUTFLOW-LOSSES FROM TAILINGS DAM		**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**TOTAL**
EVAPORATION (from pond and beaches)														
Evaporation Rate (Daily - mm)		14.7	13.5	12.7	12.6	8.1	6.1	7.4	8.7	13.8	14.8	16.9	15.7	
Evaporation Rate (Monthly - mm)		455.70	378.00	393.70	378.00	251.10	183.00	229.40	269.70	414.00	458.80	507.00	486.70	4405.10
Pan Factor		0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Monthly Dam Evaporation Rate (mm)		341.8	283.5	295.3	283.5	188.3	137.3	172.1	202.3	310.5	344.1	380.3	365.0	
Average Daily Evaporation Rate (mm)		11.0	10.1	9.5	9.5	6.1	4.6	5.6	6.5	10.4	11.1	12.7	11.8	
Pool Area & Running Beaches (m2)		110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	110,000.0	
Daily Evaporation Loss/Outflow (m3/day)		1,212.8	1,113.8	1,047.8	1,039.5	668.3	503.3	610.5	717.8	1,138.5	1,221.0	1,394.3	1,295.3	
Total Evaporation Loss/Outflow (m3/month)		37,595.3	31,185.0	32,480.3	31,185.0	20,715.8	15,097.5	18,925.5	22,250.3	34,155.0	37,851.0	41,827.5	40,152.8	**363,420.8**
EVAPO-TRANSPIRATION (from drying tailings)														
Evaporation Rate (Daily - mm)		14.7	13.5	12.7	12.6	8.1	6.1	7.4	8.7	13.8	14.8	16.9	15.7	
Evaporation Rate (Monthly - mm)		455.7	378.0	393.7	378.0	251.1	183.0	229.4	269.7	414.0	458.8	507.0	486.7	
Evapo-transpiration Rate (Pan/3)		151.9	126.0	131.2	126.0	83.7	61.0	76.5	89.9	138.0	152.9	169.0	162.2	
Average Daily Evapo-transpiration Rate (mm)		4.9	4.5	4.2	4.2	2.7	2.0	2.5	2.9	4.6	4.9	5.6	5.2	
Area Transpiring (m2)		1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	1,175.0	
Daily transpiration Loss (m3/day)		5.8	5.3	5.0	4.9	3.2	2.4	2.9	3.4	5.4	5.8	6.6	6.1	
Total Evapo-transpiration Loss (m3/month)		178.5	148.1	154.2	148.1	98.3	71.7	89.8	105.6	162.2	179.7	198.6	190.6	**1,725.3**
STANDPIPE														
Total Standpipe Outflow (m^3/day)		118.7	255.4	330.0	317.7	234.8	263.3	489.4	261.0	258.7	225.5	256.7	221.6	
Total Standpipe Outflow (m^3/month)		3,680.00	7,150.00	10,230.00	9,530.00	7,280.00	7,900.00	15,170.00	8,090.00	7,760.00	6,990.00	7,700.00	6,870.00	**98,350.0**
SEEPAGE														
Through Dam Floor (m3/day)	8.15E-07	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	
Total Seepage Outflow (m3/day)		1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	1,362.2	
Total Seepage Outflow (m3/month)		42,229.5	38,142.8	42,229.5	40,867.2	42,229.5	40,867.2	42,229.5	42,229.5	40,867.2	42,229.5	40,867.2	42,229.5	**497,218.1**
RETENTION														
Tailings Output (tpd)		1,210.0	1,527.6	1,433.8	1,811.8	1,261.6	2,167.6	1,870.1	1,858.7	2,080.4	1,736.7	1,502.6	1,361.1	
Moisture Content of Tailings (average)	20%													
Volume Retained in Tailings (m3/day)		242.0	305.5	286.8	362.4	252.3	433.5	374.0	371.7	416.1	347.3	300.5	272.2	
Total Volume Retained in Tailings (m3/month)		7,501.8	8,554.8	8,889.8	10,871.0	7,822.2	13,005.8	11,594.6	11,524.2	12,482.6	10,767.6	9,015.4	8,438.6	**120,468.4**
TOTAL OUTFLOW-LOSSES FROM TAILINGS DAM (m3/day)		**2,941.5**	**3,042.2**	**3,031.7**	**3,086.7**	**2,520.8**	**2,564.7**	**2,839.0**	**2,716.1**	**3,180.9**	**3,161.9**	**3,320.3**	**3,157.5**	
TOTAL OUTFLOW-LOSSES FROM TAILINGS DAM (m3/month)		**91,185.0**	**85,180.6**	**93,983.7**	**92,601.3**	**78,145.8**	**76,942.2**	**88,009.4**	**84,199.6**	**95,427.0**	**98,017.8**	**99,608.7**	**97,881.5**	**1,081,182.6**
BALANCE INFLOW-OUTFLOW/LOSSES (m3/day)		**2,871.7**	**5,637.2**	**3,547.6**	**4,762.1**	**2,943.1**	**7,416.8**	**6,524.0**	**5,333.7**	**5,829.0**	**4,530.6**	**3,637.0**	**3,925.0**	
BALANCE INFLOW-OUTFLOW/LOSSES (m3/month)		**89,022.8**	**157,840.5**	**109,976.6**	**142,862.4**	**91,235.2**	**222,504.7**	**202,243.8**	**165,343.4**	**174,870.0**	**140,447.6**	**109,108.9**	**121,673.6**	
RETURN WATER TO THE PLANT (if available)														
Total Water Return per month (balance of inflow-outflow for planning) (m3/month)		**89,022.8**	**157,840.5**	**109,976.6**	**142,862.4**	**91,235.2**	**222,504.7**	**202,243.8**	**165,343.4**	**174,870.0**	**140,447.6**	**109,108.9**	**121,673.6**	**1,727,129.6**
Volume of Water Return per day (m3/day)		**2,871.7**	**5,637.2**	**3,547.6**	**4,762.1**	**2,943.1**	**7,416.8**	**6,524.0**	**5,333.7**	**5,829.0**	**4,530.6**	**3,637.0**	**3,925.0**	
Volume of Water Return per day (m3/hr)		**119.7**	**234.9**	**147.8**	**198.4**	**122.6**	**309.0**	**271.8**	**222.2**	**242.9**	**188.8**	**151.5**	**163.5**	
Water Return per month (as % of tailings slurry water)		**52%**	**80%**	**54%**	**61%**	**54%**	**75%**	**70%**	**66%**	**65%**	**60%**	**53%**	**63%**	
Annual Water Return Available (m3/year)		**1,727,130**												
Annual Average Water Return (as % of tailings slurry water)		**63.5%**												

APPENDIX E: INSPECTION SHEETS

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Date: 31/10/2024

Signature:

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME: 0820	**TIME:**1800	**DAYSHIFT INITIAL:** [redacted]	
TIME: 1045	**TIME:**2000	**NIGHTSHIFT INITIAL:** [redacted]	

Processing Plant TSF INSPECTION SHEET

TIME:	1245	TIME:	2200
TIME:	0200	TIME:	2400
TIME:	0400	TIME:	0200

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Signature:

Date: 30/11/2024

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME:0600	**TIME:1730**	**DAYSHIFT INITIAL:** [redacted]
TIME:0830	**TIME:1900**	**NIGHTSHIFT INITIAL:** [redacted]

ConsMin

Processing Plant TSF INSPECTION SHEET

TIME:1230	**TIME:2030**
TIME:1400	**TIME:2300**
TIME:1630	**TIME:0115**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Signature:

Date: 31/12/2024

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME:0545	**TIME:1730**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:1900**	**NIGHTSHIFT INITIAL:** [redacted]

Processing Plant TSF INSPECTION SHEET

TIME:1230	**TIME:2230**
TIME:1445	**TIME:0100**
TIME:1600	**TIME:0315**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted] **Date:** 31/01/2025

Signature: Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1800**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2045**	**NIGHTSHIFT INITIAL:** [redacted]

Processing Plant TSF INSPECTION SHEET

TIME:1330	**TIME:2300**
TIME:1445	**TIME:0200**
TIME:1600	**TIME:0400**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader:	[redacted]	**Date:**	28/02/2025
Signature:		Shift:	☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1830**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2045**	**NIGHTSHIFT INITIAL:** [redacted]
TIME:1300	**TIME:2300**	

ConsMin

Processing Plant TSF INSPECTION SHEET

TIME:1445	**TIME:0200**
TIME:1610	**TIME:0400**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted] **Date:** 31/03/2025

Signature: **Shift:** ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1800**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2030**	**NIGHTSHIFT INITIAL:** [redacted]
TIME:1300	**TIME:2300**	

Processing Plant TSF INSPECTION SHEET

TIME:1445	**TIME:0130**
TIME:1610	**TIME:0345**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted] **Date:** 06/04/2025

Signature: Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	TIME:1730	DAYSHIFT INITIAL: [redacted]
TIME:0845	TIME:2030	NIGHTSHIFT INITIAL: [redacted]
TIME:1300	TIME:2330	

Processing Plant TSF INSPECTION SHEET

TIME:1445	**TIME:0200**
TIME:1610	**TIME:0400**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Date: 06/05/2025

Signature: [redacted]

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

Supervisor: [redacted] **Signature:**

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1800**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2000**	**NIGHTSHIFT INITIAL:** [redacted]

ConsMin

Processing Plant TSF INSPECTION SHEET

TIME:1300	**TIME:2330**
TIME:1445	**TIME:0200**
TIME:1610	**TIME:0330**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Date: 12/06/2025

Signature:

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1800**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2000**	**NIGHTSHIFT INITIAL:** [redacted]

ConsMin

Processing Plant TSF INSPECTION SHEET

TIME:1300	TIME:2330
TIME:1445	TIME:0200
TIME:1610	TIME:0430

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted] **Date:** 10/07/2025

Signature: Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0600	**TIME:1830**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2000**	**NIGHTSHIFT INITIAL:** [redacted]

ConsMin

Processing Plant TSF INSPECTION SHEET

TIME:1300	**TIME:2330**
TIME:1440	**TIME:0200**
TIME:1610	**TIME:0400**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted]

Signature:

Date: 25/08/2025

Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0800	**TIME:1830**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME:2000**	**NIGHTSHIFT INITIAL:** [redacted]

Processing Plant TSF INSPECTION SHEET

DTIME:1300	**TIME:2330**
TIME:1440	**TIME:0200**
TIME:1610	**TIME:0400**

ConsMin

Processing Plant TSF INSPECTION SHEET

Team leader: [redacted] **Date:** 18/09/2025

Signature: Shift: ☒ Day ☒ Night

Area Workplace Inspection completed to acceptable standard? (inspections each shift are a legal requirement)

[redacted]

Section 1: Process Water Pond

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
1A Bore running to Plant?	☒	☐	☒	☐
1B Leaks in water lines?	☐	☒	☐	☒
1C Is water level above 70%?	☒	☐	☒	☐
1D Do Process Water Pumps require further maintenance inspections?	☒	☐	☒	☐

Actions / Comments:

Section 2: Tailing Discharge Lines and Return Water Line

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
2A Access to pipeline corridor via designated access points?	☒	☐	☒	☐
2B Is there any seepage or wet areas along access of the pipeline corridor?	☐	☒	☐	☒
2C Are there any leaks in the pipe work or flanges?	☐	☒	☐	☒
2D Is there any spillages that still require cleanup?	☐	☒	☐	☒
2E Is the freeboard > 820mm?	☒	☐	☒	☐
2F Is the integrity of the pit rim stable?	☒	☐	☒	☐
2G Is the decant water pump running?	☒	☐	☒	☐
2H Does the spigot requires location change?	☐	☒	☐	☒
2I Is there any Emergency Sump Ponds filled up and require clean up?	☐	☒	☐	☒
2J Any windrows need to be fixed up to prevent spillage going into non mining corridor?	☐	☒	☐	☒

Actions / Comments:

Section 3: Flora & Fauna

	Dayshift Yes	Dayshift No	Nightshift Yes	Nightshift No
3A Are the any deaths or new distress to fauna?	☐	☒	☐	☒
3B Is there any noticeable damage to the flora?	☐	☒	☐	☒

Actions / Comments:

Section 4: Inspection Times

TIME0800	**TIME:1830**	**DAYSHIFT INITIAL:** [redacted]
TIME:0845	**TIME: 2130**	**NIGHTSHIFT INITIAL:** [redacted]

Processing Plant TSF INSPECTION SHEET

DTIME:1300	**TIME: 0030**
TIME:1440	**TIME: 0200**
TIME:1610	**TIME: 0345**

APPENDIX F: GROUNDWATER MONITORING

Water Level Measurement Below Top of Casing (mbTOC)

	BORE	Type	Historic Peizo	mE	mN	mTOC RL	Ground RL	Casing Height	Hole Depth	Hole Depth RL	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25
Rhodes	TDMB1	TSF MB	No	317,688.00	7,607,026.00	281.93	281.615	0.3	266.9	14.715	14.13	14.85	14.97	14.76	14.75	14.77	13.57	13.48	Quarterly	Quarterly	14.20	Quarterly
Demon standpipe	DEPTSFMB04	TSF MB	No	317,301.00	7,609,249.00	282.7	282.246	0.5	90	192.246	89.12	89.12	89.07	89.09	89.05	89.09	89.09	89.00	Quarterly	Quarterly	dry	Quarterly
Demon TSF	DEPTSFMB01																					
Demon TSF	DEPTSFMB02																					
Homestead TSF	HPTSFMB01	TSF MB	No	318,376.00	7,605,608.00	287	286.474	0.5	110	176.474	98.69	98.92	99.26	99.80	99.93	100.08	99.98	100.44	Quarterly	Quarterly	101.17	Quarterly
Homestead TSF	HPTSFMB02	TSF MB	No	318,695.00	7,605,780.00	286.7	286.317	0.4	110	176.317	Dry	dry 91	dry	Dry	dry	dry	dry	dry	Quarterly	Quarterly	dry	Quarterly
Homestead TSF	HPTSFMB03	TSF MB	No	318,727.00	7,605,379.00	283.2	282.605	0.6	110	172.605	31.09	32.45	33.56	35.35	36.27	37.27	37.00	40.29	Quarterly	Quarterly	42.97	Quarterly
Paystar TSF	PSTSFMB01												98.51	98.70	98.80	98.63	98.52	98.22	Quarterly	Quarterly	99.25	Quarterly
Paystar TSF	PSTSFMB02												94.13	94.39	94.45	94.05	94.11	94.00	Quarterly	Quarterly	95.06	Quarterly
Paystar TSF	PSTSFMB03												44.21	50.86	50.99	50.51	50.94	51.01	Quarterly	Quarterly	dry	Quarterly
Paystar TSF	PSTSFMB04												93.39	93.54	93.87	92.32	91.32	92.75	Quarterly	Quarterly	92.55	Quarterly
Malta TSF	MAPTSFMB01																					
Dartmoor TSF	DAPTSFMB01																					
Dartmoor TSF	DAPTSFMB02																					

TSF Bores – Field Parameters

HPTSFMB01			March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Field Parameters		Limit/Range		15/04/2024	5/05/2024			21/08/2024	-	-	27/11/2024	-	-	23/02/2025	-	-	21/05/2025	-	-	-	-	-	-	-
pH	-			6.77	7.53			8.06	-	-	8.17	-	-	7.65	-	-	8.17	-	-	-	-	-	-	-
Conductivity	uS/cm			33.4	1107			1136	-	-	987	-	-	1015	-	-	1116	-	-	-	-	-	-	-
Total Dissolved Solids	ppm			1252	554			568	-	-	494	-	-	506	-	-	558	-	-	-	-	-	-	-
Temperature	C'			620	29.47			28.96	-	-	28.86	-	-	28.31	-	-	24.71	-	-	-	-	-	-	-

HPTSFMB03			March	April	May	June	July	August	September	October	November	December	January	February	December	January	May	June	July	August	September	October	November	December
Field Parameters		Limit/Range		15/04/2024	5/05/2024			21/08/2024	-	-	27/11/2024	-	-	23/02/2025	-	-	21/05/2025	-	-	10/08/2025	-	-	-	-
pH	-			6.77	7.63			7.83	-	-	7.84	-	-	7.01	-	-	7.1	-	-	7.17	-	-	-	-
Conductivity	uS/cm			33.4	1290			1429	-	-	1096	-	-	1155	-	-	1251	-	-	1073	-	-	-	-
Total Dissolved Solids	ppm			1252	646			714	-	-	548	-	-	575	-	-	625	-	-	537	-	-	-	-
Temperature	C'			620	28.76			27.37	-	-	30.13	-	-	26.53	-	-	23.25	-	-	26.32	-	-	-	-

TDMB1			March	April	May	June	July	August	September	October	November	December	January	February	December	January	May	June	July	August	September	October	November	December
Field Parameters		Limit/Range		15/04/2024	5/05/2024			21/08/2024	-	-	27/11/2024	-	-	23/02/2025	-	-	22/05/2025	-	-	10/08/2025	-	-	-	-
pH	-			6.77	6.97			6.81	-	-	6.88	-	-	6.68	-	-	6.87	-	-	6.74	-	-	-	-
Conductivity	uS/cm			33.4	20400			20.48(m/s)	-	-	1100	-	-	1966mS	-	-	21960	-	-	16.74	-	-	-	-
Total Dissolved Solids	ppm			1252	0.0000103			10.24(ppT)	-	-	550	-	-	9828	-	-	10980	-	-	8375	-	-	-	-
Temperature	C'			620	28.9			32.41	-	-	32.15	-	-	30.54	-	-	27.21	-	-	28.85	-	-	-	-

DEPTSFMB04			March	April	May	June	July	August	September	October	November	December	January	February	December	January	May	June	July	August	September	October	November	December
Field Parameters		Limit/Range		15/04/2024	5/05/2024			21/08/2024	-	-	27/11/2024	-	-	23/02/2025	-	-	31/05/2025	-	-	10/08/2025	-	-	-	-
pH	-			6.77	DRY			DRY	-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Conductivity	uS/cm			33.4	DRY			DRY	-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Total Dissolved Solids	ppm			1252	DRY			DRY	-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Temperature	C'			620	DRY			DRY	-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-

DAPTSFMB02			March	April	May	June	July	August	September	October	November	December	January	February	December	January	May	June	July	August	September	October	November	December
Field Parameters		Limit/Range							-	-	27/11/2024	-	-	23/02/2025	-	-	31/05/2025	-	-	10/08/2025	-	-	-	-
pH	-								-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Conductivity	uS/cm								-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Total Dissolved Solids	ppm								-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-
Temperature	C'								-	-	Dry	-	-	Dry	-	-	Dry	-	-	Dry	-	-	-	-

DRAWN:	[redacted]
DESIGNED:	
APPROVED:	
DATE:	2025/11/02
SCALE:	NOT TO SCALE
ORIGINAL SIZE:	A4

TETRA TECH COFFEY

CLIENT:	CONSOLIDATED MINERALS PTY LTD
PROJECT:	WOODIE WOODIE MINE ANNUAL TSF AUDIT AND REVIEW 2025
TITLE:	MONITORING BORE DATA
PROJECT NO:	754-PERGE389748
DWG NO:	APPENDIX F
REV:	A

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ABN 53 140 099 207
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lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PGB1467

Client Details

Client	Consolidated Minerals Ltd (Woodie)
Contact	[redacted]
Address	Woodie Operations PO Box 1220, WEST PERTH, WA, 6872

Sample Details

Your Reference	Environment
Number of Samples	3 Groundwater
Date Samples Received	24/02/2025
Date Instructions Received	24/02/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	04/03/2025
Date of Issue	05/03/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	[redacted]
Laboratory Manager	[redacted]

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Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PGB1467-01	HPTSFMB01	Groundwater	23/02/2025	24/02/2025
PGB1467-02	HPTSFMB03	Groundwater	23/02/2025	24/02/2025
PGB1467-03	TDMB01	Groundwater	23/02/2025	24/02/2025

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Dissolved Low Level Metals (Groundwater)

Envirolab ID	Units	PQL	PGB1467-01	PGB1467-02	PGB1467-03
Your Reference			HPTSFMB01	HPTSFMB03	TDMB01
Date Sampled			23/02/2025	23/02/2025	23/02/2025
Arsenic	mg/L	0.0010	<0.0010	0.0016	<0.0010
Copper	mg/L	0.0010	<0.0010	<0.0010	<0.0010
Molybdenum	mg/L	0.0010	0.0017	0.0075	0.013
Selenium	mg/L	0.0010	0.0088	0.0022	0.0019
Uranium	mg/L	0.0010	0.011	0.0015	0.0016

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Inorganics - Physical Parameters (Groundwater)

Envirolab ID	**Units**	**PQL**	PGB1467-01	PGB1467-02	PGB1467-03
Your Reference			HPTSFMB01	HPTSFMB03	TDMB01
Date Sampled			23/02/2025	23/02/2025	23/02/2025
pH	pH units		7.4	7.7	8.5
Total Dissolved Solids	mg/L	5.0	14000	750	620

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Inorganics - Speciated Cr (III/VI) and Fe (II/III) (Groundwater)

Envirolab ID	Units	PQL	PGB1467-01	PGB1467-02	PGB1467-03
Your Reference			HPTSFMB01	HPTSFMB03	TDMB01
Date Sampled			23/02/2025	23/02/2025	23/02/2025
Hexavalent Chromium	mg/L	0.0010	<0.0010	0.011	0.0051

Certificate of Analysis PGB1467

Inorganics - Nutrients (Groundwater)

Envirolab ID	Units	PQL	PGB1467-01	PGB1467-02	PGB1467-03
Your Reference			HPTSFMB01	HPTSFMB03	TDMB01
Date Sampled			23/02/2025	23/02/2025	23/02/2025
Total Nitrogen	mg/L	0.10	8.1	15	11

Method Summary

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation: TDS = EC*0.6
INORG-118	Hexavalent Chromium by Ion Chromatographic separation and colourimetric determination. Waters samples are filtered prior to analysis. Solids are extracted with an alkaline buffered solution, for air sampling media the same alkali extraction can be used or alternatives from NIOSH/OSHA. For aqueous samples, Total Hexavalent Chromium includes the dissolved Hexavalent Chromium and any Hexavalent Chromium solubilised by the preservative i.e. Sodium Hydroxide from any particulate that may be present.
INORG-127	Total Nitrogen by high temperature catalytic combustion with chemiluminescence detection. Organic Carbon forms (inorganic, organic, total) determined using a TOC/NDIR analyser via combustion. Dissolved forms require filtering prior to determination.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PGB1467

Client Details

Client	Consolidated Minerals Ltd (Woodie)
Your Reference	Environment
Date Issued	05/03/2025

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PGB1467

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Dissolved Metals (LL) | Water	1-3	23/02/2025	26/02/2025	26/02/2025	Yes
pH | Water	1-3	23/02/2025	25/02/2025	25/02/2025	No
TDS | Water	1-3	23/02/2025	25/02/2025	25/02/2025	Yes
Cr6+ (LL) | Water	1-3	23/02/2025	04/03/2025	04/03/2025	Yes
Nitrogen - Total N | Water	1-3	23/02/2025	26/02/2025	27/02/2025	Yes

Quality Control PGB1467

METALS-022 | Dissolved Low Level Metals (Water) | Batch BGB4373

Analyte	Units	PQL	Blank	DUP1 BGB4373-DUP1# Samp | QC | RPD %	DUP2 BGB4373-DUP2# Samp | QC | RPD %	LCS %	Spike % BGB4373-MS1#
Arsenic	mg/L	0.0010	<0.0010	<0.0010 | <0.0010 | [NA]	0.00276 | 0.00275 | [NA]	104	108
Copper	mg/L	0.0010	<0.0010	0.00920 | 0.00915 | 0.567	<0.0010 | <0.0010 | [NA]	102	104
Molybdenum	mg/L	0.0010	<0.0010	<0.0010 | <0.0010 | [NA]	0.00311 | 0.00299 | [NA]	102	106
Selenium	mg/L	0.0010	<0.0010	<0.0010 | <0.0010 | [NA]	<0.0010 | <0.0010 | [NA]	111	110
Uranium	mg/L	0.0010	<0.0010	<0.0010 | <0.0010 | [NA]	0.00114 | 0.00112 | [NA]	103	95.8

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-001 | Inorganics - Physical Parameters (Water) | Batch BGB4078

Analyte	Units	PQL	Blank	DUP1 BGB4078-DUP1# Samp | QC | RPD %	DUP2 PGB1467-01 Samp | QC | RPD %	LCS %
pH	pH units		5.9	5.3 | 5.3 | 0.188	7.4 | 7.4 | 0.00	99.9

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-018 | Inorganics - Physical Parameters (Water) | Batch BGB4222

Analyte	Units	PQL	Blank	DUP1 BGB4222-DUP1# Samp | QC | RPD %	DUP2 BGB4222-DUP2# Samp | QC | RPD %	LCS %
Total Dissolved Solids	mg/L	5.0	<5.0	301 | 294 | 2.35	1550 | 1550 | 0.387	104

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-118 | Inorganics - Speciated Cr (III/VI) and Fe (II/III) (Water) | Batch BGC0157

Analyte	Units	PQL	Blank	DUP1 PGB1467-01 Samp | QC | RPD %	LCS %	Spike % PGB1467-02
Hexavalent Chromium	mg/L	0.0010	<0.0010	<0.0010 | <0.0010 | [NA]	109	103

INORG-127 | Inorganics - Nutrients (Water) | Batch BGB4383

Analyte	Units	PQL	Blank	DUP1 BGB4383-DUP1# Samp | QC | RPD %	DUP2 BGB4383-DUP2# Samp | QC | RPD %	LCS %	Spike % BGB4383-MS1#
Total Nitrogen	mg/L	0.10	<0.10	2.76 | 2.90 | 4.95	6.93 | 7.09 | 2.22	101	95.6

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

APPENDIX G: ROCKWATER HYDROLOGICAL REPORT

WOODIE WOODIE

DETAILED HYDROGEOLOGICAL ASSESSMENT AND MODELLING REPORT

REPORT FOR CONSOLIDATED MINERALS LTD

AUGUST 2023

Report No. 150.2/23/04

Rockwater
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

76 Jersey Street Jolimont 6014 Western Australia Postal: PO Box 201 Wembley 6913 Western Australia
Ph: 61 8 9284 0222 Fax: 61 8 9284 1785 Email: consult@rockwater.com.au www.rockwater.com.au ABN: 43 008 804 653

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REVISION	AUTHOR	REVIEW	AUTHORISED	ISSUED
21-01 Draft	MT	GB	GB	10/11/21
21-01 Rev1	MT			22/11/21
23-04 Rev2	MT			10/08/23

1 INTRODUCTION

The Woodie Woodie Manganese Operation (Woodie Woodie) is located approximately 400 km southeast of Port Hedland and 100 km east of Nullagine in the Pilbara region of Western Australia (Figure 1). The Woodie Woodie mine is owned and operated by Consolidated Minerals Limited's (CML), a wholly owned subsidiary Pilbara Manganese Pty Ltd. Woodie Woodie includes several open pit mines, a manganese beneficiation facility, workshop facilities, administration offices and an accommodation village. Mining operations have occurred since 1952, including various periods in care and maintenance.

CML annually dewaters significant volumes of groundwater as part of the mining operation. Dewatering has largely been undertaken using in-pit sumps, but since 2015, large diameter ex-pit dewatering bores have predominantly been used to lower the water table. Excess groundwater is discharged to the surrounding ephemeral creek system or to sedimentation ponds.

Information to assess future mining at Woodie Woodie will be supplied to the Environmental Protection Authority (EPA) next year as part of their application to continue mining operations at the site. This report details this latest phase of groundwater modelling and compiles all relevant hydrogeological information into a detailed hydrogeological assessment report suitable for regulatory assessments.

1.1 WATER RESOURCE MANAGEMENT

Woodie Woodie is located within the Pilbara groundwater allocation plan area and is licenced under the Rights in Water and Irrigation 1914 Act (RIWI).

Groundwater extraction at Woodie Woodie is currently licensed under two groundwater licences issued by the Department of Water and Environment Regulation (DWER); Groundwater Licence (GWL) 65080, which is primarily used for potable water supply, and GWL 150949 which is primary used for dewatering of mining operations. Details of the licences are summarised in Table 1.

The discharge of groundwater to the ephemeral creek system is regulated by DWER Environmental Licence to Operate L6131/1990/13 and associated amendments.

Table 1 – Summary of Groundwater Licences

Groundwater Licence No.	Allocation (kL)	Location of Activity	Use	Duration of Licence
GWL 65080	630,000	M45/432, M45/637 and G45/40	Dust suppression, exploration drilling, mineral ore processing and mining camp purposes	24 October 2018 to 23 October 2028
GWL 150949	63,000,000	L45/145, L45/146, L45/164, L45/286, L45/310, L45/322, L45/351, L46/29, G45/37, G45/38, G45/39, G45/40, G45/279, G45/280, G45/281, G45/282, G45/283, G45/284, G45/332, G45/333, G45/334, G45/335, G45/336, G46/4, G46/5, M45/107, M45/107, M45/429, M45/430, M45/431, M45/432, M45/433, M45/434, M45/435, M45/517, M45/600, M45/601, M45/602, M45/637, M45/638, M45/639, M45/640, M45/641, M45/744, M45/1115, M45/1218, M46/92, M46/93, M46/94, M46/150, M46/108, M46/150, M46/161, M46/162, M46/137, M46/383, M46/384,	Dewatering for mining, dust suppression for earthworks and construction, mineral ore processing, mining camp and rehabilitation purposes	24 October 2018 to 23 October 2028

2 PHYSIOGRAPHY AND CLIMATE

2.1 PHYSIOGRAPHY AND DRAINAGE

Woodie Woodie is located on the eastern margin of the Oakover Drainage Basin, with the Great Sandy Desert to the east. The upper reaches of the Oakover River are about 170 km south of Woodie Woodie. The Oakover River flows north into the De Grey River. Tributaries to the Oakover River in the Woodie Woodie area include the Davis River, Warri Warri Creek, Brumby Creek, and Woodie Woodie Creek (Figure 2). Numerous semi-permanent pools and rock holes occur along the Oakover River and its tributaries, indicating a shallow depth to groundwater at these locations.

The Woodie Woodie development envelope is about 24 km long by 6 km wide (Figure 2). Topography across the corridor ranges from: about 305 m Australian Height Datum (AHD) in the south and east; to about 280 m AHD in the north; and about 265 m AHD west of the mine on the alluvial flood plain.

2.2 RAINFALL AND EVAPORATION

Rainfall in the Woodie Woodie mining region is associated with monsoonal troughs or tropical cyclones, with the majority of rain falling from December to March. At Telfer airport (BoM Station 013030), 100 km to the east of Woodie Woodie, the average annual rainfall is 362.1 mm.

Table 2 – Rainfall and Evaporation Data

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1974 -2020 Average Rainfall (mm)[1]	63.2	96.8	69.4	18.1	19	12.4	11.5	4.7	2	2.9	15	47.1	362.1
1974-1995 Average Evaporation (mm)[1]	443.3	361.2	381	321	242	192	214	260	336	440	465	443.3	4,099

1. Source: Telfer airport (Bureau of Meteorology Site 013030, 100 km east of Woodie Woodie, 1974–2020)

Annual pan evaporation at Telfer is 3,656 mm. Evaporation exceeds rainfall during every month of the year and the average annual evaporation is an order of magnitude greater than average annual rainfall (Table 2).

2.3 VEGETATION AND LAND USE

The landscape at Woodie Woodie comprises rocky hills and slopes, stony plains with hard spinifex grasslands. The area is vegetated with hummock grasslands with scattered low eucalypt, acacia or Mallee trees or other low shrub species. No ecological communities of conservation significance have been identified (Umwelt-Australia, 2021). The primary land uses of the area are mining and pastoral grazing of native vegetation.

3 GEOLOGY AND HYDROGEOLOGY

3.1 GEOLOGY

Woodie Woodie is located close to the eastern margin of the Pilbara Craton in the north-eastern part of the Hamersley Basin, also known as the Mount Bruce Supergroup (Williams, 1989). The stratigraphy of the Woodie Woodie area is presented in Chart 1. It comprises the basal Fortescue Group, a volcano-sedimentary package, which is conformably overlain by the Carawine Dolomite (Hamersley Group) (Figure 3). The Carawine Dolomite is overlain by a thick weathering carapace of chert breccia (Pinjian Chert Breccia) and then unconformably by other younger units, including the Waltha Woora Sandstone (either part of the Tarcunyah Group or Stag Arrow formation (Jones, 2009)), Paterson Formation (glacial deposits), various younger Tertiary sedimentary units (e.g. the Oakover Formation).

The Fortescue Group and the Carawine Dolomite were deposited in a broad extensional synclinal basin, known as the Oakover Basin. These features are shown in the geological cross section in Figure 4. This basin is over 180 km long; the width of the basin being about 16 km near Woodie Woodie. Deep drilling and detailed mapping along the margins of the Oakover Basin suggest that the basin is a half-graben, with the dolomite thicknesses increasing markedly to the east (Jones, 2010). This interpretation contrasts with previous descriptions of the Oakover Basin by Hickman (1978). Jones (2010) outlines a structural framework, as displayed in Figure 5, that is dominated by major NNW-trending faults connected to lesser second and third order ENE-trending faults which are typically sub-vertical.

Manganese mineralisation is likely to have a hydrothermal origin and is associated with major faulting (Jones, 2010). Mineralisation is hosted by the Carawine Dolomite, Pinjian Chert Breccia and basal sedimentary units of the overlying Mesoproterozoic sedimentary units.

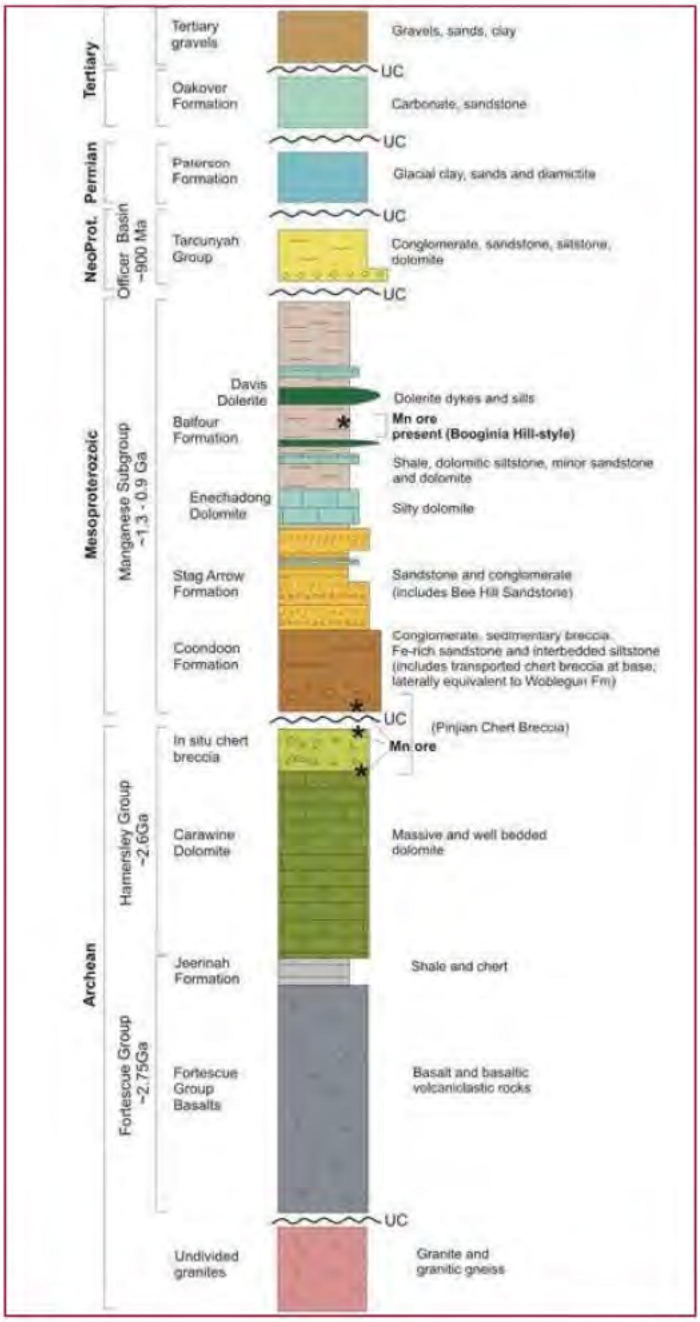

Chart 1: Woodie Woodie Stratigraphy (after Jones, 2009)

3.1.1 LEAPFROG MODEL

In 2020, CML provided Rockwater with a Leapfrog model of the greater Woodie Woodie region. This imparted additional information away from the mine corridor and was used to populate the distribution of geological units across the extent of the numerical groundwater model. It included new information on surficial clayey sediment (including the Paterson and Oakover Formations), which were mapped as being typically 30 to 60 m thick at the surface, and +100 m in the north-west of the study area. It also provided detail on the distribution of the Waltha Woora Sandstone and the top of the Carawine Dolomite.

Further detail on the distribution of geological units is provided in the discussion of model set-up (Section 7.4).

3.2 HYDROGEOLOGY

3.2.1 AQUIFER DESCRIPTION

Groundwater flow in the Woodie Woodie mine region is dominated by the faults and fractures in the Upper Carawine Dolomite; and by the highly permeable Pinjian Chert Breccia. These are overlain by thick sequence of Permian glacial sediments of the Paterson Formation which act as an aquitard. The basal Fortescue Group, including the Jeerinah Formation and Maddina Basalt, have negligible permeability and are interpreted to be aquitards (GRM, 2004). The eastern margin of the mine corridor is strongly deformed, and subvertical shale beds of the Jeerinah Formation extend along the edge of the corridor. To the west, basalts of the Fortescue Group occur. ~~This unit is an~~These are aquitards and mark~~s~~ the ~~eastern~~ margin of the aquifer system as shown in Figures 4.

The Pinjian Chert Breccia forms a major aquifer that is commonly confined by the Paterson Formation where it is present, but is otherwise unconfined. The hydraulic conductivity of the Pinjian Chert Breccia is estimated to range from about 5 to 150 m/day. The Pinjian Chert Breccia is often vuggy, with voids either open or infilled with clay or other ~~fine grained~~fine-grained sediments. Vuggy Pinjian Chert Breccia often surrounds the manganese ore zones.

The Carawine Dolomite can be divided into the Upper Carawine Dolomite and Lower Carawine Dolomite. The Upper Carawine Dolomite contains discontinuities (including bedding planes and fractures) and vugs. The Lower Carawine Dolomite, which occurs beneath about 150 m AHD, is generally less fractured and more massive. The hydraulic conductivity of the Upper Carawine Dolomite is estimated to be about 5 m/day, although some faulted occurrences are estimated to be as high as 30 m/d. The Lower Carawine Dolomite has a lesser permeability, estimated to be about 0.1 m/day regionally and about 1 m/day within the mine corridor.

The Woodie Woodie mine corridor is subject to significant faulting as described by Jones 2010 and 2011. Faults are commonly sealed during the mineralisation events, with manganese, silica and clay but can be 'cracked' open during subsequent deformation events. Therefore, some faults have been found to act as hydraulic barriers and others conduits to flow with extremely high hydraulic conductivities ~~(Figure 5).~~ Interpreted faults and lineaments are shown in Figure 5, along with faults that have been interpreted to specifically act as hydraulic conduits or barriers, as well as the significantly broken area in the Topvar region. It should be noted that most of the Mine Corridor is significantly faulted and this is accounted for by prescribing high hydraulic conductivity values in the groundwater model (see Section 7.3).

The specific yield for the two aquifers is likely to be low because of the low primary porosity, although values of up to 20% for the Carawine Dolomite and 10% for the Pinjian Chert Breccia have been quoted in historical reports and may be appropriate at localities with the greatest development of faults and vugs. The confined storage (storativity) is likely to be in the order of 5.0E^{-4} to 1.0E^{-6} (see Section 7.6).

3.2.2 HYDRAULIC GRADIENT

The pre-mining water table was about 257 m AHD (circa 1950's), with regional groundwater flow from south to north as shown in Figure 6. Groundwater flow in the Woodie Woodie mine region is dominated by faults and fractures in the Carawine Dolomite and has been heavily altered due to pit dewatering. Mine-corridor scale hydraulic gradients are typically very flat, with a hydraulic gradient typically of about

0.0002 m/km beyond the influence of mine dewatering. This is largely due to the high (net) hydraulic conductivities in the Woodie Woodie aquifer system in the mine corridor.

3.2.3 AQUIFER THICKNESS

Estimated thickness of aquifer is presented in Figure 7; the thickness was calculated by subtracting the base of significant permeability layer (at about 150 m AHD – approximately the top of model Layer 7) from the static groundwater levels (end of 2020). This method of calculation is more suited for areas outside the mine corridor, as the known geology within the corridor is more complex (particularly due to faulting) and the permeability extends deeper in some areas. Tertiary aged surficial clayey sediments of varying thickness (but not always saturated) overlie the main aquifers (the Pinjian Chert/Upper Carawine Dolomite). Where present, these surficial clays are considered to be less permeable than the underlying the Pinjian Chert/Upper Carawine Dolomite.

3.2.4 RECHARGE AND DISCHARGE

Aquifer recharge occurs via direct rainfall infiltration, with preferential recharge occurring along surface water drainage features, faults and lineaments. As surficial clay occurs across the majority of the study area, rainfall recharge is largely limited aerially. It is considered that the aquifers within the project area, are predominantly recharged with flow from the south, bottlenecking near the Woodie Woodie mine corridor.

Following the hydraulic gradient, groundwater leaves the project area to the north, and possibly discharges along watercourses in the Oakover River valley where groundwater is close to surface.

4 EXISTING GROUNDWATER USE

4.1 DEWATERING

4.1.1 EXTRACTION

Dewatering has occurred at Woodie Woodie since the 1950s, however, there are limited reliable dewatering data prior to 1999.

The current GWL allocation for dewatering purposes is 63 GL/a (GWL 65080). A summary of dewatering data is presented in Figure 8 (1999–2012) and Figure 9 (2012–2020). Detailed extraction summaries are presented to DWER annually (CML, 2021). Extracted annual volumes since 2012 are presented in Table 3.

Table 3 – Summary of Recent Historical Dewatering Volumes

Year	Total dewatering volume (GL)
2012	42.8
2013	35.8
2014	31.2
2015	11.4
2016	5.2
2017	6.8

2018	13.1
2019	12.3
2020	11.3

4.1.2 INFRASTRUCTURE

Dewatering from the 1950s until 2015 was undertaken via sump pumping from active and abandoned mine pits. Since 2015, large diameter dewatering bores feature strongly in the dewatering programme. Present-day dewatering infrastructure includes:

- A network of five high-capacity dewatering bores (Figure 10 and Table 4).
- A network of monitoring bores (Figure 10 and Appendix VI).
- A pipeline system connecting the dewatering bore sites to a point of discharge along Brumby Creek.
- Pontoon/sump and associated infrastructure in the Big Mack, Chutney and Cracker pits.

Table 4 – Summary of Existing Production Bores

Production bore	Coordinates (MGA94)		Elevation	Bore depth		Screen interval		Bore yield	
	mE	mN	(m AHD)	(m bgl)	(m AHD)	From (m AHD)	To (m AHD)	Original (L/s)	2018 (L/s)
THDW01	315,972	7,609,489	279.3	244	35.3	107.3	35.3	167	142
THDW02	316,733	7,610,929	291.9	236	55.9	184.2	57.9	167	107
THDW03	316,926	7,610,939	284.3	241	43.3	111.3	45.3	90	91
THDW04	317,296	7,610,397	287.2	240.3	46.9	169.2	48.9	167	143
THDW05	316,680	7,609,355	295.8	216.8	79	171.1	81	90	53
							Total:	**683**	**536**

Bore THDW01 has operated since 2015 and bores THDW02 to 05 were commissioned in June 2018. Extraction from these bores peaked in mid-2018 at about 480 L/s and by the end of 2020 was about 300 L/s (Figure 9).

Further details for these bores are provided in Section 5 and Appendix I and II.

4.2 OTHER GROUNDWATER USERS

There are no other significant users of groundwater sourced from the East Hamersley Fractured Rock Aquifer in the vicinity of Woodie Woodie. DWER's online Water Register database indicates that these are 10 other licensed users of the aquifer within 100 km of Woodie Woodie. All have allocations of less than 100,000 kL/annum. The closest groundwater user is Fortescue Metals Group, located 42 km to the southeast, with an allocation of 20,000 kL/annum.

CML recently installed stygofauna and troglofauna monitoring bores across the project area. Sampling is currently being undertaken, with the results expected in early 2022. The estimated aquifer thickness (Figure 7) has been provided to assist with interpreting the impact of drawdown on potential stygofauna habitat.

CML has advised that there are no groundwater dependent vegetation habitats within the project area.

5 HYDROGEOLOGICAL INVESTIGATIONS

Hydrogeological investigations have been undertaken at Woodie Woodie since mining began in the 1950's. This understanding of the hydrogeology has been used to guide dewatering efforts. Most of the recent investigations focused on the installation and testing of the large diameter dewatering bores (Rockwater 2015 and 2016a; Appendices I and II), subsequent modelling (Rockwater, 2018a; Appendix III), installation of additional monitoring bores (Rockwater, 2018b; Appendix IV) and groundwater exploration programmes at Chutney, Radio Hill, Canyon, Cracker and Eat deposits (Appendix V).

A brief summary of each is presented following in Section 5.1 - 5.5.

5.1 TOPVAR HUB DEWATERING – BORE COMPLETION REPORT THDW01 (APP I)

Large-diameter, ex-pit dewatering bores were elected as a suitable dewatering strategy for the Topvar Hub. These bores targeted the highly permeably 'broken ground' (Figure 5) surrounding the Topvar region. This report contains the bore construction details of the first bore in this programme, THDW01. Drilling of bore THDW01 was performed by Easternwell using air-hammer and dual-rotary drilling methods in October to December 2014. The bore was successfully completed to 244 m depth. Bore construction utilised 337 mm ID, stainless steel screens (172 to 244 m) and 336 mm ID, steel casing (+0.57 To 172 m). During drilling, airlift yields of up to 200 L/s were encountered. During bore-development airlifting, the maximum bore yields were 115 L/s.

5.2 TOPVAR HUB DEWATERING – BORE COMPLETION REPORT PHASE 2 DRILLING AND CONSTRUCTION PROGRAMME (APP II)

This report details the construction of another four productions bores, THDW02, THDW03, THDW04, and THDW05, constructed from September to December 2015. Drilling was performed by Boart Longyear using conventional air-hammer, conventional mud-rotary, and dual tube flooded reverse circulation methods. The bores were successfully completed to depths ranging from 216.4 to 241.0 m. Recommended maximum pumping rates of the four bores range from 90 L/s at THDW03 to THDW05 to 167 L/s at THDW02 and THDW04. The pumping test data suggest a combined maximum dewatering rate (including bore THDW01) of 634 L/s for the borefield could be achievable.

5.3 WOODIE WOODIE MINE NUMERICAL MODELLING OF PIT DEWATERING MAY 2018 TO DECEMBER 2020 (APP III)

This report provides details of a numerical model of the greater Woodie Woodie aquifer system that was developed using the FEFLOW finite-element modelling platform. Based on the then current mining schedules, predictive modelling scenarios suggested that three additional production bores would be required in 2018 to achieve the then current Topvar pit dewatering target, with another bore being required by January 2020 to reach the Cracker pit dewatering target. Dewatering extraction was expected to peak at about 1,200 L/s in 2020, but due to changes in the mining schedule, these peaks were not reached.

5.4 WOODIE WOODIE MINE GROUNDWATER MONITORING BORE COMPLETION (WWMB 15-18) (APP IV)

Four monitoring bores (WWMB15 to WWMB18) were constructed in July 2018. The increased monitoring bore network aimed to improve dewatering tracking and assessment, as well as improve the hydrogeological understanding of key aquifer regions.

5.5 RECENT GROUNDWATER EXPLORATION PROGRAMME SUMMARY (APP V)

Field results and associated interpretations from recent groundwater exploration programmes at Chutney, Radio Hill, Canyon, Cracker and Eat deposits are presented.

6 PLANNED FUTURE MINING

6.1 DEWATERING

The current dewatering schedule used in this modelling assessment is summarised in Table 5. It includes depth targets for the various mine deposits for 2021 to the end of 2030. Deposit locations are shown in Figure 10.

Table 5 – Planned Pit Dewatering Schedule, 2021 to 2030

Deposit	Chutney Stg 2	Cracker Stg 1 & 2	Topvar Stg 2 to 4	BigMack	Chris D Stg 4 to 6	Radio Hill	Airport	Palo	Corgon	Chutney Stg 3	Cracker South	Canyon	George	Gulch	Windyslope	Cracker Stg 3
Current WL (m AHD)	175	167	166	160	168	171	186	183	193	175	167	285	285	285	185	167
Final Planned Elevation (m AHD)	149	81	120	102	69	162	173	147	168	99	81	~~111~~ 270	~~216~~ 270	~~177~~ 270	91	57
2021																
2022																
2023																
2024																
2025																
2026																
2027																
2028																
2029																
2030																

Active Dewatering

6.2 SITE WATER BALANCE

The anticipated site water balance is provided as Table 6. It is based on the current understanding of the site water uses and predicted dewatering volumes as set out in Section 7.8.1.

Table 6 – Anticipated Site Water Balance, 2021 to 2033

Action	Facility	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
		GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a
Extraction GWL 150949	Chutney	13.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cracker & Cracker South	7.3	14.7	18.3	20.0	22.1	0.0	17.3	24.4	0.0	0.0	0.0	0.0	0.0
	Topvar	2.3	3.9	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	BigMack	0.0	0.0	0.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Chris D	0.0	0.0	0.0	2.3	6.4	19.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Canyon, George & Gulch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0
	Windyslope	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	17.3	0.0	0.0	0.0
	THDW Borefield	9.6	9.6	9.6	9.6	9.6	9.6	0.0	0.0	9.6	9.6	9.6	9.6	9.6
	Total Extraction	**32.9**	**28.2**	**32.0**	**36.2**	**38.1**	**28.7**	**17.3**	**24.4**	**13.7**	**36.1**	**9.6**	**9.6**	**9.6**
Usage	Process Plant	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	0.0	0.0	0.0
	Remote Crib Hut RO	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
	Dust Suppression	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
	Total Use	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	***5.2***	0.0	0.0	0.0
TSF	Plant discharged to TSF	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	0.0	0.0	0.0
	Decant return	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	0.0	0.0	0.0
	Homestead	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	0.0	0.0	0.0
	% Recycled	96.4%	96.4%	96.4%	96.4%	96.4%	96.4%	96.4%	96.4%	96.4%	96.4%	0.0%	0.0%	0.0%
Discharge	Topvar Discharge	27.7	23.0	26.8	31.0	32.9	23.5	12.1	19.2	8.5	9.6	9.6	9.6	9.6
	Canyon Discharge	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.3	0.0	0.0	0.0
	Total Discharge	***27.7***	***23.0***	***26.8***	***31.0***	***32.9***	***23.5***	***12.1***	***19.2***	***8.5***	***30.9***	***9.6***	***9.6***	***9.6***

7 GROUNDWATER FLOW-MODELLING

7.1 PREVIOUS MODELLING ASSESSMENTS

Rockwater has previously developed a groundwater model for CML of the Woodie Woodie manganese resource. It was constructed in 2012 using the Visual MODFLOW modelling platform (Rockwater, 2012). The model was successfully used in dewatering planning. The Department of Agriculture and Food (Agriculture) also used this model to assess alternative water supply arrangements for the Warrawagine Project (Rockwater, 2016b). This Visual MODFLOW model was used for various dewatering-options assessments until 2017, by which stage the model had reached the limit of its capabilities. CML engaged Rockwater to update and improve the numerical model in 2018 (Rockwater, 2018a). This version of the model used the more robust industry standard FEFLOW finite-element modelling platform to predict the rates of dewatering and to provide forecast drawdown extents. FEFLOW also allowed for faster run times via the adoption of a finite element mesh.

In 2020, CML developed a geological model of the greater Woodie Woodie region using Leapfrog software. This geological model, with localised and regional geological complexity not previously available, was integrated by Rockwater into the Woodie Woodie FEFLOW groundwater model. This version of the groundwater model has been recalibrated and is used for predictive modelling scenarios in this assessment.

7.2 MODEL OBJECTIVES

The main modelling objectives are to:

- Update the regional geological content within the model to follow CML's Leapfrog geological model;
- Update the FEFLOW model to follow the latest mine plan;
- Predict required dewatering volumes to meet the latest mine plan; and to
- Provide predictions of drawdown extent associated with the dewatering operation.

The model was developed using the Australian groundwater modelling guidelines (Barnett et al., 2012) as a basis. Following these guidelines, the Woodie Woodie model currently sits into the Class 2 confidence category.

7.3 CONCEPTUAL MODEL

The conceptual model follows the hydrogeology described in Section 3.2 as depicted in Figure 11. Groundwater flow in the area is dominated by the faults and fractures in the Carawine Dolomite, and by the highly permeable Pinjian Chert Breccia. The basal Fortescue Group, including the Jeerinah Formation and Maddina Basalt, have negligible permeability and are interpreted to be aquicludes.

Hydraulic properties in the model were populated based on the geological unit distributions in the Leapfrog model provided by CML. Highly-transmissive and low permeability fault zones within the mine corridor are modelled based on CML's structural mapping (Jones, 2015 and Figure 5), high vs low flow zones interpreted by CML from drilling data and self-potential geophysical data (Jones, 2011) and drawdown responses in monitoring bores (Appendix VI). Outside the corridor, the hydraulic nature of faults have not been established and therefore they haven't explicitly been included in numerical modelling but instead incorporated in the bulk property of the units. The ~~conceptual~~ main features of the numerical groundwater model ~~is~~ are depicted in Figure 12 and ~~12~~13.

7.4 NUMERICAL MODEL DESCRIPTION

The model encompasses a total area of about 1,500 km^2 (approximately 25-27 km × 50 km). A finite element network (grid) was designed to provide a high resolution of the numerical solution, while at the same time accommodating the large model area. The model extent is shown in Figure 14.

The finite element mesh was compiled using the FEFLOW pre-processing, applying progressive refinement towards the Woodie Woodie mine corridor and further refinement for all parts of the model where most of the flow changes are likely to occur (pits, production bores and faults). The triangular grid consists of 16,648 nodes and 32,793 elements. Elemental diameters range from 25 m near the dewatering bores, to 20 to 50 m around the faults and to 1,500 m away from the mine corridor.

A transient numerical model integrating the saturated and unsaturated zones has been developed and the Richard's equation is used, applying a Van Genuchten scheme. This approach allows the modeller to recreate a realistic dewatering programme with more accuracy near each pit while the aquifer is stressed.

7.4.1 MODEL LAYERS

The top of the model is represented by the publicly-available Digital Elevation Model (DEM) and by the elevation data provided by CML in the mining area. The regional topography was imported at 100 m spacing and the local topography at 45 m spacing.

The model comprises eight layers and nine slices. The model layering follows topography with layers 1 to 4 are on average 19 m thick, increasing to on average 38 m thickness by layer 7. Layer 8, the base of the model is set at -100 m AHD.

7.4.2 BOUNDARY CONDITIONS

The following boundary conditions were applied:

- Constant head boundaries of 303 m AHD and 200 m AHD were applied at the southern and northern boundary of the model.
- The Oakover River and Woodie Woodie Creek were also set as constant head boundaries with ground level elevation applied as the head.
- Western and eastern boundaries of the model coincide with the impermeable Fortescue Group and as such were assigned no-flow boundaries.
- Net recharge was considered to be homogeneous for the model extent and was set at 1E-5 m/d across the model domain surface.
- In-pit dewatering was simulated using variable head boundary conditions, with the water level set at the base of mining/or measured pit water levels as applicable across the relevant extent of the pit. Model calculated dewatering rates were derived based on the volume of water removed to maintain the set water level.

- Ex-pit dewatering bore extraction was simulated using the multi-layer well function. Measured pumping rates for bores THDWB 01 to 05 (Figure 10) were applied from 2015 onwards in the calibration phase, and THDWB 01, 02 and 04 were set at a total of 304 L/s when operating in the prediction phase.

- Infiltration downstream of the Topvar dewatering discharge point (Figure 14) was assigned to the model from 2015 onwards. Rates were based on calculations from LiDAR data made by Cardno (2021, pers. comm.); for the calibration period this is assumed to be approximately 5% of dewatering discharge.

7.5 CALIBRATION

The Woodie Woodie groundwater system is dynamic, as it has been subjected to several periods of historic dewatering, some with limited corresponding monitoring data. Therefore, model calibration needed to be completed in stages (Table 7). Stage 3 was the predominant calibration phase, as it corresponded to the best available dataset. Also the majority of the dewatering over Stage 3 was undertaken using dewatering bores with extraction rates that could be prescribed in the model. For earlier periods of dewatering, there is considerable uncertainty around mining levels which have a strong control over model calculated dewatering rates.

Table 7 – Model Calibration Stages

Stage	Stage name	Stage details
1	Steady-state	Modelled steady-state pre-mining groundwater levels were compared with the interpreted pre-mining groundwater levels shown in Figure 6**Error! Reference source not found.**. Recharge was set at 1E 5 m/d and the hydraulic properties were altered to broadly match the observed groundwater head distribution.
2	Transient I (Historic dewatering)	Modelled transient heads for the period of January 1999 to March 2012 were compared with monitoring data (mining level data limited)
3	Transient II (Recent dewatering)	Modelled transient heads for the period of April 2012 to December 2020 were compared with monitoring data (mining level data reliable)

Each model-calibration stage involved a two-step process:

1. The model was initially calibrated via manual-input iterative parameter updates. Calibration was undertaken until a close correspondence between model-calculated and measured groundwater levels (and dewatering outflows where possible) was achieved.

2. Further model-calibration was achieved with the assistance of parameter estimation software PEST. This tool was also used to explore model-sensitivity and was used to specify the hydraulic conductivity of the mine corridor barrier faults.

The following parameters were varied during model calibration: hydraulic conductivity, specific yield and specific storage. Recharge was not varied during model-calibration.

Calibration hydrographs for the site monitoring bores over the Transient II (Stage 3) model runs are presented in Appendix VI. Measured versus modelled groundwater levels at the end of the calibration have a standardised root mean square (SRMS) error of 3.45%.

7.6 ADOPTED AQUIFER PARAMETERS

The range of hydraulic parameters obtained from model calibration are provided in Table 8.

Table 8 – Summary of Aquifer Parameters Adopted in Calibration

Unit	Horizontal Hydraulic Conductivity	Vertical Hydraulic Conductivity	Effective Porosity	Specific Storage
	(m/d)	(m/d)	n (m^3/m^3)	Ss (1/m)
Clayey Sediment	0.02	0.002	0.05	1.0E-6
Waltha Woora	5	2	0.2	5.0E-4
Pinjian Chert Breccia	100	10	0.2 – 0.3	5.0E-4
Upper Carawine Dolomite	5	0.5	0.2 – 0.3	5.0E-4
Lower Carawine Dolomite	0.1 - 1	0.05 – 0.5	0.05	1.0E-5 - 5.0E-5
Fault - Drain	20 -30		0.3	5.0E-4 - 5.0E-5
Fault – Barrier North	1.5E-3		0.05	1.0E-5
Fault – Barrier Mid-Corridor	7.4E-3			
Fault – Barrier West	2.4E-4			
Fault – Barrier South	2.0E-4			

7.7 WATER BALANCE

The water balance for the model domain at the end of the 2012 to 2020 calibration period is presented in Table 9.

Table 9 – Model Water Balance at the end of Calibration

Flow Component	In	Out
	(kL)	(kL)
Constant Head Boundary	221,362	227,481
Well	0	29,512
Recharge	12,470	0
Storage	27,361	4,199
Total	261,193	261,191
Imbalance (In - Out)		**2**
Imbalance (%)		**0.0008%**

7.8 PREDICTIVE MODELLING

7.8.1 DEWATERING STRATEGY

The calibrated model was used to assess the dewatering requirements and extent of drawdown for the planned dewatering schedule from 2021 to 2033, as set out in Table 5. Dewatering is anticipated to be focused in the Topvar region until 2028, and then the Canyon region until 2030. Dewatering bores THDW 01, 02 and 04 were set to run from 2021 to 2026, and again from 2028 to 2033 to maintain dewatering levels and to allow for the waning of discharge to watercourses post-dewatering operations.

Predicted total dewatering requirements are summarised in Table 10 and presented in Figure 15~~14~~. A break-down of predicted dewatering requirements for each deposit/area is presented in Table 11 and Figure 15~~14~~. Dewatering requirements are predicted to peak in 2025 at 38 GL/a largely due to mining in the Cracker region, and again in 2030 at 35 GL/a with mining occurring in the Canyon area. Those deposits not listed have no separable dewatering requirement and are predicted to be dewatered using ex-pit bores or dewatering operations occurring at nearby deposits.

Table 10 – Model Predicted Total Dewatering Requirements

Date	Model Time		Pit Drains Rate		Bores* Rate		Total Volume
Year	Year	Days	m³/d	L/s	m³/d	L/s	GL/a
2021	1	365	64,092	742	26,242	304	33.0
2022	2	730	51,025	591	26,242	304	28.2
2023	3	1,095	61,388	711	26,242	304	32.0
2024	4	1,461	72,644	841	26,242	304	36.1
2025	5	1,827	77,978	903	26,242	304	38.0
2026	6	2,193	52,215	604	26,242	304	28.6
2027	7	2,559	47,285	547	0	0	17.3
2028	8	2,925	66,929	775	0	0	24.4
2029	9	3,290	11,317	131	26,242	304	13.7
2030	10	3,655	70,500	816	26,242	304	35.3
2031	11	4,020	0	0	26,242	304	9.6
2032	12	4,386	0	0	26,242	304	9.6
2033	13	4,751	0	0	26,242	304	9.6
						Total	**315.4**

*Rate specified based on end of 2020 duty rates

Table 11 – Model Predicted Pit Dewatering Requirements

Date	Chutney	Cracker & Cracker South	Topvar	BigMack	Chris D	Radio Hill	Airport	Palo	Corgon	Canyon, George & Gulch	Windyslope	Total
Year	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a	GL/a
2021	13.7	7.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.4
2022	0.0	14.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6
2023	0.0	18.3	3.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4
2024	0.0	20.0	0.0	4.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	26.5
2025	0.0	22.1	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	28.5
2026	0.0	0.0	0.0	0.0	19.1	0.0	0.0	0.0	0.0	0.0	0.0	19.1
2027	0.0	17.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3
2028	0.0	24.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4
2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	4.1
2030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	17.3	26.5
2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2032	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	13.7	124.0	10.1	4.5	27.7	0.0	0.0	0.0	0.0	9.2	21.4	210.8

7.8.2 AQUIFER RECHARGE RESULTING FROM DISCHARGE

All modelled dewatering discharge was set to recharge downstream from the Topvar discharge location (Figure 14~~13~~) from 2021 to 2028, with discharge entirely from the production bores from 2029 to 2033. Discharge was set at the Canyon location (Figure 14~~13~~) for 2029 and 2030 only. The rate of recharge by infiltration to the groundwater system were based on calculations made by Cardno (2021, pers. comm.) with the annual volume assumed to be infiltrated across the length of the water course as specified in Table 12.

Table 12 – Modelled Discharge Volume Recharged to Aquifers

Date	Year	Days	Topvar	Canyon	Total
			GL/a	GL/a	GL/a
2021	1	365	1.3	0.0	1.3
2022	2	730	1.3	0.0	1.3
2023	3	1,095	1.3	0.0	1.3
2024	4	1,461	1.3	0.0	1.3
2025	5	1,827	1.3	0.0	1.3
2026	6	2,193	1.3	0.0	1.3
2027	7	2,559	1.3	0.0	1.3
2028	8	2,925	1.3	0.0	1.3
2029	9	3,290	0.5	0.9	1.4
2030	10	3,655	0.5	0.9	1.4
2031	11	4,020	0.5	0.0	0.5
2032	12	4,386	0.5	0.0	0.5
2033	13	4,751	0.5	0.0	0.5

7.8.3 MODELLED WATER LEVELS AND EXTENT OF DRAWDOWN

Modelled groundwater levels at the end of 2020 were used as the starting point in prediction modelling (Figure 16~~15~~). Model calculated groundwater levels to the end of 2033 for site monitoring bores are presented in Appendix VII.

From the end of 2020 to the end of 2028, it is predicted that water levels in the vicinity of Topvar will be drawn down to about 90 m AHD and to about 120 m AHD in the southern part of the corridor, inside the fault barriers (Figure 17~~16~~). This compares to the end of 2020 baseline water levels of about 165 m AHD and 180 m AHD, respectively. Significant drawdown (≥ 2 m) is predicted to extend in a northward direction about 8.5 km outside the fault barriers, with negligible drawdown predicted in both westerly and southerly directions (Figure 18~~17~~).

At the cessation of mining in the Canyon region (end of 2030), it is predicted that groundwater levels will be at 270 m AHD in this area, and between 90 and 100 m AHD within the fault barrier bounded part of the mine corridor (Figure 19~~18~~). The 2020 baseline water levels were about 285 m AHD and 165-180 m AHD, respectively. Compared to the end of 2020 baseline water levels, significant drawdown (≥ 2 m) is predicted to extend about 10 km northward of the corridor and due to mining in the Canyon area, 3.8 km northwest and 1.9 km south of Canyon (Figure 20~~19~~).

Extraction is planned to be continued from dewatering bores in the Topvar area from 2028 to 2033, primarily to allow for the waning of discharge to water courses post-dewatering operations. At the end of 2033, groundwater levels are predicted to be at about 80 m AHD in the vicinity of these bores, about 95 m AHD at the southern end of the mine corridor bounded by the fault barriers, and to have recovered relatively close to 2020 levels in the Canyon area (Figure 21~~Figure 22Figure 21~~). Significant drawdown (≥ 2 m) is predicted to extend about 11 km northward of the corridor and only about 3 m of residual drawdown is predicted near the Canyon mine area (Figure 22).

7.8.4 POST-MINING RECOVERY

The model was run post-dewatering to assess the predicted rate of groundwater recovery in the mine region. For areas within the existing cone of dewatering depression (i.e. the Topvar area), groundwater levels are predicted to recover back to current levels in about 75 to 100 years and return to estimated pre-mining levels in about 400 years (Figure 23~~22~~). In the Canyon area and north of the mine corridor where there is (and will be) minimal drawdown, groundwater levels are predicted to return back to initial levels in about 10 years in the Canyon area and about 50 years north of the mine corridor (Figure 24~~23~~).

7.9 PARAMETER SENSITIVITY AND PREDICTIVE UNCERTAINTY ANALYSIS

The Woodie Woodie groundwater system is an extremely heterogeneous system and hence very challenging to model. For such systems, extensive temporal and spatial data are required in order to develop a decidedly accurate model. The Woodie Woodie groundwater monitoring network is relatively sparse (Figure 10) considering the scale of the dewatering operations and the fracture-dominated nature of groundwater flow. It is also largely limited to the development envelope (excluding recently constructed stygofauna monitoring bores). Nonetheless, given the high aquifer heterogeneity, it is likely to be impractical to build a monitoring network capable of capturing this complexity completely. This brings inherent uncertainty into the model and its predictions, however, it is still considered that the model fits into the Class 2 confidence category (Barnett, et. al. 2012).

Parameter sensitivity with respect to predicted dewatering rates has been undertaken by considering a variety of aquifer parameters (Table 13) and comparing predicted dewatering rates. This shows that the assigned specific storage in the mine corridor largely controls the predicted dewatering rate. Specific storage was derived during calibration with model able to predict total dewatering with an accuracy of about ±20%. Due to uncertainty regarding mining levels, particularly pre-2012, calibration was primarily focussed on the recent dewatering when dewatering bores were utilised and the dewatering rate could be better defined in the model.

Table 13 – Modelled Predicted Dewatering Requirement Sensitivity Analysis

Uncertainty Scenario	Change in parameter	Total Pit Extraction (GL)	Change in dewatering
Base case	-	210.8	-
Hydraulic Conductivity, Whole Model	200%	266.4	26%
	50%	173.9	-18%
Hydraulic Conductivity, Barrier Bounded Mine Corridor	200%	234.7	11%
	50%	184.1	-13%
Hydraulic Conductivity, Fault Barriers (around Mine Corridor)	200%	226.8	8%
	50%	198.4	-6%
Specific Yield, Whole Model	200%	210.8	0%
	50%	210.8	0%
Specific Storage, Whole Model	200%	400.2	90%
	50%	102.2	-51%
Specific Storage, Barrier Bounded Mine Corridor	200%	393.2	87%
	50%	107.8	-49%

Note: Models used in this assessment are un-calibrated and are for qualitative assessment of parameter controls on dewatering rates only.

Parameter sensitivity with respect to predicted drawdown, focussing on the bores outside the fault bounded corridor, has also been undertaken by considering a variety of aquifer parameters (Table 14) and comparing predicted drawdown. This shows that the assigned drawdown to the west and south is mainly controlled by the prescribed fault barrier hydraulic conductivity (also whole model hydraulic conductivity but this too alters the barrier fault conductivity), as well as the prescribed recharge volume along the discharge watercourse.

Table 14 – Modelled Predicted Drawdown Sensitivity Analysis

Uncertainty Scenario	Change in parameter	Monitoring Bore 2030 Drawdown					
		Bore	WMMB04	WMMB07	WMMB09	WMMB10	WMMB11
		Location	West			North	South (Canyon)
Base case	-	Base Model Drawdown	0.98	-0.46	-0.48	12.54	5.08
Hydraulic Conductivity, Whole Model	200%	Change in Drawdown (+ve = increase, -ve =decrease	3.19	2.94	2.61	1.12	2.44
	50%		-3.94	-3.32	-2.19	-0.99	-2.58
Hydraulic Conductivity, Barrier Bounded Mine Corridor	200%		0.34	0.31	0.36	0.05	0.48
	50%		-0.34	-0.27	-0.25	0.02	-0.71
Hydraulic Conductivity, Barriers	200%		3.90	2.88	2.80	0.13	5.50
	50%		-2.15	-1.56	-1.48	-0.07	-3.33
Specific Yield, Whole Model	200%		0.00	0.00	0.00	0.00	0.00
	50%		0.00	0.00	0.00	0.00	0.00
Specific Storage, Whole Model	200%		-0.56	-0.29	-0.16	-0.85	-1.58
	50%		1.04	0.92	1.09	1.03	1.48
Discharge Infiltration	200%		-2.60	-2.54	-1.74	-0.05	-0.77
	50%		1.30	1.27	0.87	0.02	0.38

>1 m drawdown change
<-1 m drawdown change

Note: Models used in this assessment are un-calibrated and are for qualitative assessment of parameter controls on drawdown only.

For both the fault barrier hydraulic conductivity and recharge volume along the discharge watercourse, there were reasonable controls in model calibration. Water level responses in monitoring bores were used to explicitly calibrate the barrier faults in PEST. Modelled infiltration rates along discharge watercourse were based on detailed Lidar data and associated calculation (Cardno, 2021 pers. comm.) however, no field infiltration data were collected. Over the calibration period, no significant drawdown was observed outside the fault barrier bounded areas to the west and south, and only limited drawdown was reported to the north (see Appendix V). Therefore it is considered unlikely that there will be significant drawdown in these areas due to mine dewatering within the fault barrier bounded corridor.

The amount of drawdown that will be experience due to dewatering outside the fault barrier bounded areas of the current mine corridor (i.e. in the Canyon area) is more uncertain. Currently there are no modelled barrier faults south and west of the Canyon area prescribed in the modelling as there are no data to support their existence. If they are present, they would limit the extent of drawdown significantly.

8 SUMMARY AND CONCLUSION

This report details this latest phase of groundwater modelling and compiles all relevant hydrogeological information into a detailed hydrogeological assessment report suitable for regulatory assessments. It follows the latest mine plan which anticipates that dewatering will be focused in the Topvar region until 2028, and then the Canyon region until 2030. Dewatering bores THDW 01, 02 and 04 are anticipated to be used from 2021 to 2026 to aid dewatering, and again from 2028 to 2033 to maintain dewatering levels and to allow for the waning of discharge to watercourses post-dewatering operations. Dewatering requirements are predicted to peak in 2025 at 38 GL/a largely due to mining in the Cracker region, and again in 2030 with mining occurring in the Canyon area.

At the cessation of mining (end of 2030), it is predicted that groundwater levels will be at between 90 and 100 m AHD within the modelled fault barrier bounded portion of the mine corridor, and at 270 m AHD in the Canyon area. The drawdown is predicted to be largely contained within the modelled fault barriers, with significant drawdown (≥ 2 m) predicted to extend about 10 km northward of the corridor and due to dewatering in the Canyon area, 3.8 km northwest and 1.9 km south of Canyon. No significant drawdown is predicted west of the mine corridor.

The Woodie Woodie groundwater system is an extremely heterogeneous system and hence very challenging to model. This brings inherent uncertainty into the model and its predictions. Predictive uncertainty analysis indicates that the dewatering volumes are largely controlled by the model prescribed specific storage and the extent of drawdown is predominantly controlled by the prescribed fault barrier hydraulic conductivity and recharge set along the discharge watercourse. The current dataset has allowed there to be reasonable control of these parameters in the modelling.

The amount of drawdown that will be experience due to dewatering outside the fault barrier bounded areas of the current mine corridor (i.e. in the Canyon area) is uncertain. Currently there are no modelled fault barriers limiting the extent of drawdown south and west of Canyon, as there are no data to support their existence. If they are present, they would limit the extent of drawdown significantly.

Dated: 8 August 2023

Rockwater Pty Ltd

M.Taylor

MJ Taylor
Principal Hydrogeologist

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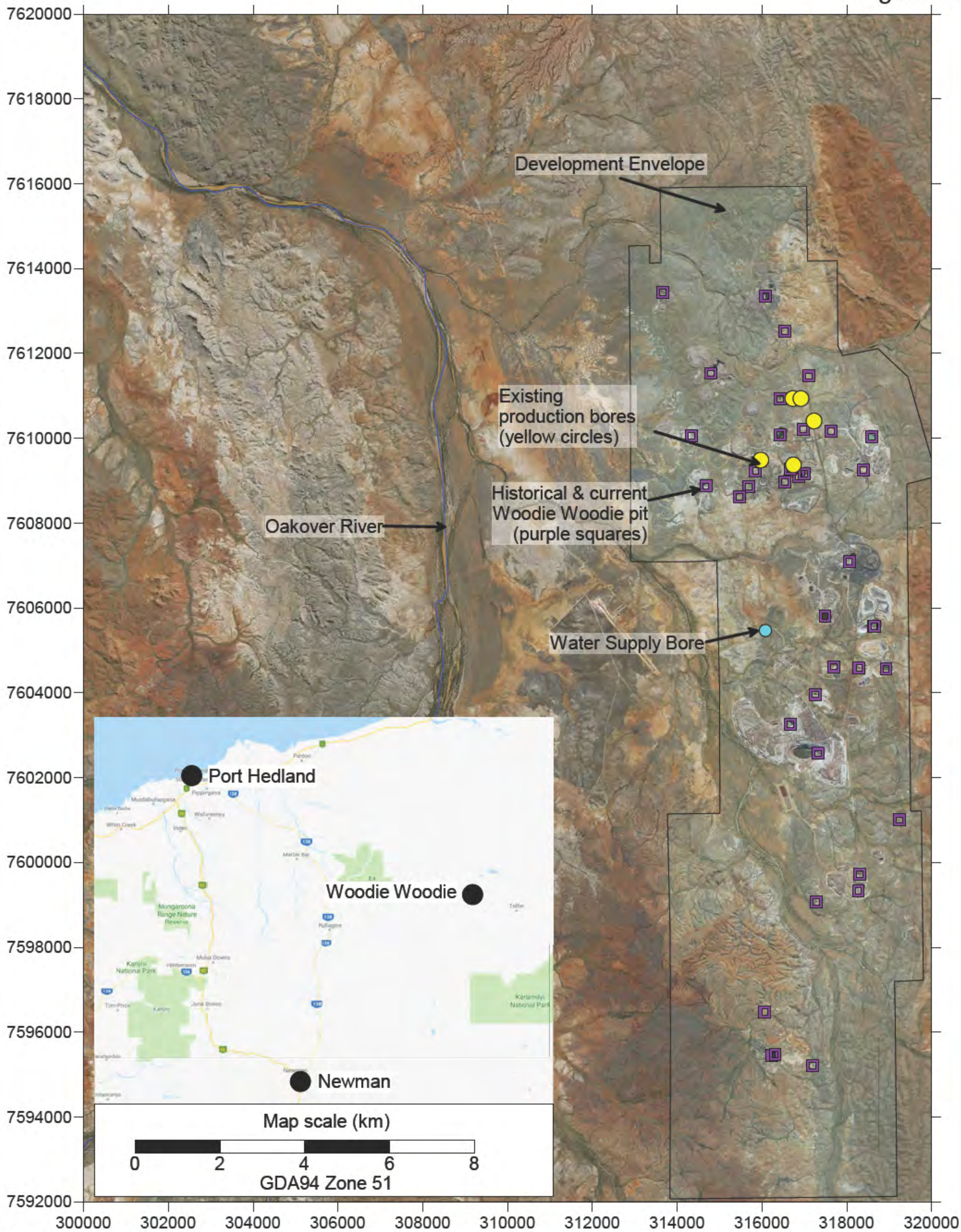
FIGURES

Figure 1



150-2/Surfer/23-04/Figure 1.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-1

WOODIE WOODIE SITE LOCATION

ConsMin

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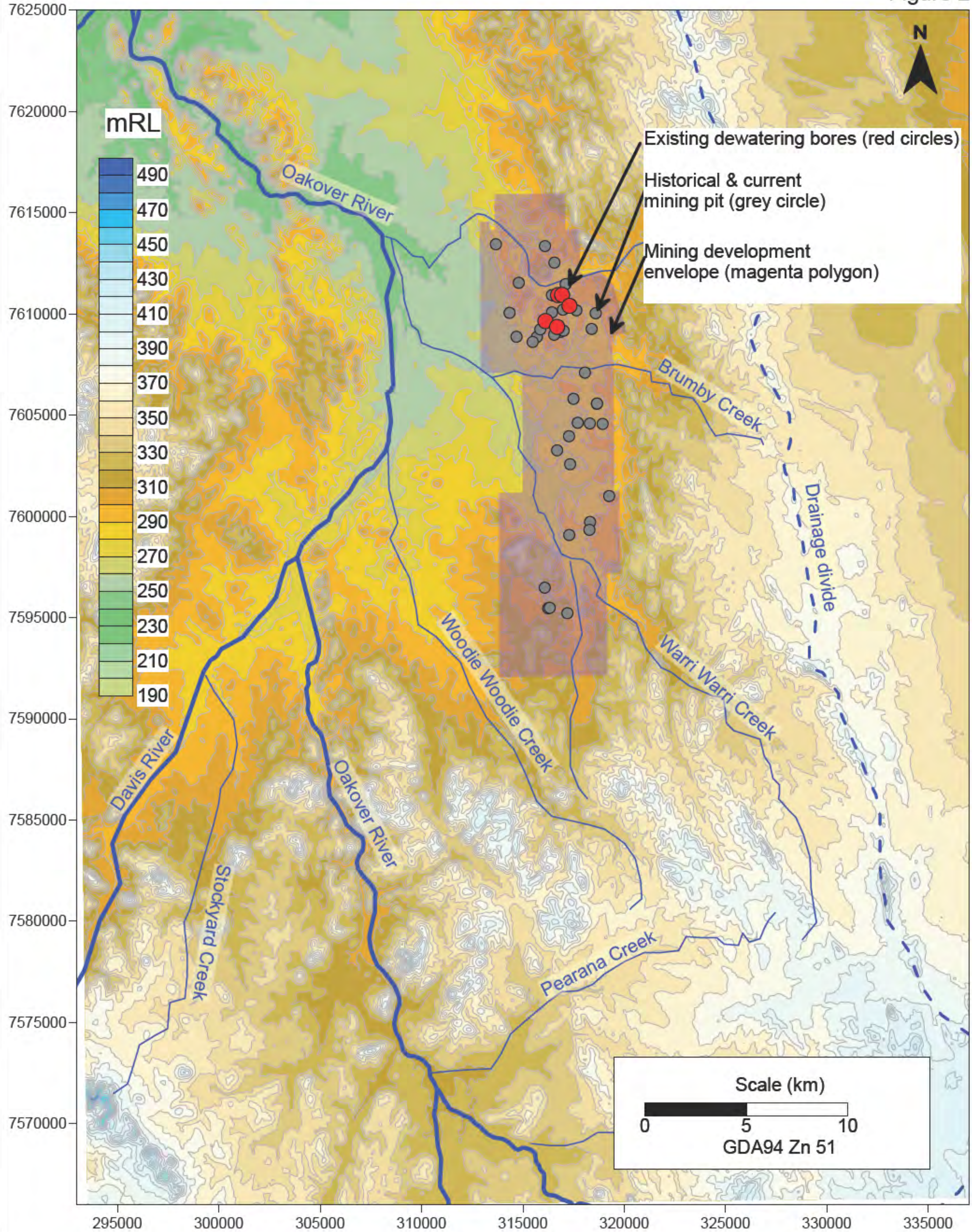
Figure 2



150-2/Surfer/23-04/Figure 02.srf

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Date: August 2023

Dwg. No: 150-2/23/4-2

REGIONAL TOPOGRAPHY AND DRAINAGE

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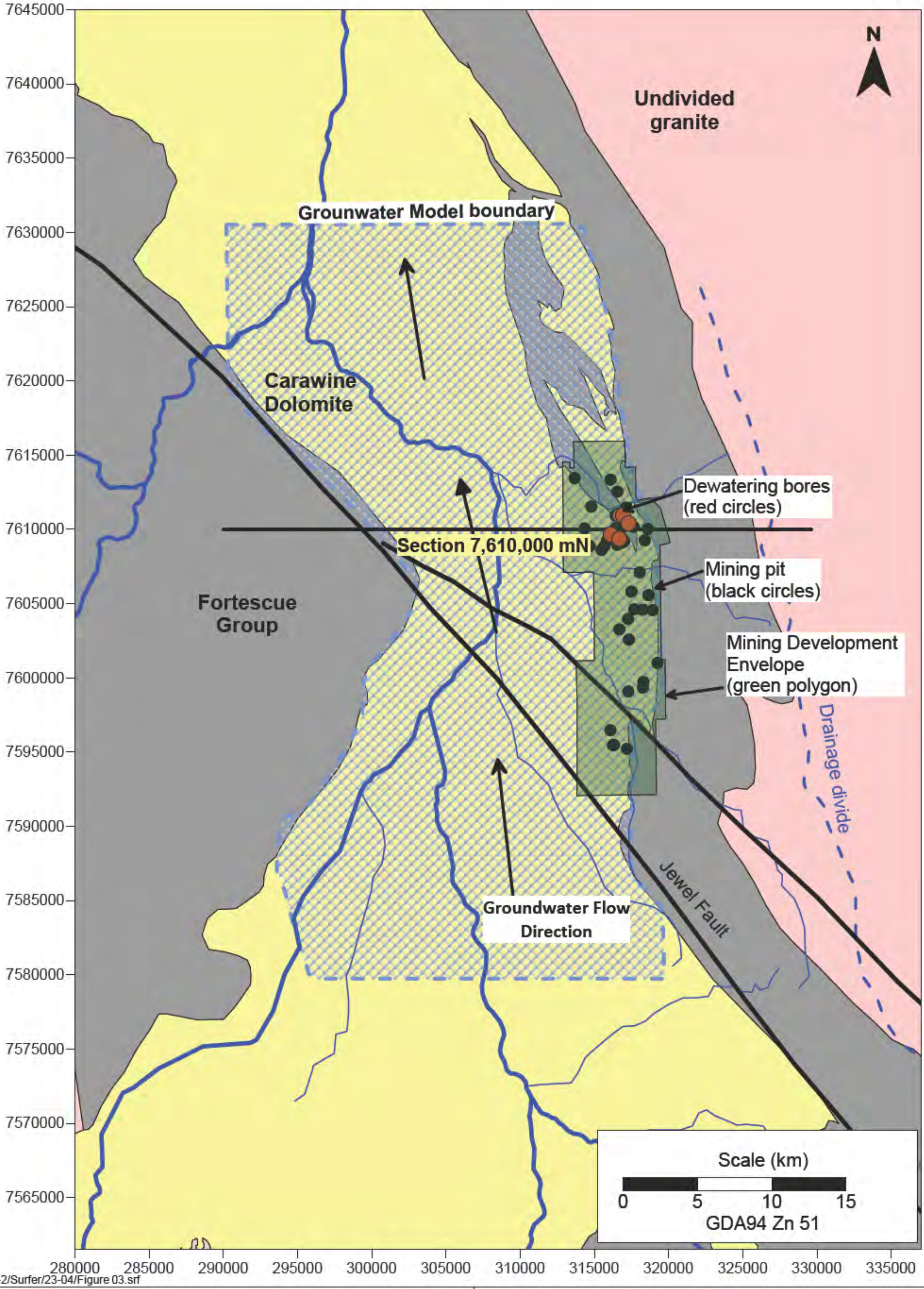
Figure 3



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Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-3

REGIONAL GEOLOGICAL UNITS

ConsMin

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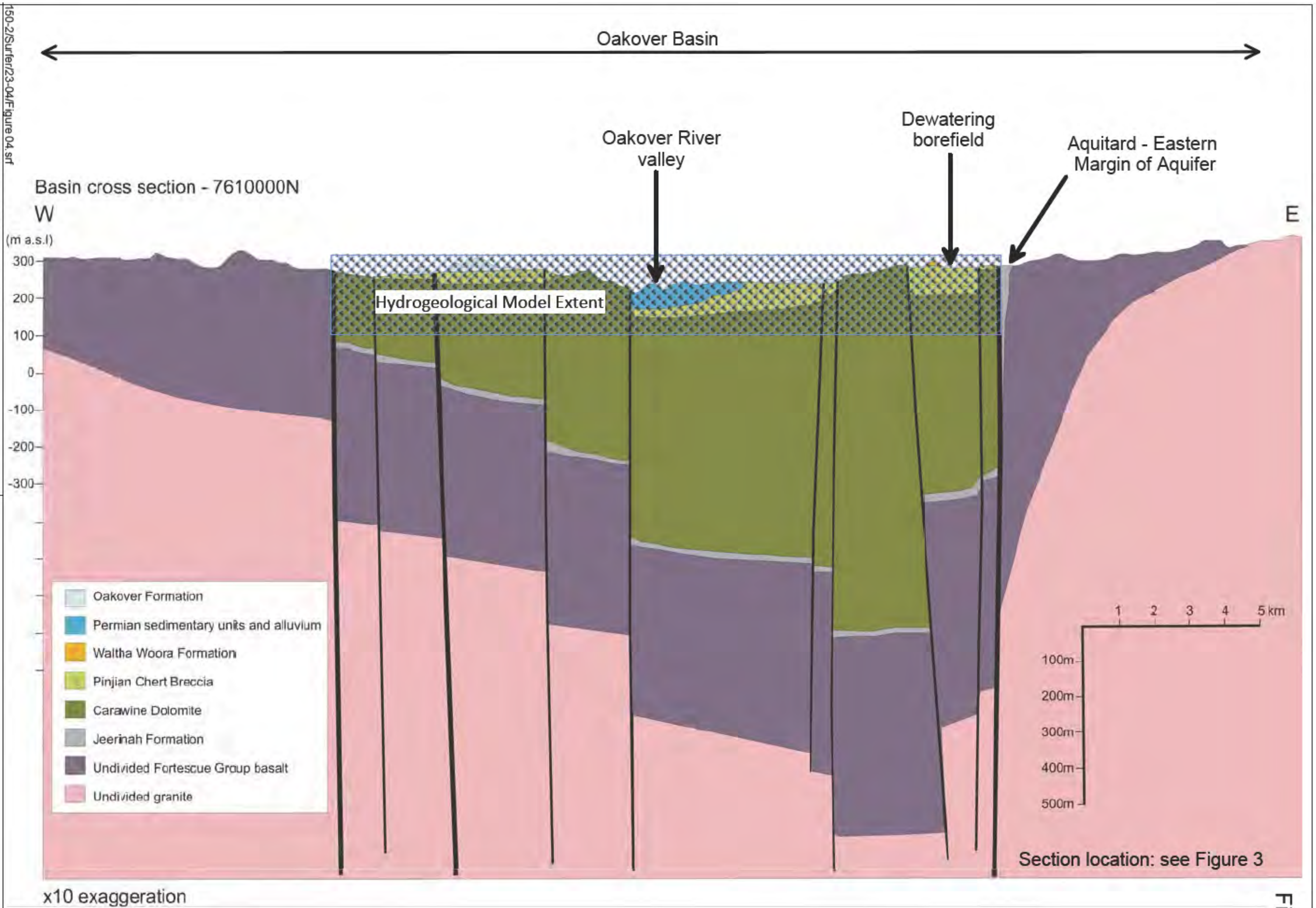

Figure 4

150-2/Surfer/23-04/Figure 04.srf

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Date: August 2023

Dwg. No: 150-2/23/4-4

ConsMin

GEOLOGICAL CROSS-SECTION
7,610,000 mN

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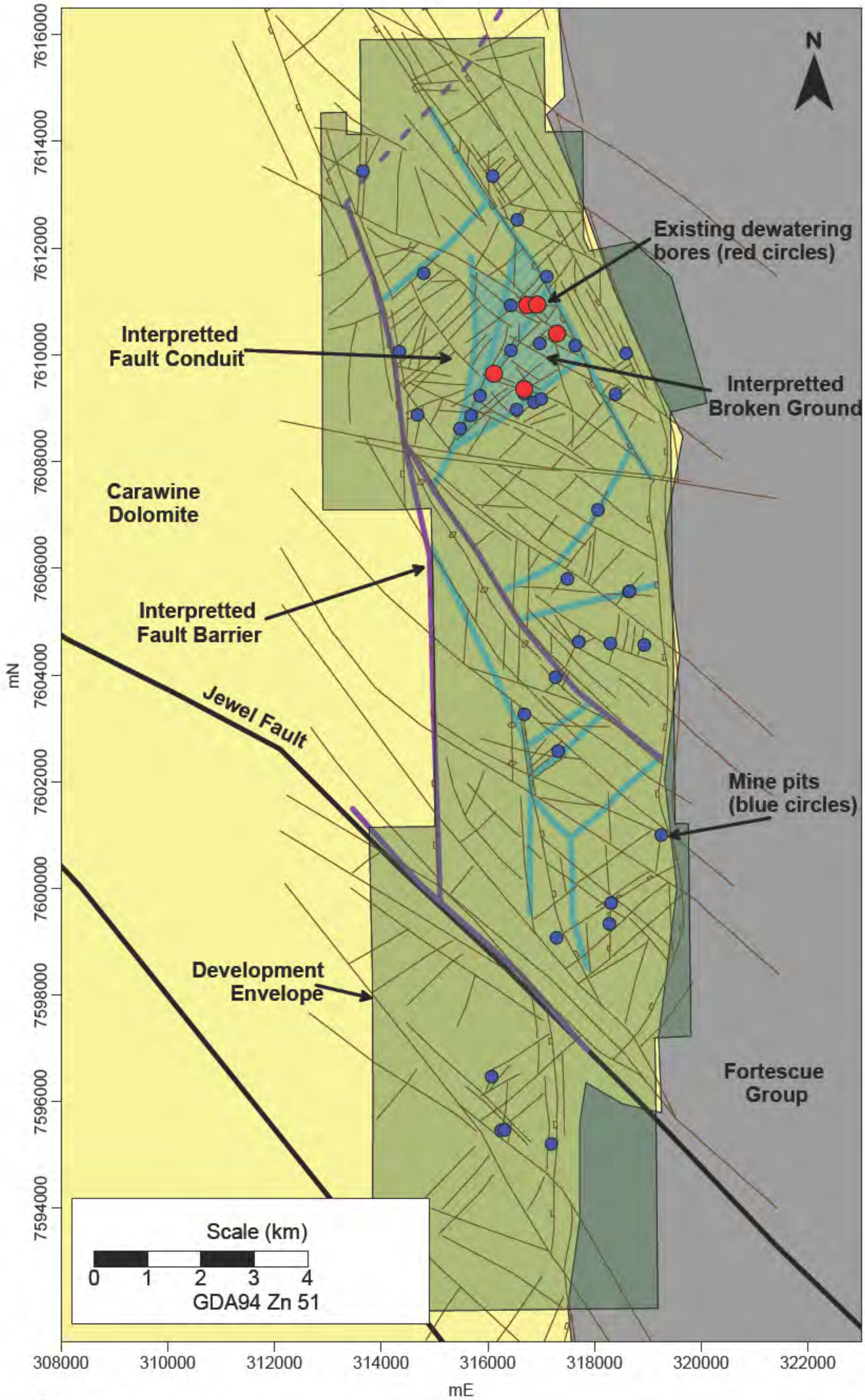
Figure 5



150-2/Surfer/23-04/Figure 05.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-5

INTERPRETED FAULTS AND LINEAMENTS

ConsMin

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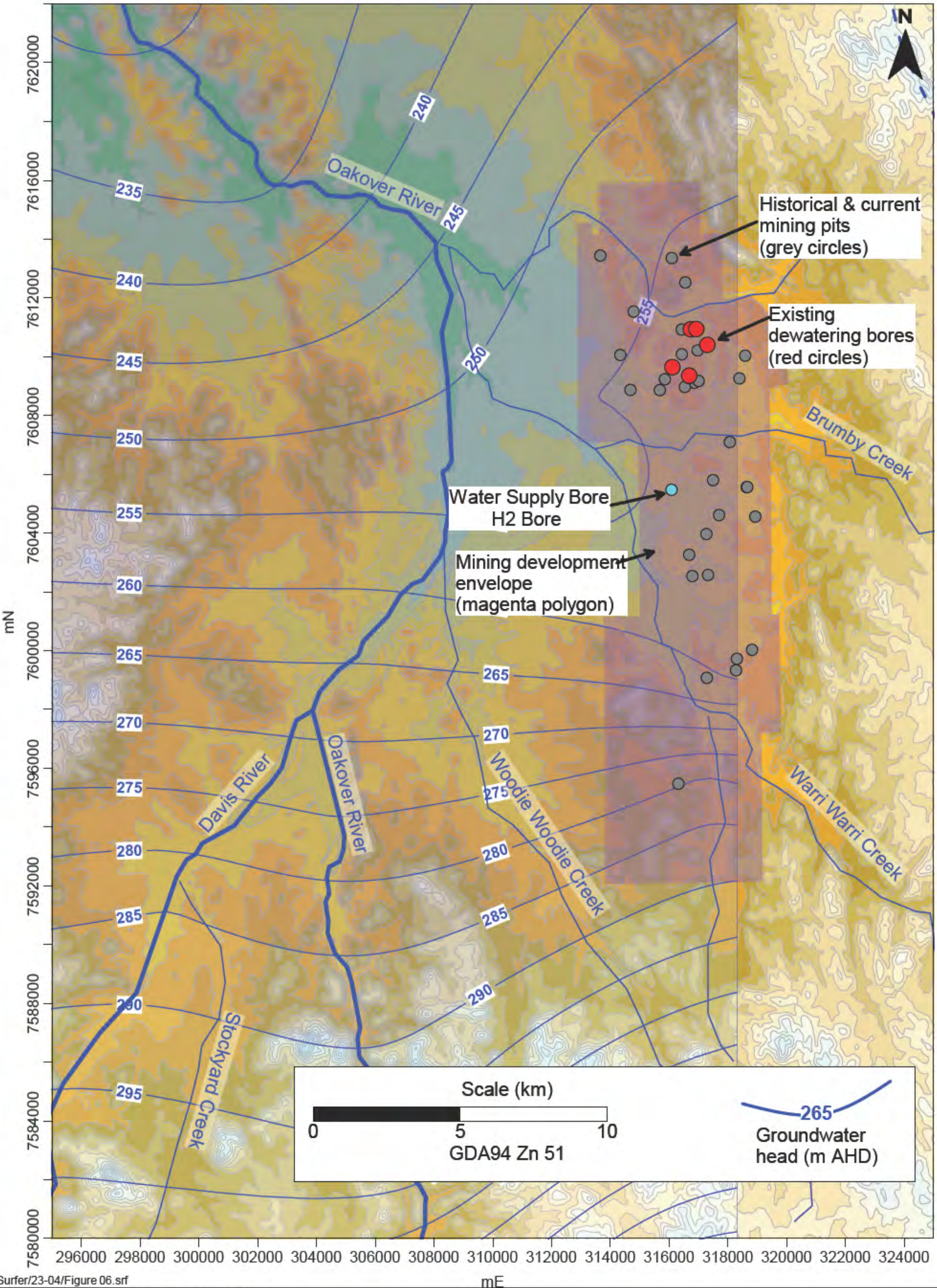
Figure 6



150-2/Surfer/23-04/Figure 06.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

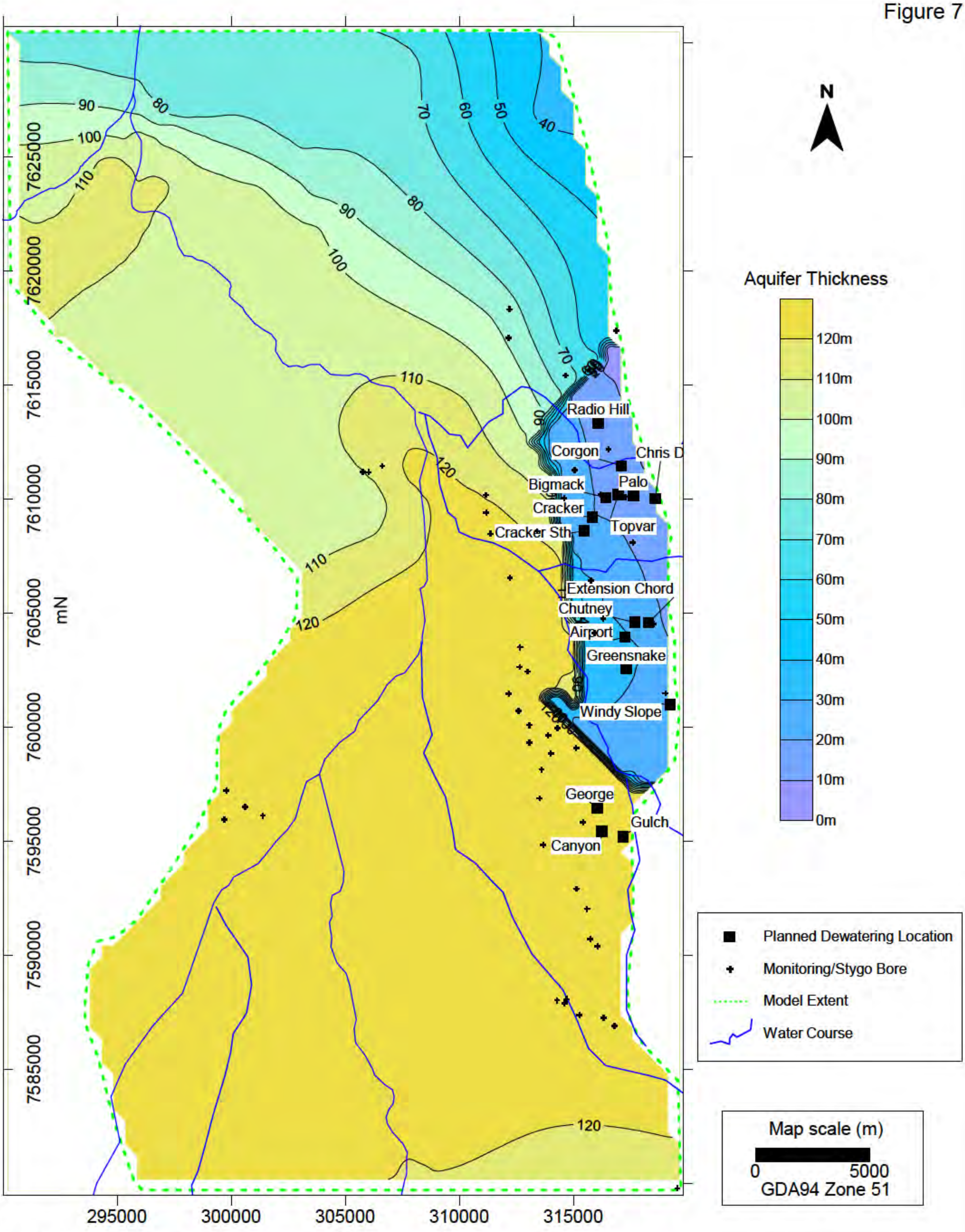
Dwg. No: 150-2/23/4-6

PRE-MINING GROUNDWATER LEVELS

ConsMin

Rockwater PROPRIETARY LIMITED

Figure 7



150-2/Surfer/23-04/Figure 7 Aquifer thickness.srf

Client: Consolidated Minerals Ltd	ESTIMATED AQUIFER THICKNESS (m)
Project: Detailed Hydrogeological Assessment and Modelling Report	
Date: August 2023	
Dwg. No: 150-2/23/4-7	

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-8

HISTORICAL DEWATERING SUMMARY, 1999–2012

150-2/Grapher/23-04/Figure 8.grf

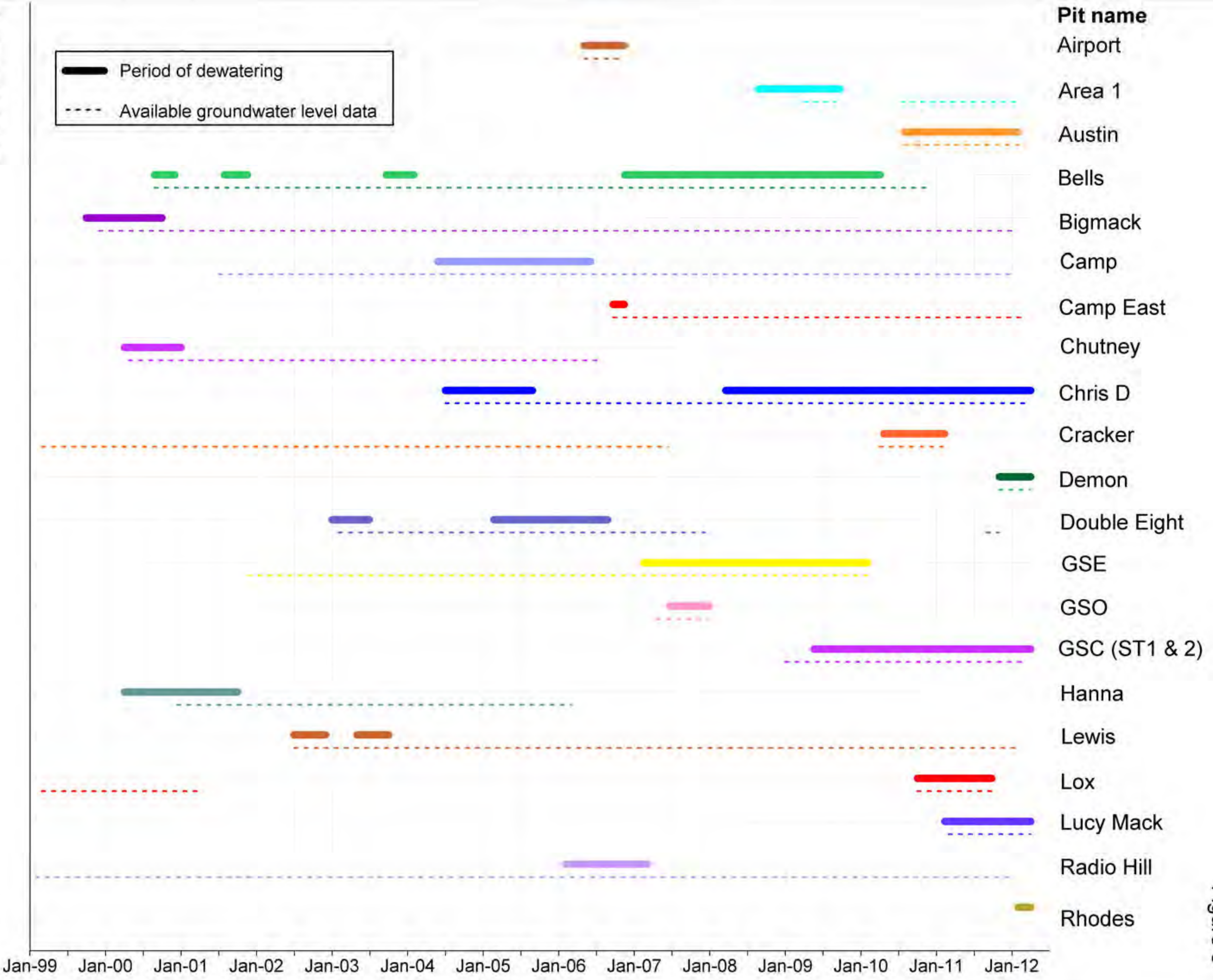
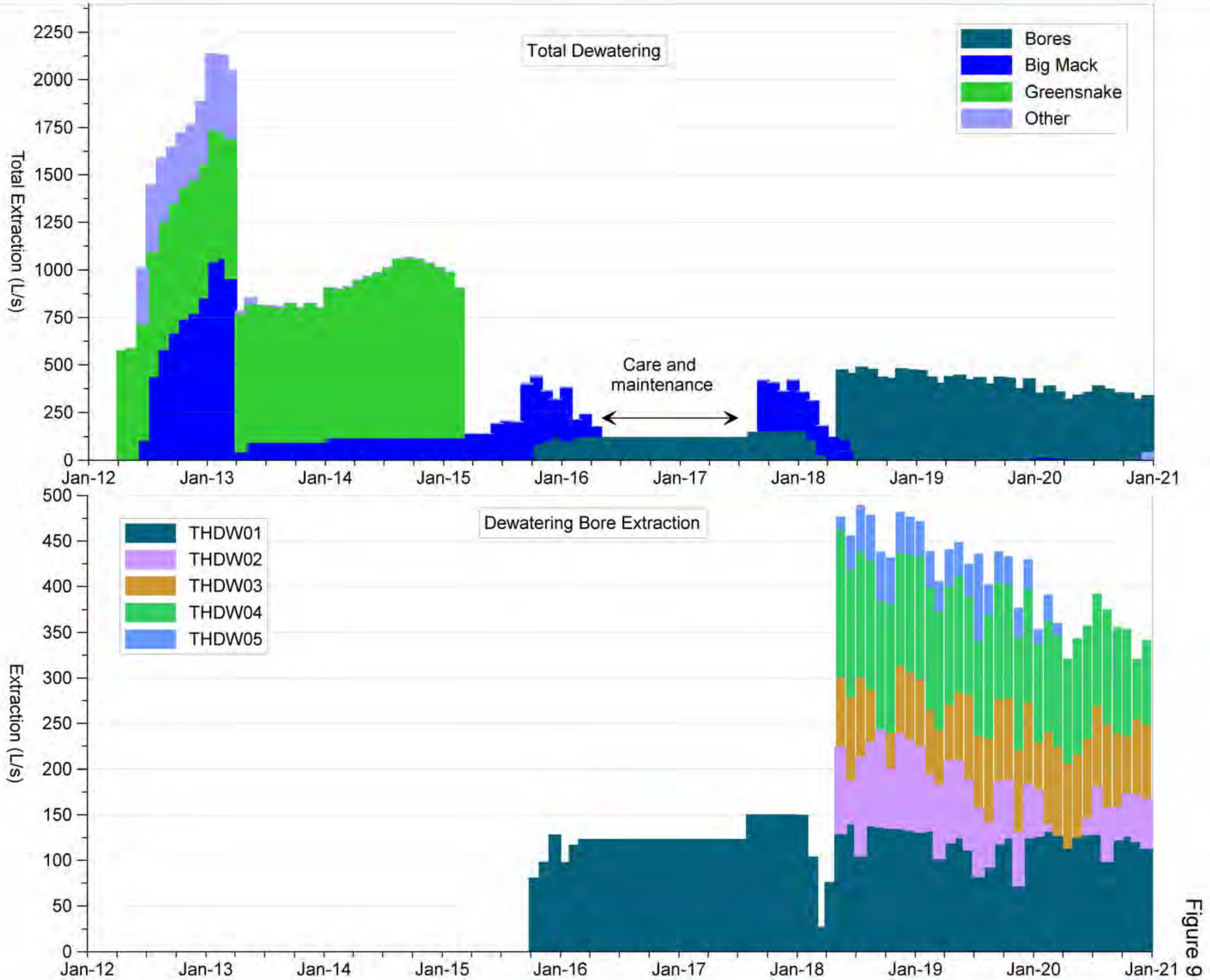


Figure 8

Rockwater



150-2/Grapher/23-04/Figure 9.grf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

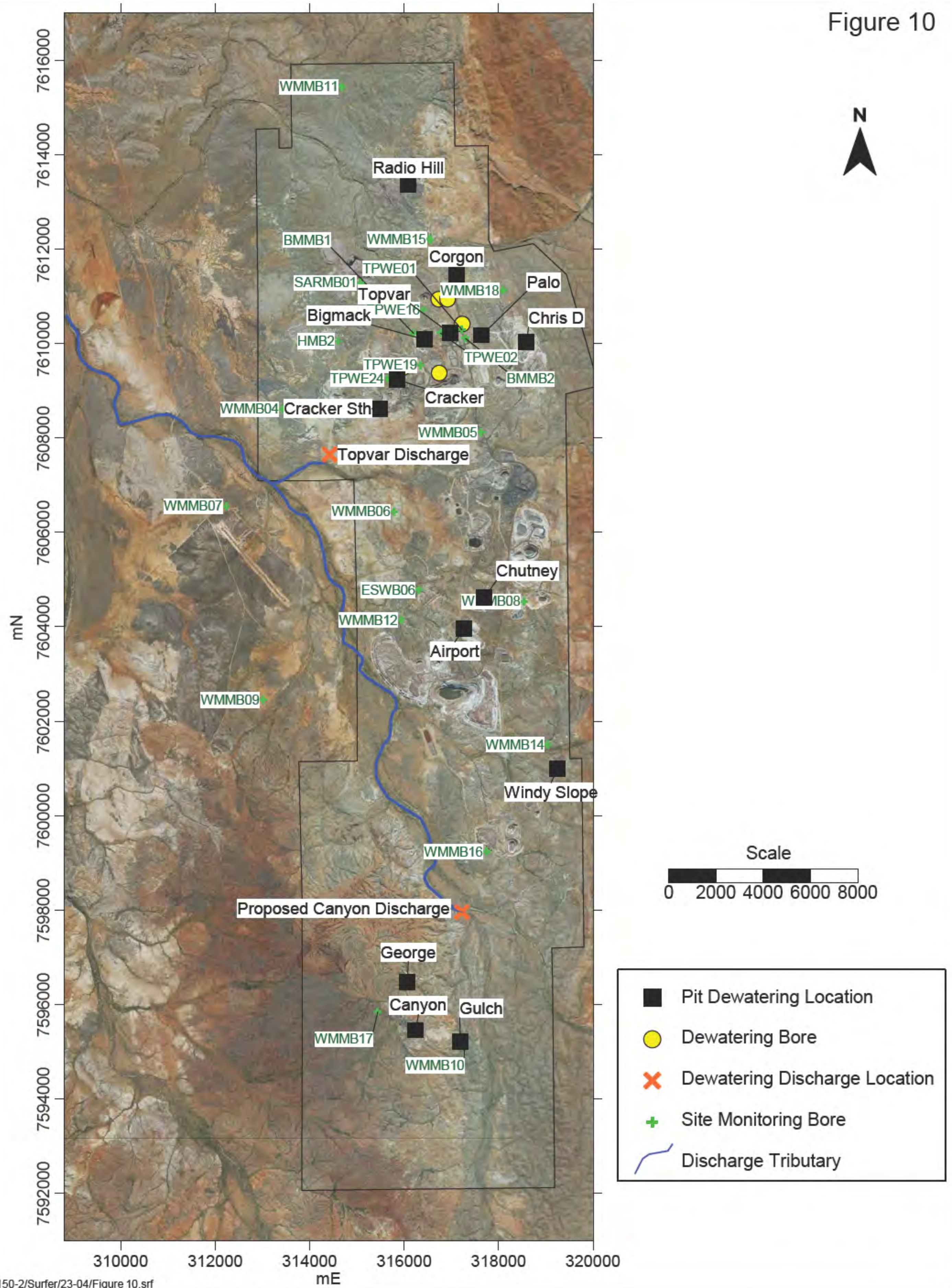
Date: August 2023

Dwg. No: 150-2/23/4-9

RECENT DEWATERING SUMMARY
2012 - 2020

Figure 9

Figure 10



150-2/Surfer/23-04/Figure 10.srf

Client: Consolidated Minerals Ltd Project: Detailed Hydrogeological Assessment and Modelling Report Date: August 2023 Dwg. No: 150-2/23/4-10	PLANNED DEWATERING LOCATIONS 2021 TO 2030 ConsMin Rockwater PROPRIETARY LIMITED

150-2/Grapher/23-04/Fig 11Mid-Section.grf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-11

DEPICTION OF CONCEPTUAL MODEL
7,610,000 mN

Rockwater

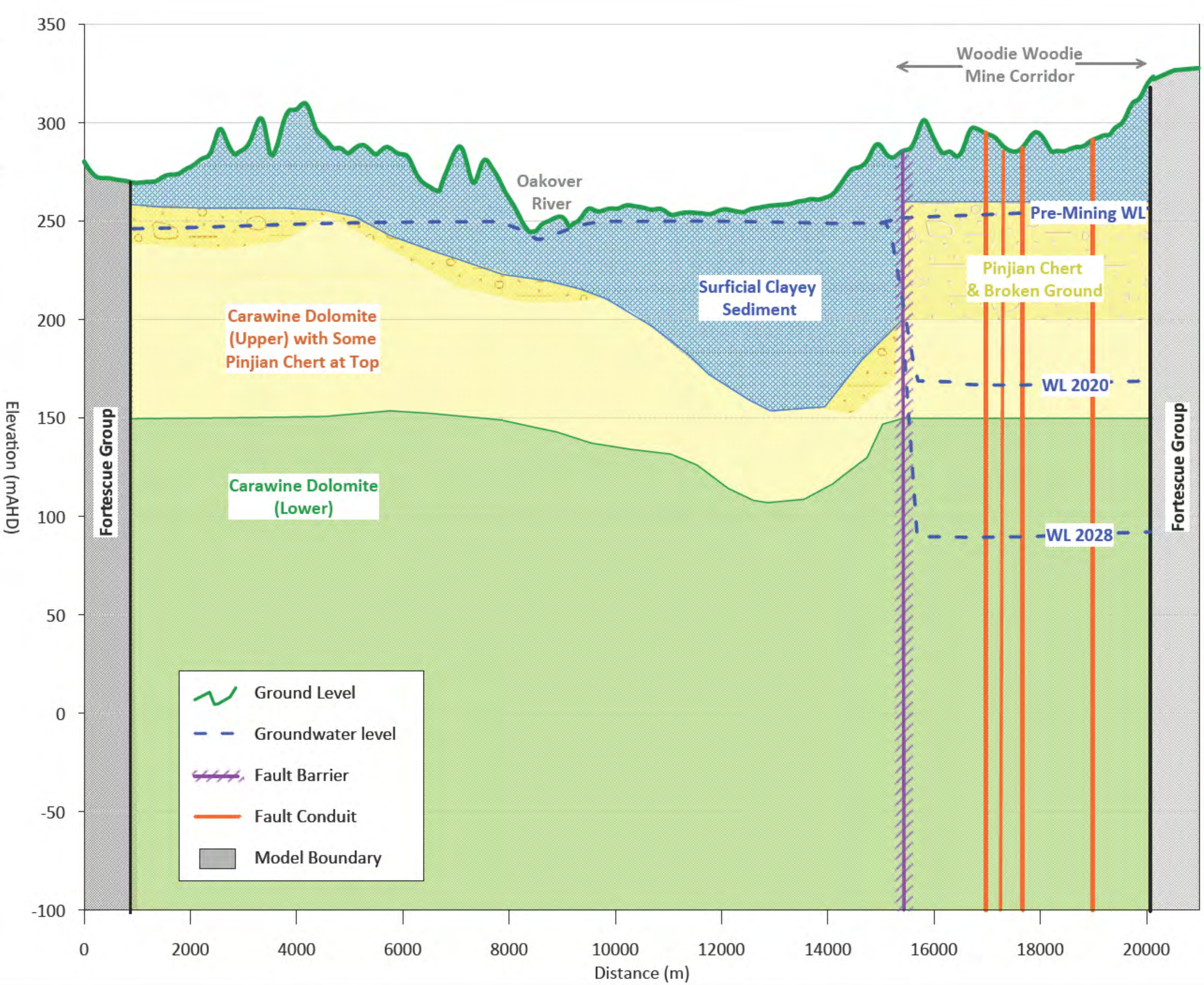
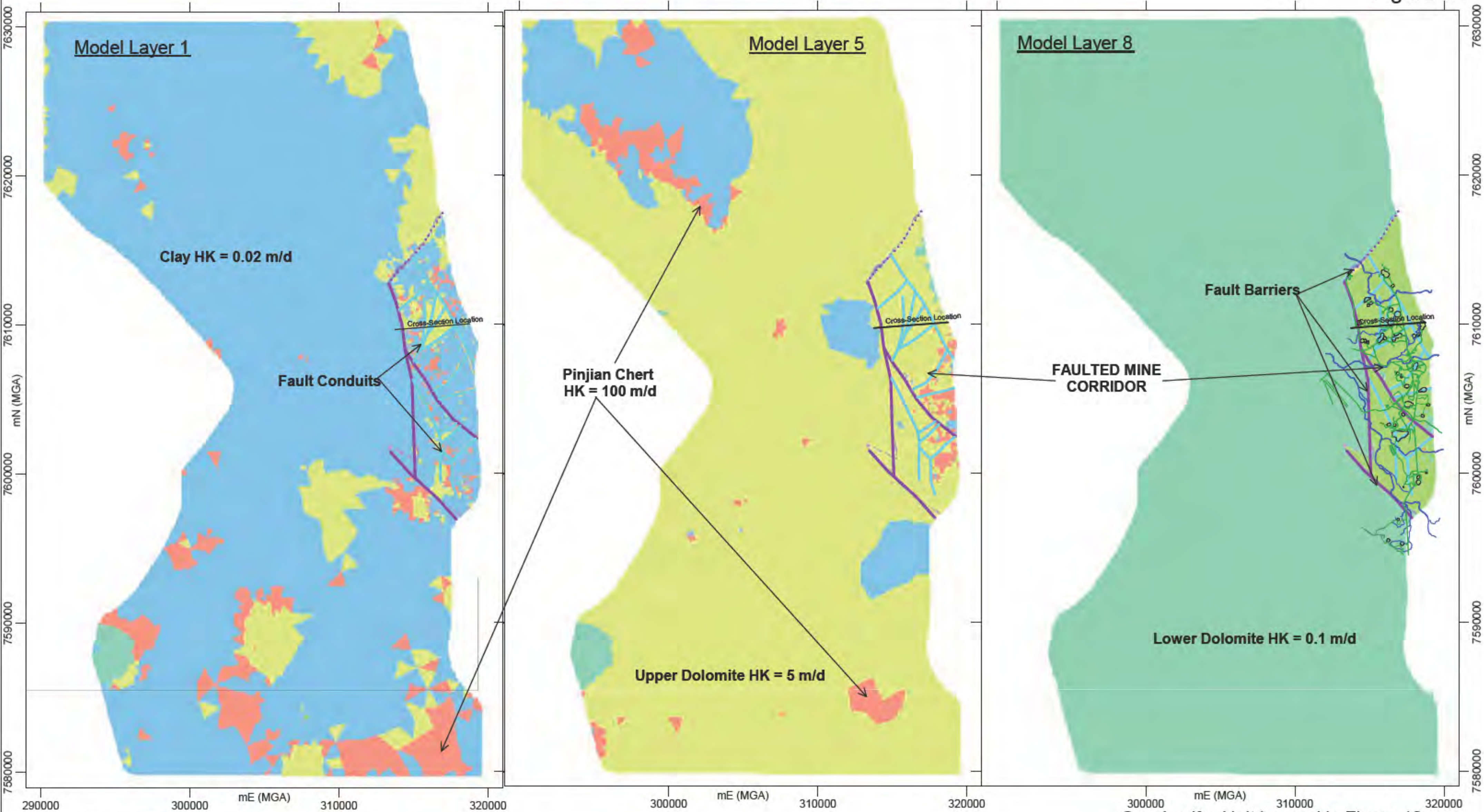


Figure 11

Figure 12



150-2/Surfer/23-04/Figure 12 Features of Model.srf

See Aquifer Unit Legend in Figure 12

Client: Consolidated Minerals Ltd

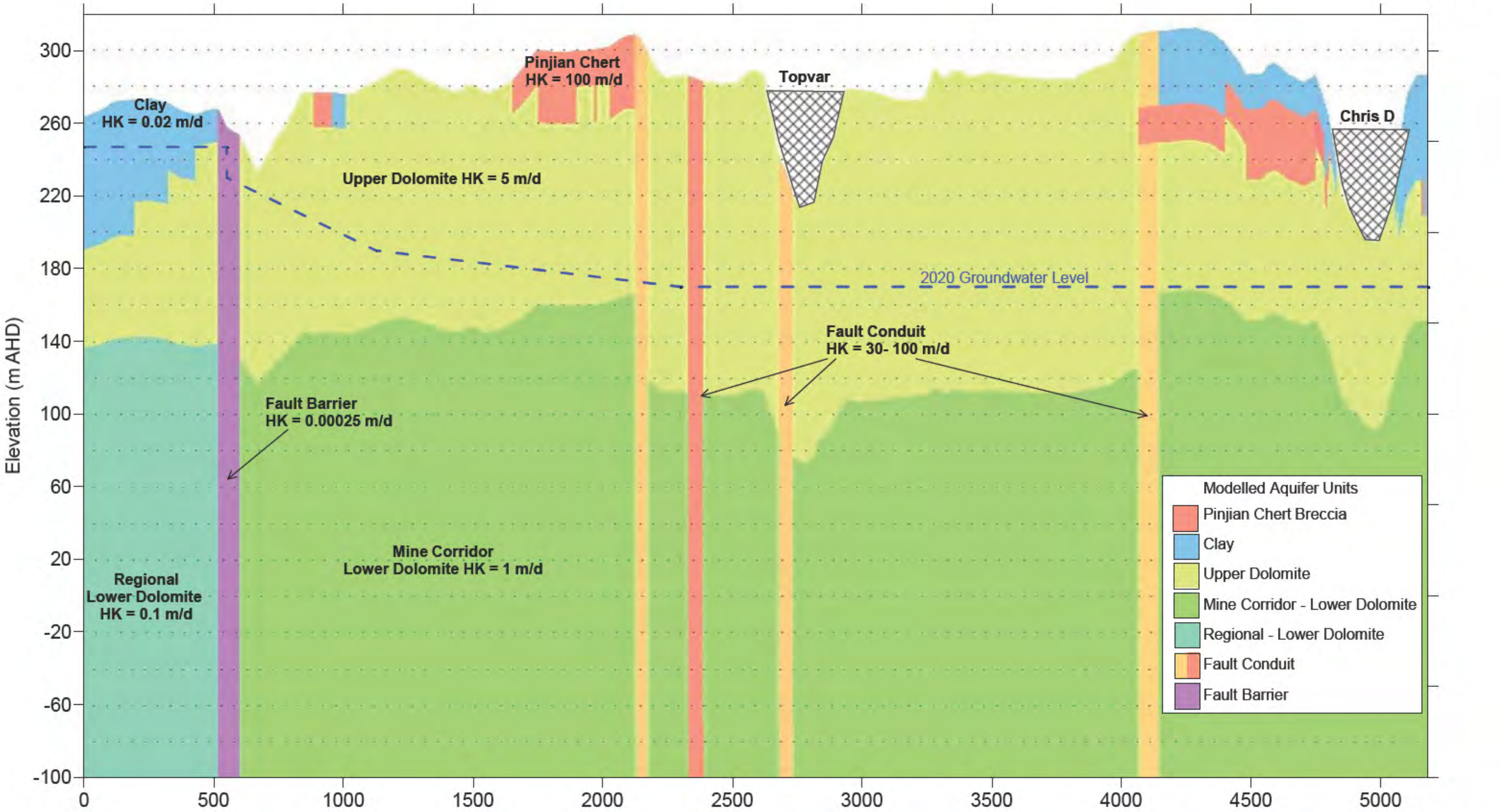
Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-12

HYDROGEOLOGICAL FEATURES
OF GROUNDWATER MODEL

Figure 13



See Figure 12 for Cross-Section Location

150-2/Surfer/23-04/Figure 13 Model Section - Topvar.srf

Client: Consolidated Minerals Ltd

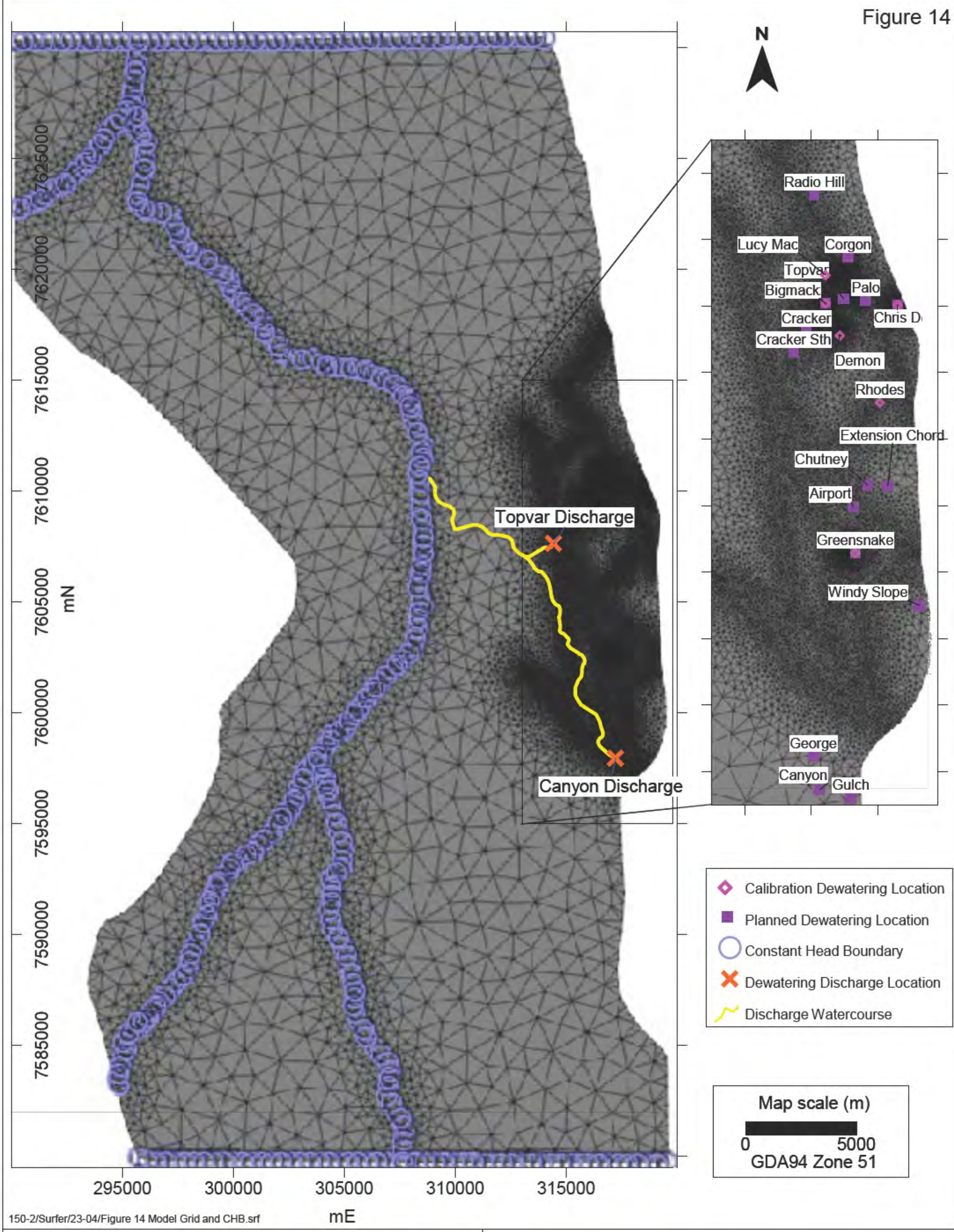
Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/1-13

MODEL CROSS-SECTIONAL DIAGRAM
THROUGH TOPVAR REGION

Figure 14



150-2/Surfer/23-04/Figure 14 Model Grid and CHB.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-14

MODEL MESH AND CONSTANT HEAD BOUNDARIES

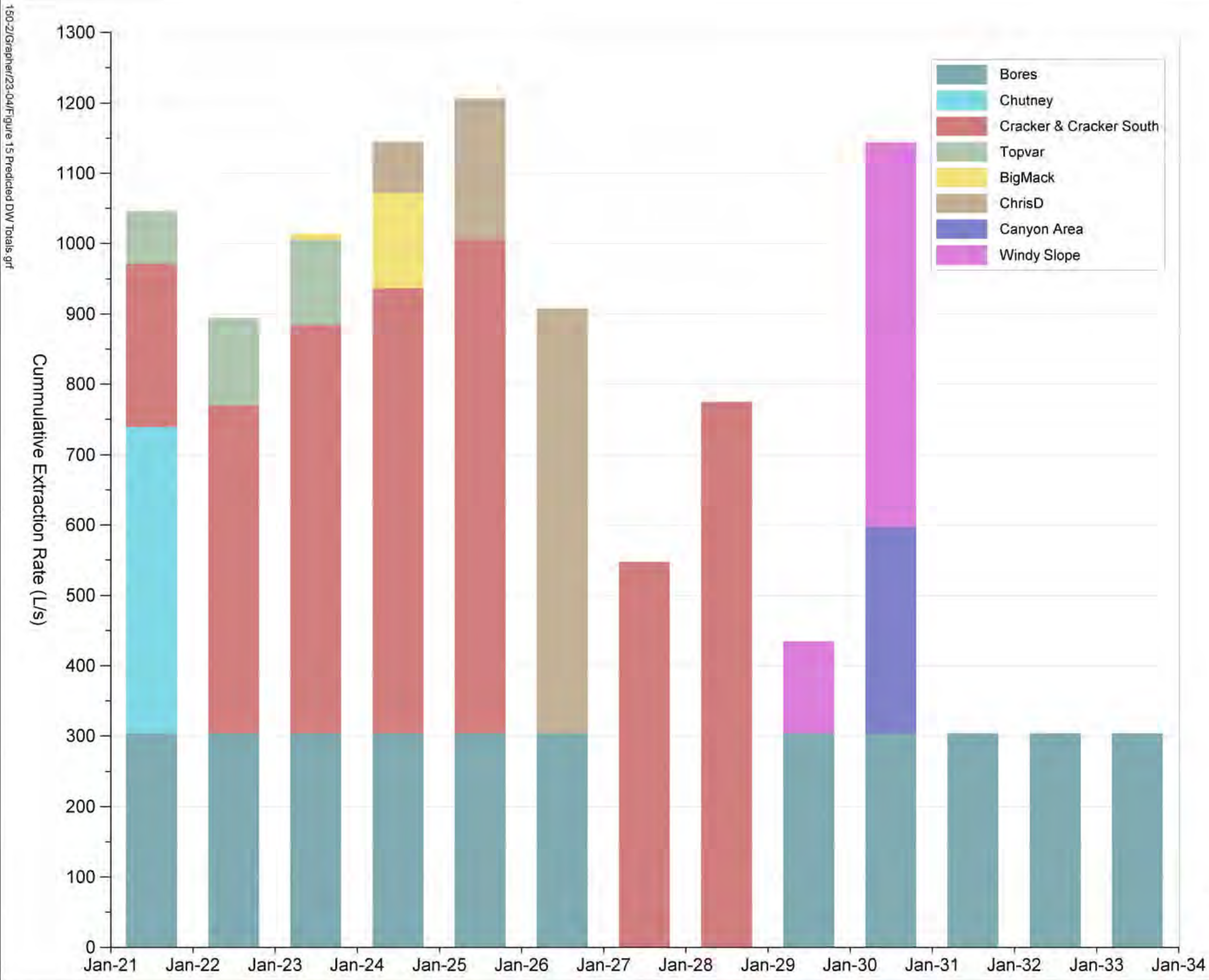


Figure 15

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

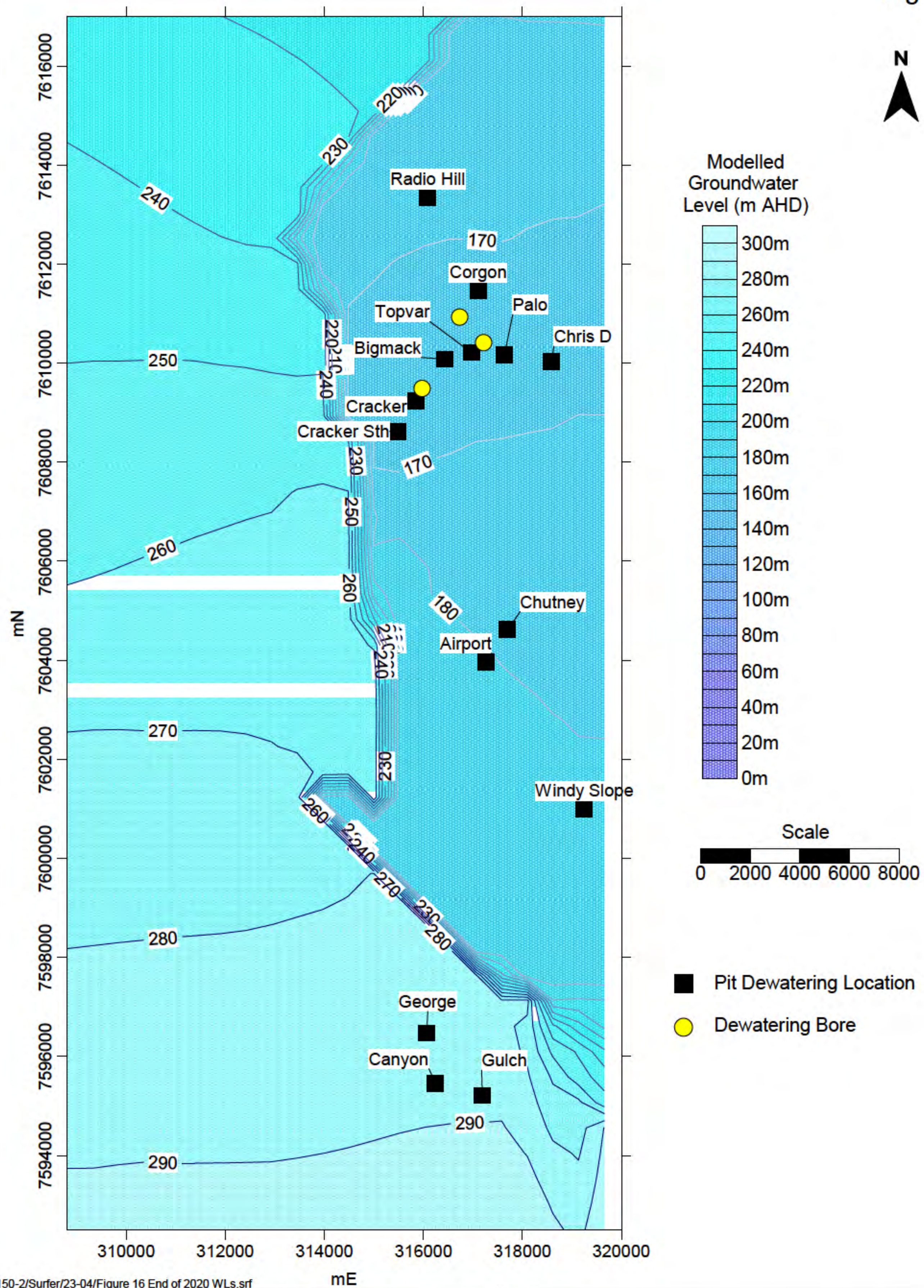
Date: August 2023

Dwg. No: 150-2/23/1-15

MODEL PREDICTED REQUIRED DEWATERING RATES

Rockwater

Figure 16



150-2/Surfer/23-04/Figure 16 End of 2020 WLs.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

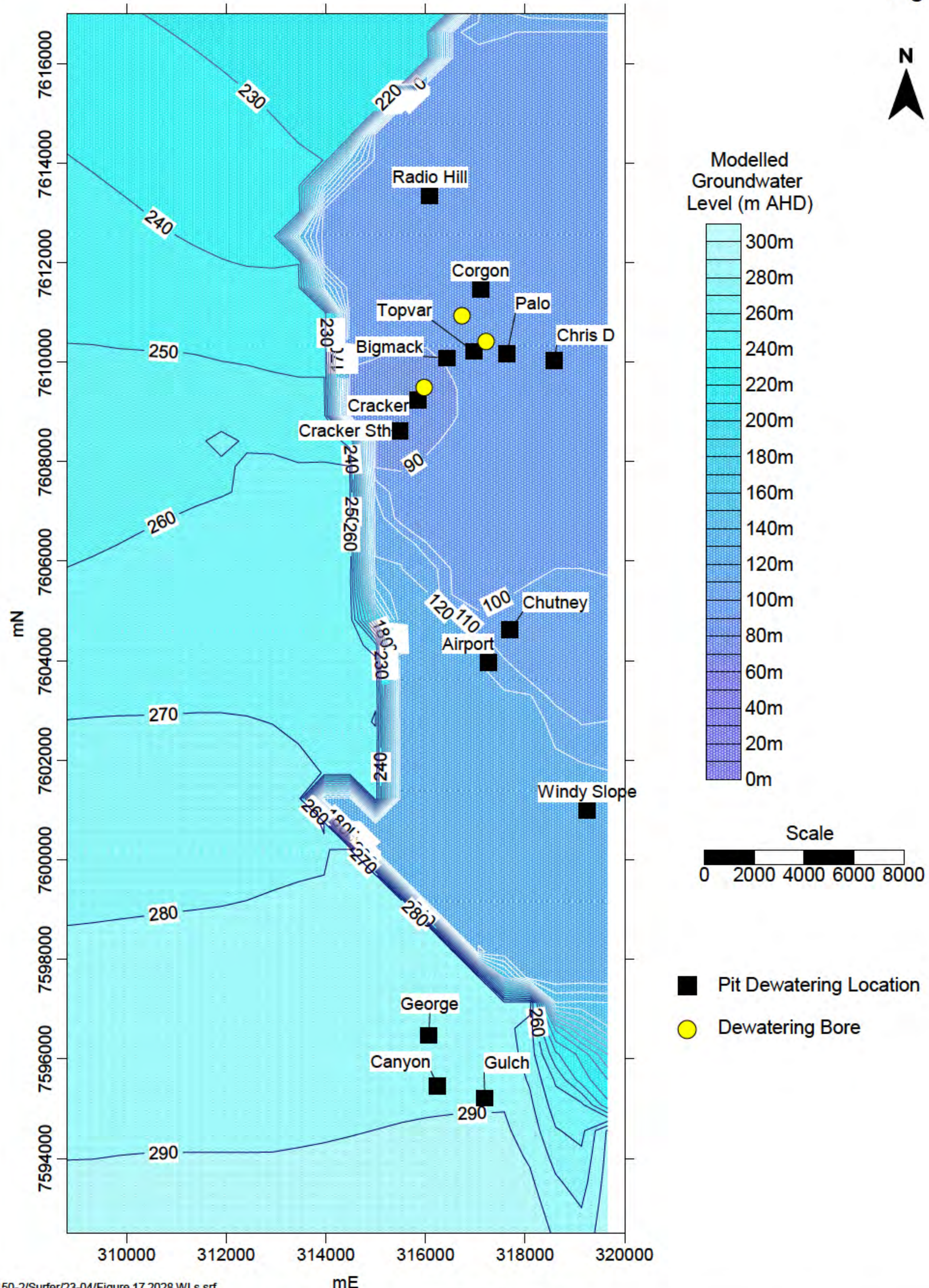
Date: August 2023

Dwg. No: 150-2/23/4-16

MODELLED GROUNDWATER LEVELS AT THE END OF 2020

Rockwater PROPRIETARY LIMITED

Figure 17



150-2/Surfer/23-04/Figure 17 2028 WLs.srf

Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

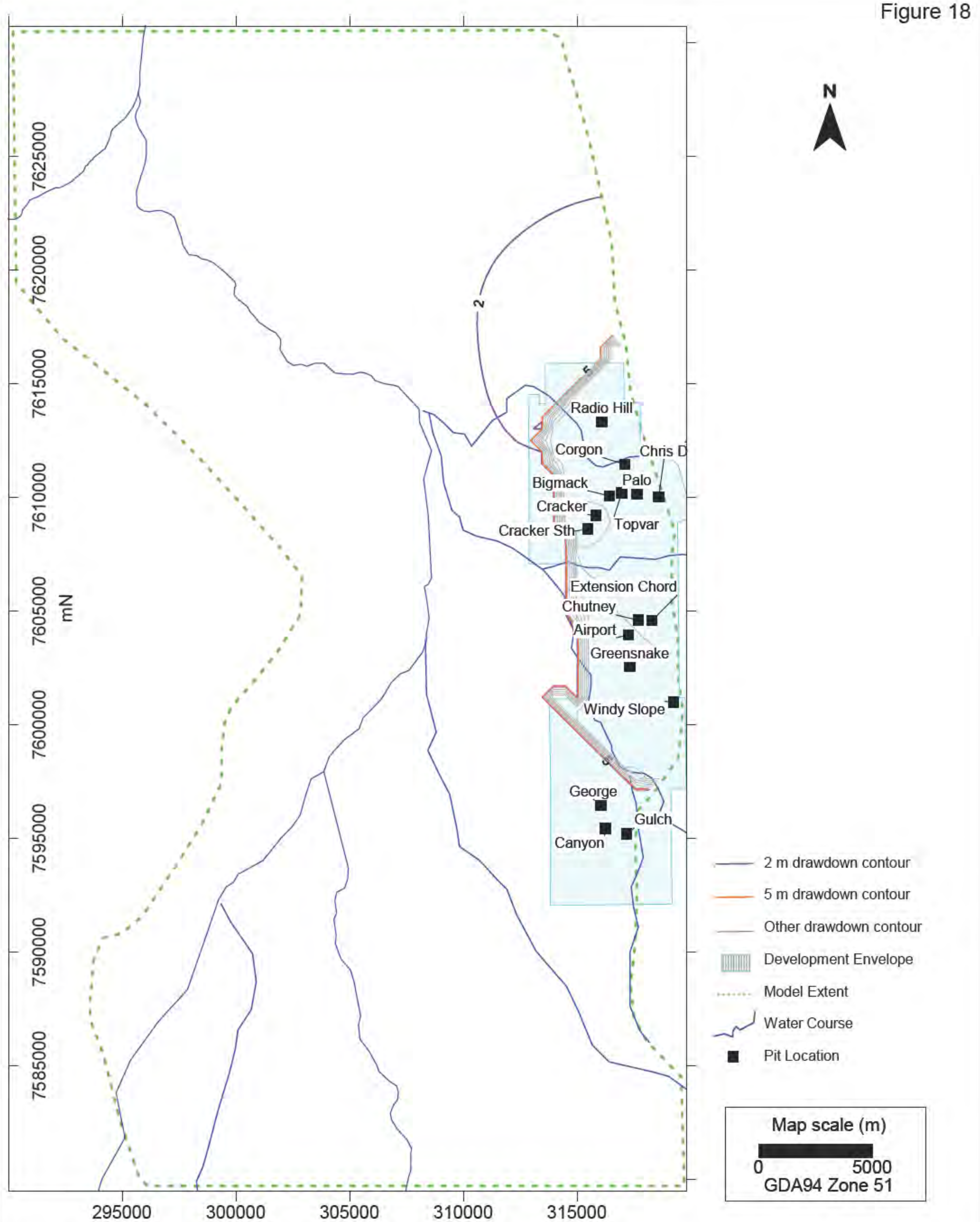
Date: August 2023

Dwg. No: 150-2/23/4-17

MODELLED GROUNDWATER LEVELS AT THE END OF 2028 (CESSATION OF TOPVAR DEWATERING)

Rockwater PROPRIETARY LIMITED

Figure 18



150-2/Surfer/23-04/Figure 18 extent of dd 2028.srf

Client: Consolidated Minerals Ltd

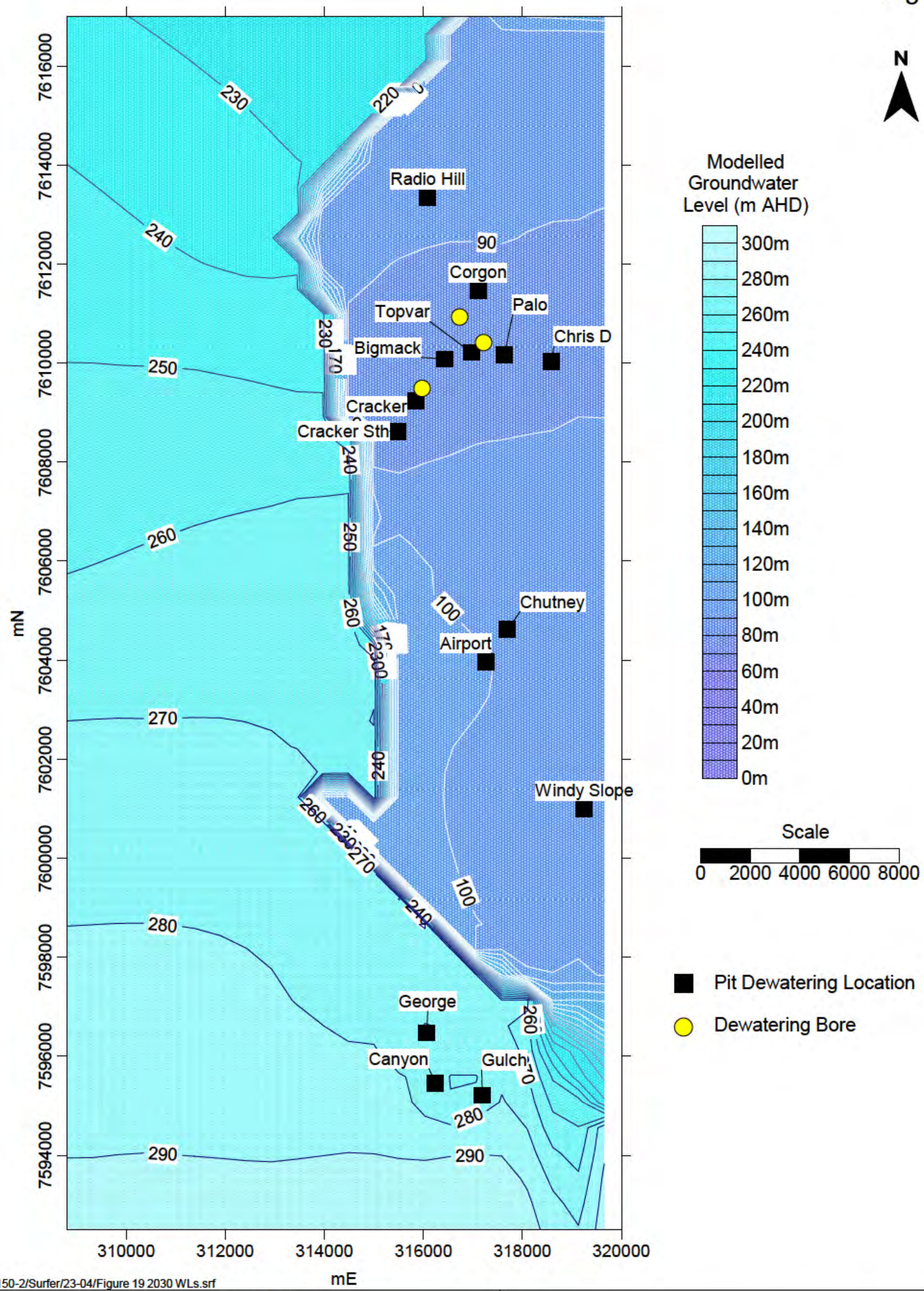
Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-18

MODELLED EXTENT OF DRAWDOWN AT THE END 2028 (CESSATION OF TOPVAR DEWATERING)

Figure 19



150-2/Surfer/23-04/Figure 19 2030 WLs.srf

Client: Consolidated Minerals Ltd

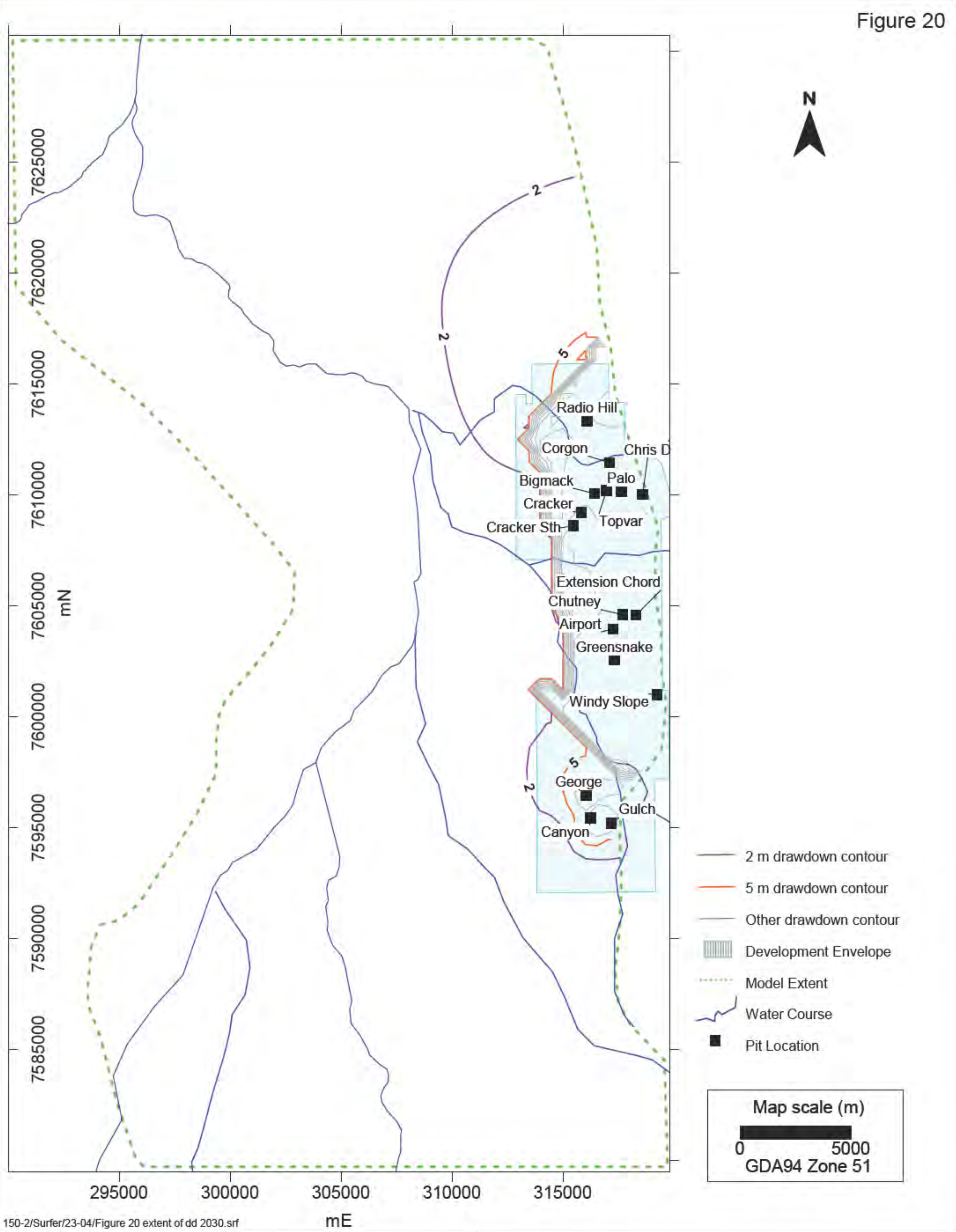
Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-19

MODELLED GROUNDWATER LEVELS AT THE END OF 2030 (CESSATION OF CANYON DEWATERING)

Rockwater PROPRIETARY LIMITED



Client: Consolidated Minerals Ltd

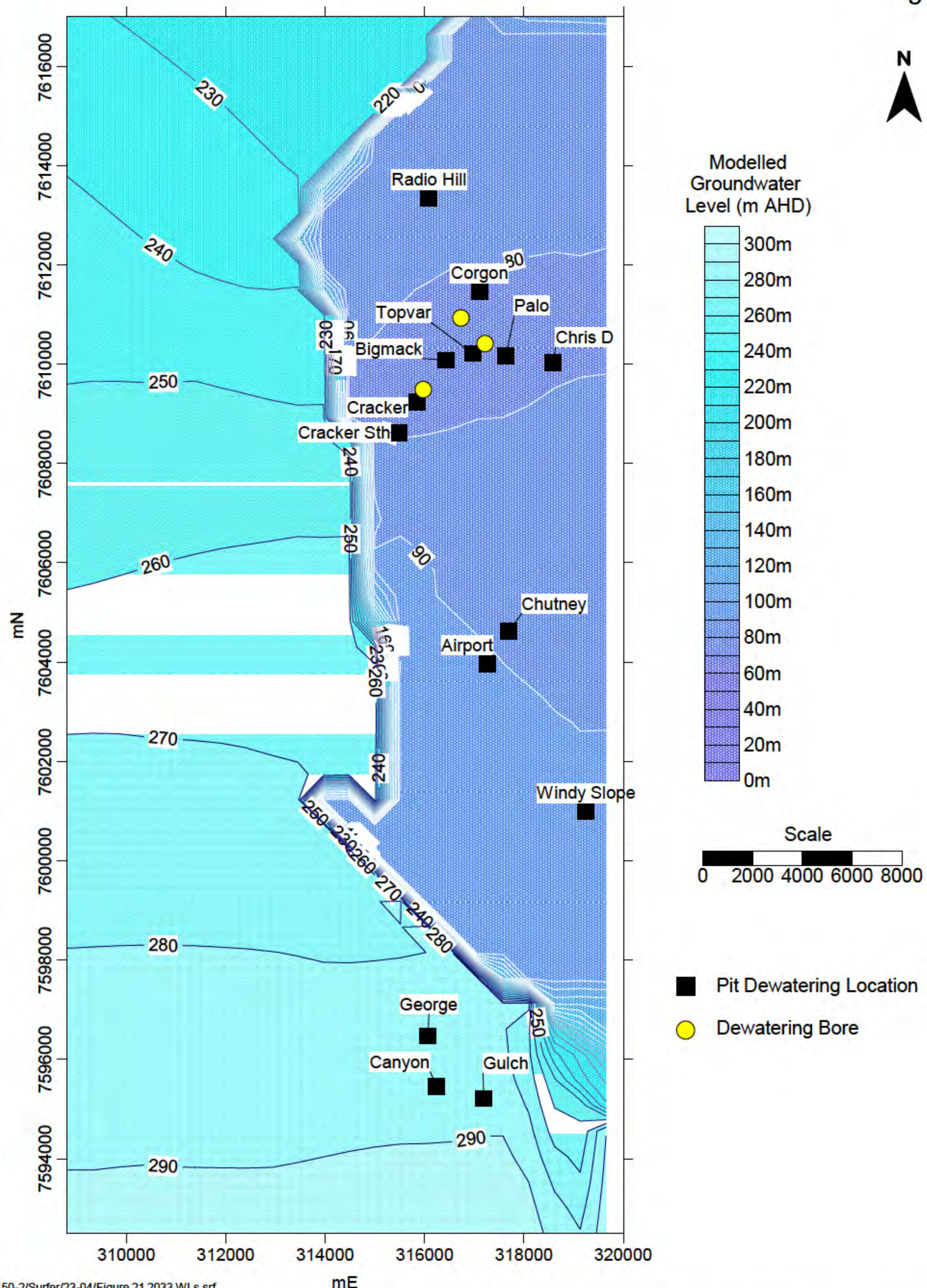
Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

Dwg. No: 150-2/23/4-20

MODELLED EXTENT OF DRAWDOWN AT THE END 2030 (CESSATION OF CANYON DEWATERING)

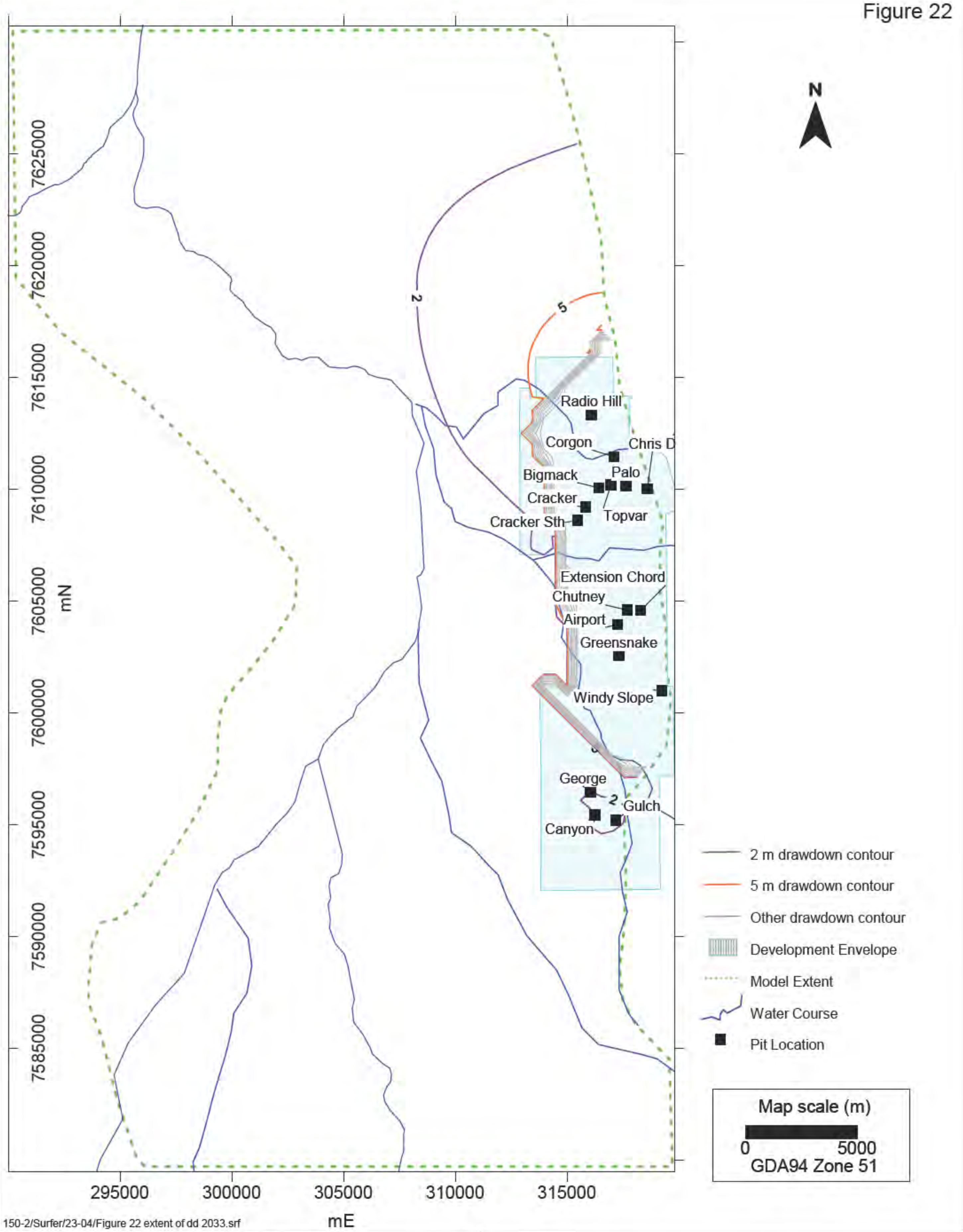
Figure 21



150-2/Surfer/23-04/Figure 21 2033 WLs.srf

Client: Consolidated Minerals Ltd Project: Detailed Hydrogeological Assessment and Modelling Report Date: August 2023 Dwg. No: 150-2/23/4-21	MODELLED GROUNDWATER LEVELS AT THE END OF 2033 (CESSATION OF TOPVAR BORE EXTRACTION) Rockwater PROPRIETARY LIMITED

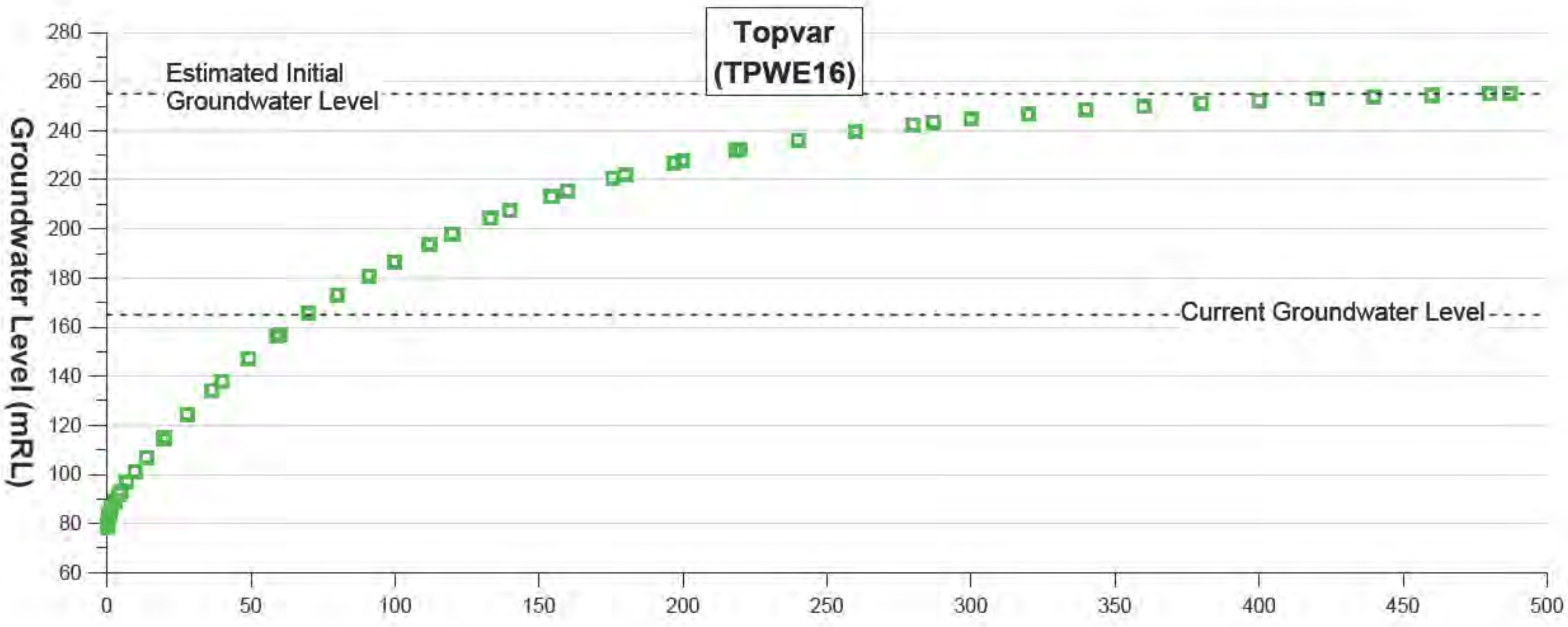
Figure 22

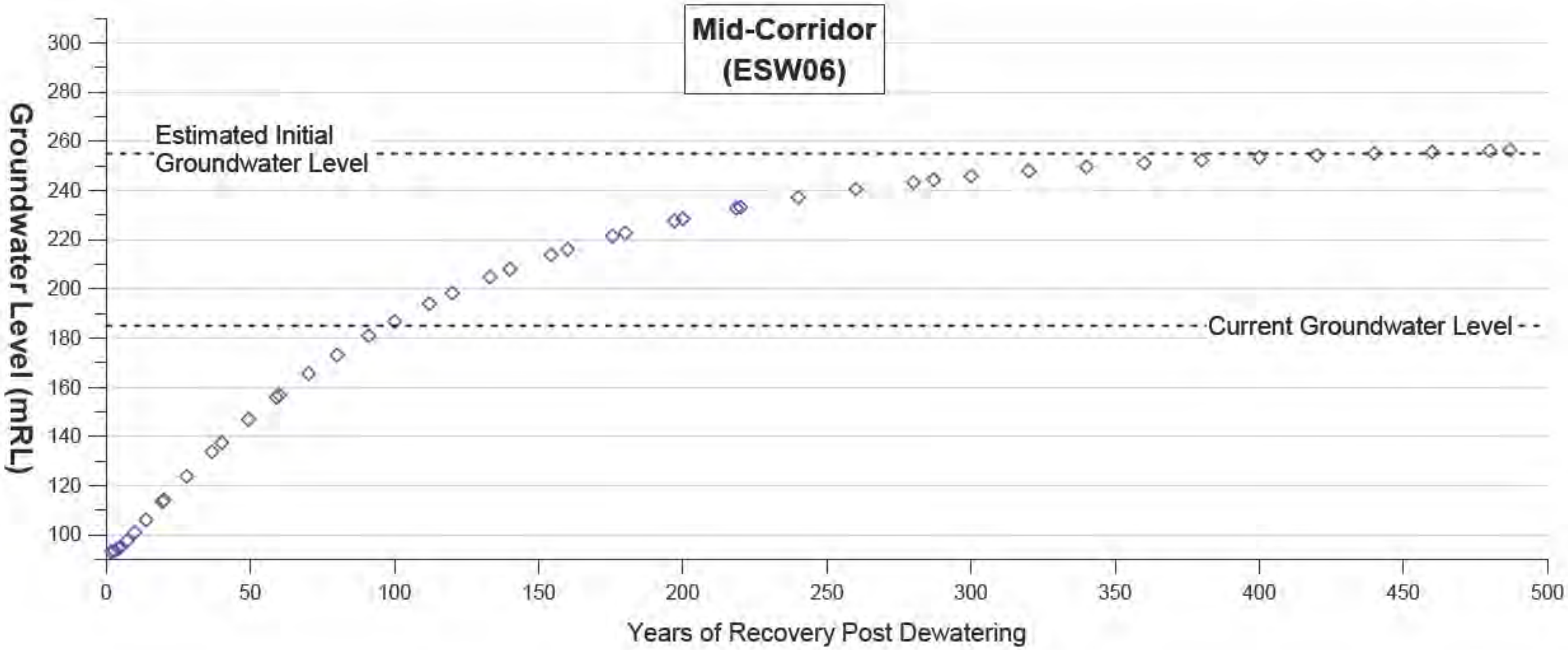


150-2/Surfer/23-04/Figure 22 extent of dd 2033.srf

Client: Consolidated Minerals Ltd Project: Detailed Hydrogeological Assessment and Modelling Report Date: August 2023 Dwg. No: 150-2/23/4-22	MODELLED EXTENT OF DRAWDOWN AT THE END 2033 (CESSATION OF TOPVAR BORE EXTRACTION)

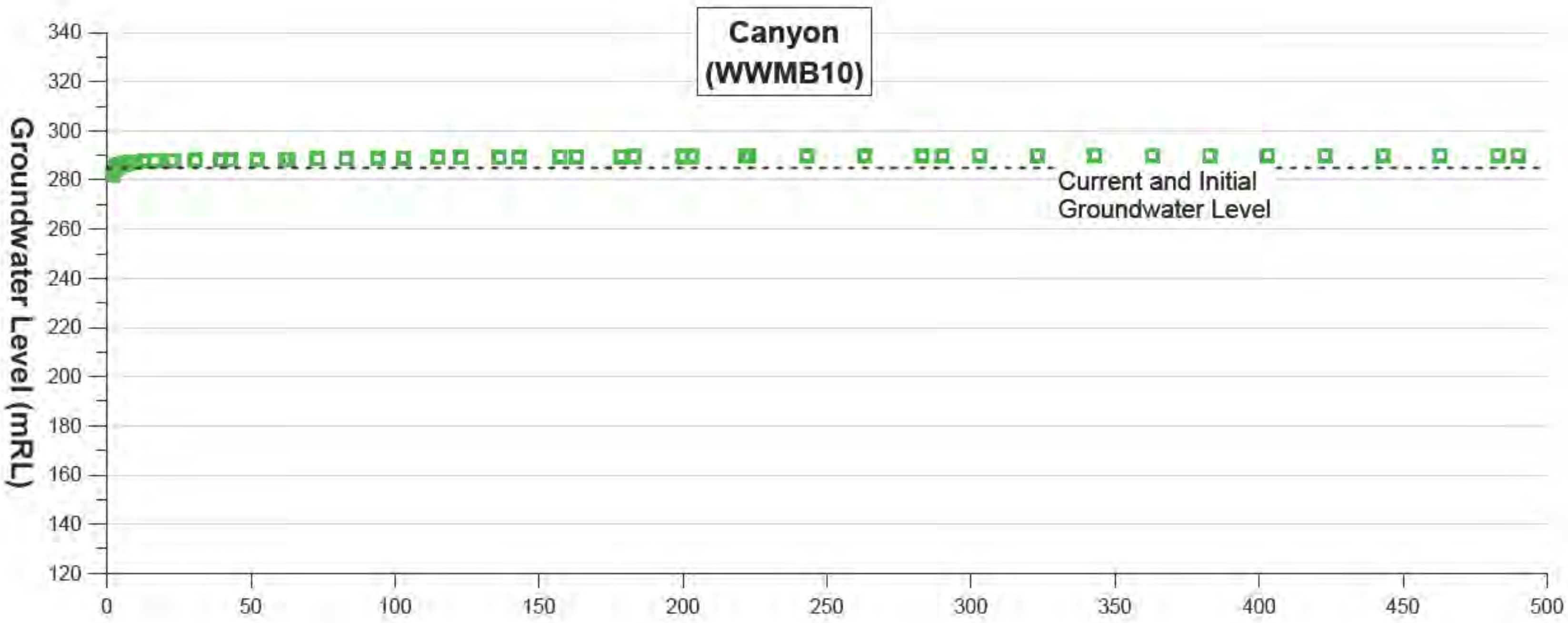
Client: Consolidated Minerals Ltd
Project: Detailed Hydrogeological Assessment and Modelling Report
Date: August 2023
Dwg. No: 150-2/23/1-23

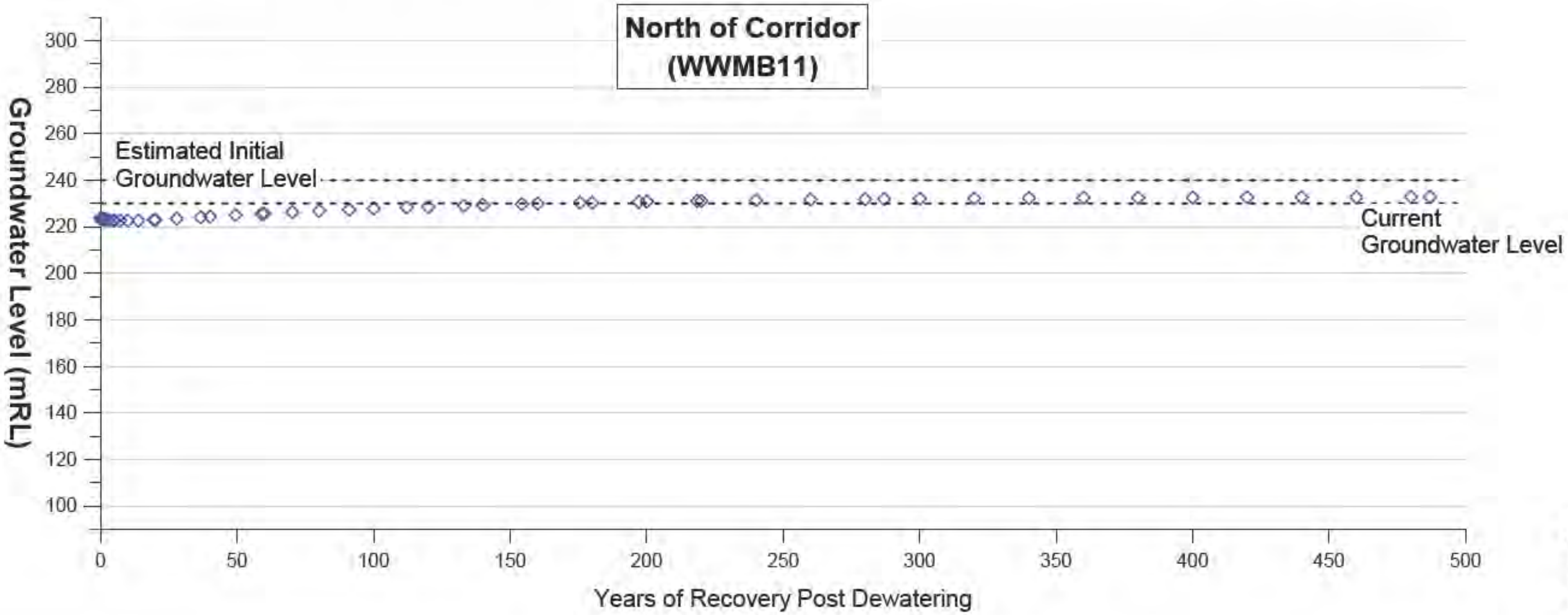




POST DEWATERING RECOVERY
TOPVAR REGION AND CENTRAL
MINE CORRIDOR

Figure 23





Client: Consolidated Minerals Ltd

Project: Detailed Hydrogeological Assessment and Modelling Report

Date: August 2023

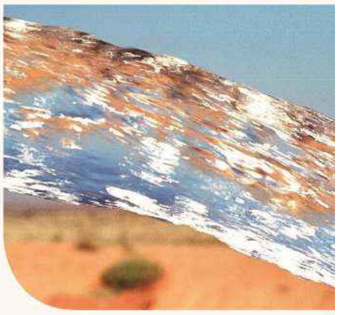
Dwg. No: 150-2/23/4-24

POST DEWATERING RECOVERY CANYON AND NORTH OF MINE CORRIDOR

Figure 24

APPENDIX I

THDWB1 Bore Completion Report



TOPVAR HUB DEWATERING

BORE COMPLETION REPORT THDW01

REPORT FOR CONSOLIDATED MINERALS

JANUARY 2015

Report No. 150.2/15/01

Rockwater
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

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2 Bore Locality
3 THDW01 Bore Construction Log

Appendices

I THDW01 Bore Completion Data
II Bore Construction Licence and Groundwater Licence
III Laboratory Certificates

REVISION	AUTHOR	REVIEW	ISSUED
Rev 0	[redacted]	[redacted]	12/01/2015

1 INTRODUCTION

Consolidated Minerals (Consmin) is the parent company of Pilbara Manganese Pty Ltd, which owns and operates the Woodie Woodie manganese mine, situated in the East Pilbara region of Western Australia (Fig. 1). Open pit mines within the Woodie Corridor typically produce large water inflows that require dewatering. Dewatering to date has been achieved mainly by the use of in-pit sumps. Rockwater (2014) identified large-diameter, ex-pit dewatering bores as a suitable dewatering strategy for the Topvar Hub. This report contains the bore construction details of the first bore in this programme, THDW01.

2 GEOLOGY AND HYDROGEOLOGY

The Topvar project area (Fig. 1) is located in the Pilbara Region of Western Australia within a large synclinal basin known regionally as the Oakover Syncline. The Oakover Syncline is a platform carbonate unit that unconformably overlies the Jeerinah Formation. The primary lithology is a unit identified as the Carawine Dolomite. Other rocks include the Pinjian Chert Breccia, Waltha Woora Sandstone, Paterson Formation (glacial deposits), Coondoon Formation, various younger Cainozoic sedimentary units (including the Oakover Formation) and the manganese deposits. The orebodies are within the Pinjian Chert Breccia of Proterozoic age and the underlying Carawine Dolomite units which are of Archaean age. The Mesoproterozoic Coondoon Formation, an extensional conglomerate, also hosts some minor ore bodies.

The Oakover Syncline is over 180 km long; the width of the basin is about 16 km near Woodie Woodie. The Carawine Dolomite, which underlies the Pinjian Chert Breccia, comprises bedded dolomite that is commonly silicified and contains various sedimentary structures and stromatolites. The Pinjian Chert Breccia, which unconformably overlies the dolomite, comprises chert fragments in a silicified matrix that is commonly broken, jointed and vuggy. The Coondoon Formation is predominantly comprised of conglomerate, sedimentary breccia, poorly sorted ferruginous sandstone and siltstone and lies unconformably on the Carawine Dolomite in local fault-bounded basins.

Groundwater flow within the Woodie Woodie region has been heavily altered due to pit dewatering. Sub-regional groundwater flow is currently from the west towards the active mine dewatering operations (predominantly Greensnake Pit and to a lesser extent Big Mack pit).

Transmissivities within the greater Woodie Woodie region are high. Pre-mining groundwater levels ranged 230 to 258 m AHD (GRM, 2013) and have been lowered to about 200 m AHD in mining regions over the last decade. Pre-mining groundwater flow was towards the Oakover

River, which has a bed elevation at about 250 m to 254 m AHD west and north-west of Woodie Woodie.

The main aquifers are the Pinjian Chert Breccia and the Upper Carawine Dolomite. These units, along with various clay and altered zones within the dolomite, form the dissolution zone, which on a regional scale is the primary aquifer. The Jeerinah Formation, Lower Carawine Dolomite and Patterson Formation form aquitards within the Woodie Woodie area. The Pinjian Chert Breccia forms a major aquifer that is commonly confined by the Patterson Formation where it is present, but is otherwise unconfined.

The transmissivity of the Pinjian Chert Breccia is estimated to range from about 500 to over 2,500 m^2/day. The Pinjian Chert Breccia is often vuggy, with voids either open or infilled with clay or other fine grained sediments. Vuggy Pinjian Chert Breccia often surrounds the manganese ore zones.

The Carawine Dolomite that has been assigned as two hydrogeological units: Upper Carawine Dolomite; and Lower Carawine Dolomite. The Upper Carawine Dolomite (often hematite altered), defined as the dolomite near the contact with the Pinjian Chert Breccia and/or manganese, forms another unconfined aquifer within the region. The transmissivity of the Upper Carawine Dolomite ranges from less than 100 m^2/day to over 2,000 m^2/day. The higher permeability within the Upper Carawine Dolomite is controlled by discontinuities (including bedding planes and fractures) and vugs. The Lower Carawine Dolomite, defined as the dolomite zone furthest from the contact with the Pinjian Chert Breccia, is thought to be of lower permeability.

The specific yield for the two aquifers are likely to be low because of the low primary porosity, although values of up to 20% for the Carawine Dolomite and 10% for the Pinjian Chert Breccia have been quoted in historical reports and may be appropriate at localities with the greatest development of vugs. The confined storage (storativity) is likely to range between 1 × 10-4 and 1 × 10-6.

The Woodie Woodie manganese deposits are highly heterogeneous and may either be of a lower or similar permeability to the main aquifers. In some areas manganese ore zones have been associated with major groundwater inflows, indicating higher permeability. This higher permeability appears to be associated with a significant zone of faulting, which extends between Cracker and Big Mack and possibly towards Radio Hill. In addition, there is some evidence that inflow rates at Cracker and Big Mack may have been exacerbated by drill holes left un-grouted, possibly linking the pits to not only the highly permeable manganese ore zones at depth, but also to the highly permeable Upper Carawine Dolomite.

Groundwater in the Woodie Woodie region typically has total dissolved solids (TDS) less than 1000 mg/L.

3 DRILLING AND BORE CONSTRUCTION

Drilling of bore THDW01 was performed by Easternwell using air-hammer and dual-rotary drilling methods. The location of THDW01 is shown in Figure 2 and a composite log is presented in Figure 3. Drilling and bore construction details are presented in Table 1 and Appendix I. Drilling and bore construction was undertaken under Department of Water groundwater licence CAW179818(1); groundwater extraction is undertaken under Licence to Take Water GWL150949(4) (Appendix II).

Table 1: Production Bore THDW01

MGA coordinates	316,112.2 mE, 7,609,644.0 mN
RL (top of 356 mm casing)	279.74
Drilled depth	248 m
Cased depth	244 m
Casing	+0.57 – 172m
Screened interval	172 – 244 m
Airlift yield*	115 L/s
Salinity as TDS^	637 mg/L
Groundwater level (below 356 mm casing)	75.49 m bgl on 12/12/2014
Recommended pump inlet setting	166 m#
Recommended pumping rate	To be advised following 2015 Q1 pumping test

*Airlifted yield from cased bore
^ Salinity as TDS calculated from field EC using a conversion factor of 0.65 (electrical conductivity)
# further dewatering depths will ultimately require deeper pump settings (below 166m). Placing the pump within the screen section will require the adoption of a motor shroud.

Drilling commenced on the 31 October 2014 with a 610 mm pre-collar being installed from 0 to 6.5 m and grouted in place. A 559 mm air-hammer hole was then drilled from 6.5 to 68 m. Difficulties maintaining circulation were experienced below 64 m as the ground was highly weathered and broken. At 68 m the hole could not be cleared of cuttings; with 2 m of cuttings remaining in the base of the hole. The hole was cased with 508 mm casing to 64 m before switching drilling techniques to dual-rotary to advance through the broken section of ground.

At 64 m dual rotary drilling began and the remainder of the 508 mm casing was reamed down to 88 m using a 470 mm air-hammer. The basal 10 m of the 508 mm casing was then grouted in place.

The hole was then extended using a 470 mm air-hammer drill bit from 88 to 94 m. Open hole drilling was unsuitable for strata below 94 m and so Easternwell elected to change to 432 mm dual-rotary drilling using 457 mm casing. This casing was reamed to 148 m depth by 13 November 2014. Hard ground conditions were intersected from 137 m onwards. Due to the hard ground conditions 432 mm air-hammer drilling was used to extend the hole to 178 m. At 174 m the ground was weathered and broken and dual-rotary drilling resumed.

By 24 November 2014 the 406 mm casing was reamed down using a 375 mm air-hammer from 174 m to 248 m. Difficulties were experienced installing this casing and the casing welds twice snapped, requiring it to be fished from the hole with a twin-line packer and then reinstalled.

Installation of the production casing began on 8 December 2014. The basal 72 m section of the casing consists of 356 mm OD, 1 mm aperture wire-wound stainless steel screens (collapse pressure 1975 kPa) with a stainless steel end cap. The upper 172 m of the hole is cased with blank 356 mm OD schedule 30 blank steel casing.

The hole was airlifted and developed on 12 and 13 December 2014 for a total of 9 hours. Airlifting and development was carried out until the discharge water was clean and sand free. A maximum airlift rate of about 115 L/s was produced from the completed bore. The field-measured electrical conductivity (EC) was 944 µS/cm; the static water level was 75.49 mbgl (203.7 mAHD) on 12 December 2014.

4 WATER QUALITY

Water samples were collected by Rockwater from the discharge pipe of the bore on 24 November 2014 (completion of drilling) and 12 December 2014 (completion of bore development). Water pH, salinity and temperature were measured in the field with calibrated instruments. All samples were chilled before being transported by Consolidated Minerals to MPL, a NATA-accredited laboratory, for analyses. The results of the analyses are presented in Table 2 and laboratory certificates are included as Appendix III.

Table 2: Laboratory Analysed Water Chemistry

Analyte	Units	THDW01 24/11/2014*	THDW01 12/12/2014^
Field pH	pH	7.1	7.1
Field EC @ 25ºC	µS/cm	944	974
Field Temperature	°C	31.3	30.5
pH	pH Unit	8.3	8.3
Total Dissolved Solids (grav)	mg/L	590	610
Total Hardness as $CaCO_3$	mg/L	270	270
Hydroxide Alkalinity as $CaCO_3$	mg/L	<5	<5
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	330	340
Total Alkalinity as $CaCO_3$	mg/L	330	340
Sulphate as $SO4^{2-}$	mg/L	64	63
Chloride	mg/L	120	120
Calcium	mg/L	43	43
Magnesium	mg/L	40	40
Sodium	mg/L	120	120
Potassium	mg/L	3.6	3.9
Iron – Dissolved	mg/L	<0.01	<0.01
Aluminum – Dissolved	mg/L	<0.01	<0.01
Silica – Dissolved	mg/L	29	30
Ammonia as N	mg/L	0.02	0.02
Manganese	mg/L	<0.005	0.009
Total Nitrogen (Total N)	mg/L	1.5	1.6

*Sample taken at the completion of drilling during hole conditioning procedures.
^Sample taken at the completion of airlifting/bore development procedures.

5 SUMMARY AND RECOMMENDATIONS

- Bore THDW01 was successfully completed to 244 m depth. Bore construction utilised 337 mm ID stainless steel screens (172 to 244 m) and 336 mm ID steel casing (+0.57 To 172 m).
- Dual rotary drilling proved to be a suitable technique for the installation of dewatering bores at Woodie Woodie minesite. Challenges related to snapped conductor casing welds were likely associated with welding procedures; future bore installations should include a review of welding procedures.
- During drilling airlift yields of up to 200 L/s were encountered. During bore-development airlifting the maximum bore yields were 115 L/s.
- Dewatering-pump selection should be assessed based on the results of a pumping test. The pumping test should focus on pump-selection requirements (step-rate tests and shorter-duration constant-rate tests) as opposed to regional-aquifer parameter characteristics.

- The dewatering pump installation should include a dip tube. This is required to measure groundwater levels in THDW01. Consmin will ultimately require a water level indicator that is 250 m in length.
- Construction of future ex-pit dewatering bores should be preceded by an RC drilling and testing programme. The RC drilling and testing programme should be supervised by a suitably qualified hydrogeologist.

[redacted]

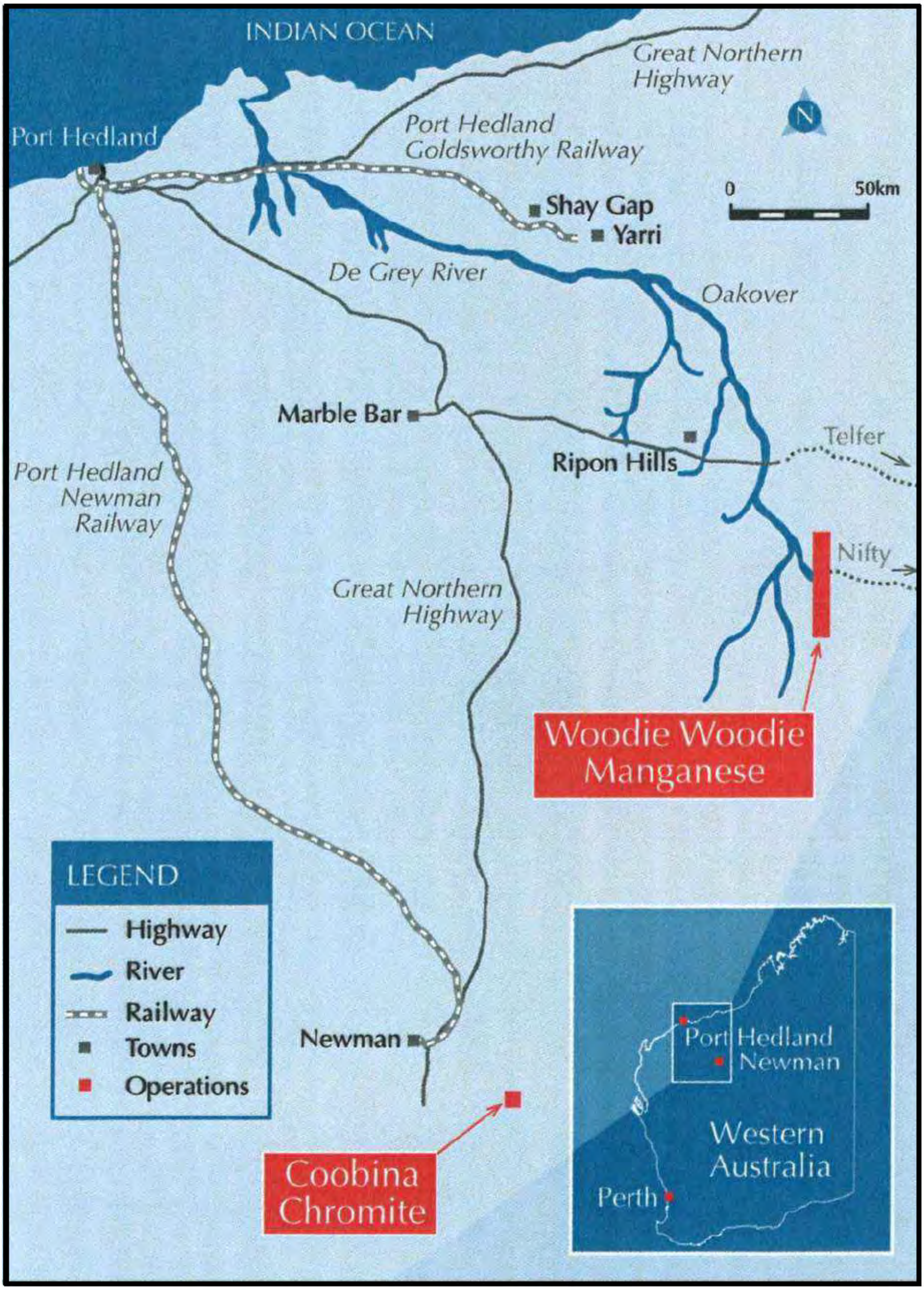
REFERENCES

GROUNDWATER RESOURCE MANAGEMENT (GRM) 2013, Woodie Woodie Manganese Project Groundwater Monitoring Review Jan 2012 to Dec 2012, Prepared for Pilbara Manganese Pty Ltd, March

ROCKWATER 2014, Conceptual Design of the Topvar Dewatering Borefield, Prepared for Consolidated Minerals, October

FIGURES

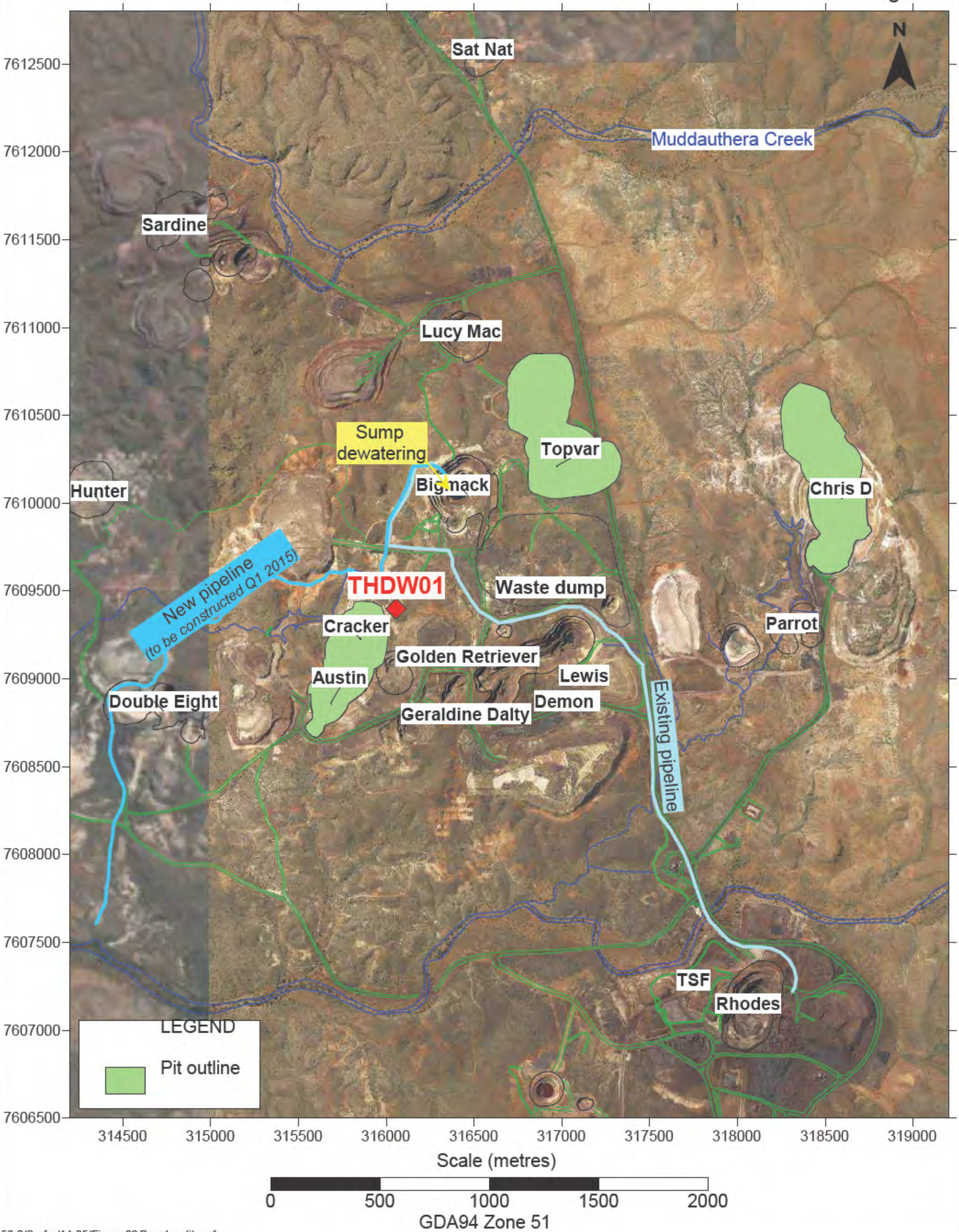
Figure 1



150-2/Surfer/14-05/Figure 01 General locality.srf

Client: Consolidated Minerals Ltd Project : Topvar Hub Dewatering Date : January 2015 Dwg. No: 150.2/15/1-1	SITE LOCALITY Rockwater PROPRIETARY LIMITED

Figure 2



150-2/Surfer/14-05/Figure 02 Bore locality.srf

Client: Consolidated Minerals Ltd

Project : Topvar Hub Dewatering

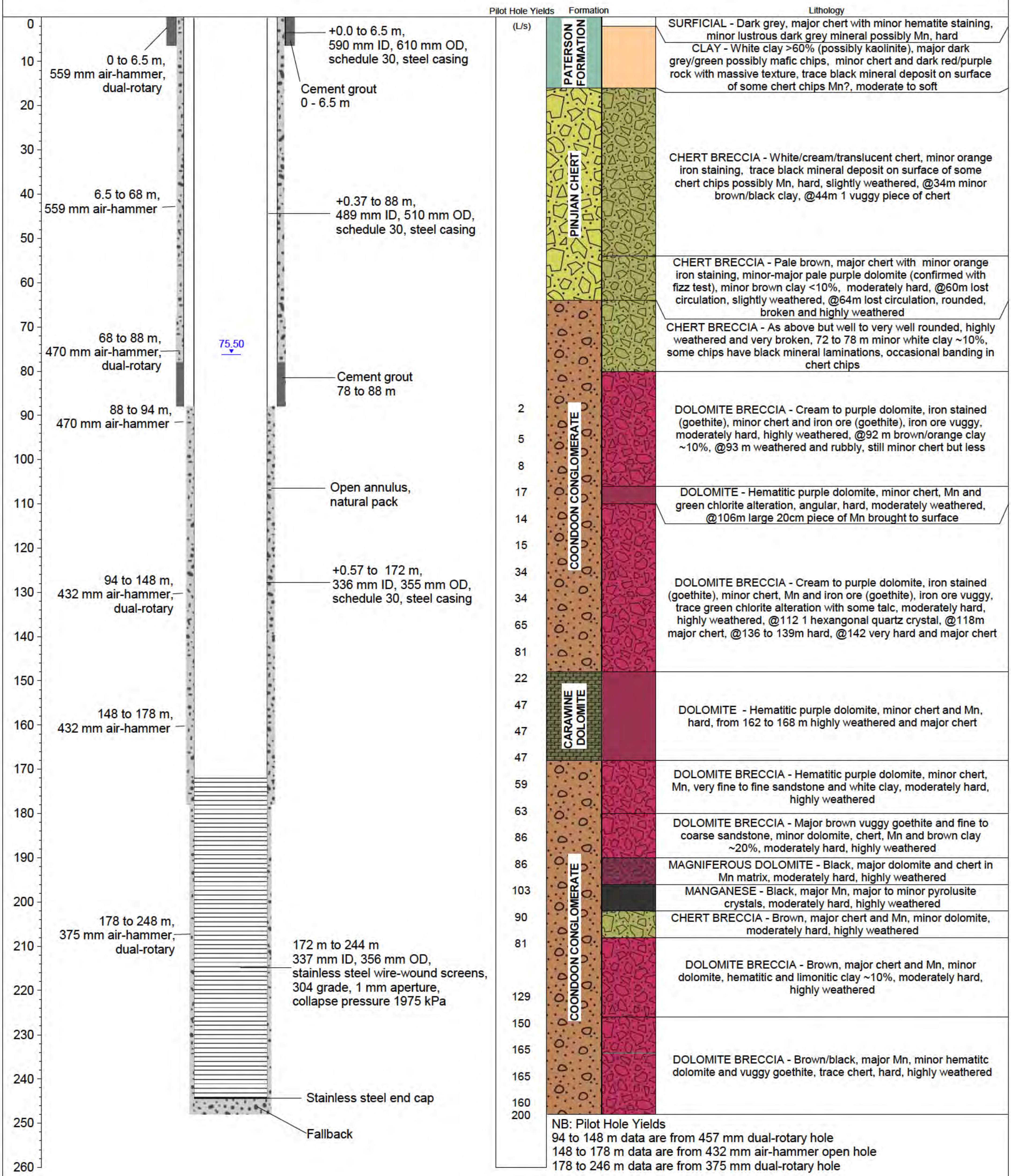
Date : January 2015

Dwg. No: 150.2/15/1-2

BORE LOCALITY

Rockwater PROPRIETARY LIMITED

Figure 3



NB: Pilot Hole Yields
94 to 148 m data are from 457 mm dual-rotary hole
148 to 178 m data are from 432 mm air-hammer open hole
178 to 246 m data are from 375 mm dual-rotary hole

NB: Temporary casing was used to hold the hole open during drilling operations as the majority of the strata intersected was highly weathered and broken. 457 mm casing was installed from 0 to 148 m and then 406 mm casing was run inside this to total depth. The production string was then run inside the 406 mm casing. Both the 406 mm and 457 mm casings have been removed from the hole.

Construction Date:	30/10/2014 to 14/12/2014	Depth Drilled (m bgl):	248	SWL (m bgl) (December 2014):	75.49
Easting (m MGA):	316,112.2	Top of Casing (m agl):	0.57	Water Chemistry (November 2014):	590 mg/L TDS; pH 8.3
Northing (m MGA):	7,609,644.0	Cased Depth (m bgl):	244	Airlift (L/s):	115
Ground Level (m AHD):	279.2	Screened Interval (m bgl):	172 - 244		

150-2/Strater/2014.12 THDW01/THDW01.str

Client: Consolidated Minerals
Project: Topvar Hub Dewatering
Date: January 2015
Dwg. No.: 150-2/15/1-3

COMPOSITE LOG
THDW01

Rockwater

APPENDIX I

THDW01 BORE COMPLETION DATA

PRODUCTION BORE DATA – THDW01

Project:	TOPVAR Dewatering
Bore No:	**THDW01**
Location:	100 m north-west of Cracker pit
GDA Coordinates:	316,112.2 mE, 7,609,644.0 mN
Status:	Production bore
Date Commenced:	31/10/2014
Date Completed:	14/12/2014 (drilling completed 24/11/14)
Drilling Contractor:	Easternwell
Drilling Rig:	Foremost DR01
Depth Drilled:	248 m
Drilling Details:	0 to 6.5 m, 559 mm dual rotary air-hammer with 610 mm casing 6.5 to 68 m, 559 mm air-hammer 68 to 88 m, dual rotary 470 mm air-hammer with 508 mm conductor casing 88 to 94 m, 470 mm air-hammer 94 to 148 m, dual rotary 432 mm air-hammer with 457 mm casing 148 to 178 m, 432 mm air-hammer 178 to 248, dual rotary 375 mm air-hammer with 406 mm casing
Casing Details:	0.0 to 6.5 m, 610 mm OD, 590 mm ID (24" Sched. 30) steel casing +0.37 to 88 m, 510 mm OD, 489 mm ID (20" Sched. 30) steel casing, blank +0.57 to 172 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 172 to 244 m, 356 mm OD, 337 mm ID (14") grade 304 stainless steel wire-wound screens, 1 mm aperture
Gravel Pack Interval:	Nil

PRODUCTION BORE DATA – THDW01 (continued)

Reference Point Description: 14” casing

Height of Casing Above Ground: 0.57 m (14” casing)

Reference Point Elevation: 279.74 mAHD (15/12/14)

Pumping Tests: Nil

Final Airlift Yield: ~115 L/sec during bore development

Final Water Salinity: 980 µS/cm (field measurement, airlift yield)

Static Water Level: 75.49 (12/12/14)

Depth m	Yield L/s	Salinity (as EC µS/cm)	Temp. °C	pH	Comment
87	2				Cut water, murky orange
94	5	896		8.22	murky orange
100	8	942	32.3	7.90	murky orange
106	17	-		-	murky orange
112	14*	943	34.2	7.71	murky orange
118	15*	965	34.2	8.02	murky orange
124	34	951	32.8	8.32	murky orange
130	34	932	31.9	7.90	murky orange
136	65	1001	32.3	7.94	
142	81	947	34.7	8.35	Clear
148	22	-		-	Clear
154	47	965		7.7	Clear
160	47	1031		7.7	Clear
166	47	1119		7.4	Clear
172	59	1009		7.7	Clear
178	63	1010		7.4	Clear
184	86	932	33.4	7.55	Slightly cloudy
190	86	946	31.5	7.0	Slightly cloudy
196	103	986	32.7	-	Slightly cloudy
202	90	-	-	-	Slightly cloudy
208	81	982	29.7	-	Murky black
214	-	968	31.6	-	Murky orange
220	129	952	32.8	-	Murky orange
226	150	961	31.5	-	Slightly cloudy
232	165	993	33.0	-	Slightly cloudy
238	165	955	32.1	-	Murky red/orange
244	160	-	-	-	Murky red/orange
246	200	944	31.3	7.1	Murky red/orange

*V-notch weir is an underestimate of real flow as all water is not yet running towards the weir. Some water pooling in the sump.

Hydro Data:

From 94 to 148 m data are from 457 mm dual-rotary hole using 432 mm casing

From 148 to 178 m data are from 432 mm air-hammer open hole

From 178 to 246 m data are from 375 mm dual-rotary hole using 406 mm casing

Lithology:

Depth		Lithology	Description
From	To		
0	2	SURFICIAL	Dark grey, major chert with minor hematite staining, minor lustrous dark grey mineral possibly Mn, hard
2	16	CLAY	White clay >60% (possibly kaolinite), major dark grey/green possibly mafic chips, minor chert and dark red/purple rock with massive texture, trace black mineral deposit on surface of some chert chips possibly Mn, moderate to soft
16	54	CHERT (BRECCIA)	White/cream/translucent chert, minor orange iron staining, trace black mineral deposit on surface of some chert chips possibly Mn, hard, slightly weathered, @34m minor brown/black clay, @44m 1 vuggy piece of chert
54	80	CHERT BRECCIA	Pale brown, major chert with minor orange iron staining, minor-major pale purple dolomite (confirmed with fizz test), minor brown clay <10%, moderately hard, @60m lost circulation, slightly weathered, @64m lost circulation, rounded, broken and highly weathered, 66 to 78 m well rounded, highly weathered and very broken, 72 to 78 m minor white clay ~10%, some chips have black mineral laminations, occasional banding in chert chips
80	106	DOLOMITE BRECCIA	Cream to purple dolomite, iron stained (goethite), minor chert and iron ore (goethite), iron ore vuggy, moderately hard, highly weathered, @92 m brown/orange clay ~10%, @93 m weathered and rubbly, still minor chert but less
106	110	DOLOMITE	Hematitic purple dolomite, minor chert, Mn and green chlorite alteration, angular, hard, moderately weathered, @106m large 20cm piece of Mn brought to surface
110	148	DOLOMITE BRECCIA	Cream to purple dolomite, iron stained (goethite), minor chert, Mn and iron ore (goethite), iron ore vuggy, trace green chlorite alteration with some talc, moderately hard, highly weathered, @112 1 hexangonal quartz crystal, @118m major chert, @136 to 139m hard, @142 very hard and major chert
148	168	DOLOMITE	Hematitic purple dolomite, minor chert and Mn, hard, from 162 to 168 m highly weathered and major chert
168	180	DOLOMITE BRECCIA	Hematitic purple dolomite, minor chert, Mn, very fine to fine sandstone and white clay, moderately hard, highly weathered
180	190	DOLOMITE	Major brown vuggy goethite and fine to coarse sandstone,

Depth		Lithology	Description
From	To		
		BRECCIA	minor dolomite, chert, Mn and brown clay ~20%, moderately hard, highly weathered
190	196	MAGNIFEROUS DOLOMITE	Black, major dolomite and chert in Mn matrix, moderately hard, highly weathered
196	202	MANGANESE	Black, major Mn, major to minor pyrolusite crystals, moderately hard, highly weathered
202	208	CHERT BRECCIA	Brown, major chert and Mn, minor dolomite, moderately hard, highly weathered
208	226	DOLOMITE BRECCIA	Brown, major chert and Mn, minor dolomite, hematitic and limonitic clay ~10%, moderately hard, highly weathered
226	248	DOLOMITE BRECCIA	Brown/black, major Mn, minor hematitc dolomite and vuggy goethite, trace chert, hard, highly weathered
		End of hole	

APPENDIX II

BORE CONSTRUCTION LICENCE AND GROUNDWATER LICENCE

File No: RF8835

Government of **Western Australia**
Department of Water

Instrument No. CAW179818(1)

LICENCE TO CONSTRUCT OR ALTER WELL

Granted by the Minister under section 26D of the Rights in Water and Irrigation Act 1914

Licensee(s)	Pilbara Manganese Pty Ltd	
Description of Water Resource	Pilbara Hamersley - Fractured Rock	
Location of Well(s)	M45/430	
Authorised Activities	**Activity**	**Location of Activity**
	Construct 2 non-artesian well(s).	M45/430
Duration of Licence	From 6 October 2014 to 5 October 2016	

This Licence is subject to the following terms, limitations and conditions:

1 The well must be constructed by a driller having a current class 1 water well drillers certificate issued by the Western Australian branch of the Australian Drilling Industry Association or equivalent certification recognised nationally by the Australian Drilling Industry Association.

2 No well shall be constructed within 400 metres of an existing well without the written permission of the owner of that well.

End of terms, limitations and conditions

This Licence is granted subject to the Rights in Water and Irrigation Regulations 2000.

Instrument No. GWL150949(4)

LICENCE TO TAKE WATER

Granted by the Minister under section 5C of the Rights in Water and Irrigation Act 1914

Licensee(s)	Pilbara Manganese Pty Ltd		
Description of Water Resource	Pilbara Hamersley - Fractured Rock	**Annual Water Entitlement**	63000000 kL
Location of Water Source	G45/37, L46/29 - Woodie Woodie Mine Site, G45/39, G45/40, G46/4, M46/162, M46/93, G46/5, M45/600, M45/601, M45/602, M46/161, M45/637, M45/638, M45/639, M45/640, M45/641, M46/92, M45/433, M45/429, M45/430, M45/431, M45/432, M46/137, M45/517, M46/150, M45/107, M46/108, G45/38		
Authorised Activities	**Taking of water for**	**Location of Activity**	
	Dewatering for mining purposes Dust suppression for earthworks and construction purposes Mineral ore processing and other mining purposes Mining camp purposes Rehabilitation purposes	G45/37, L46/29 - Woodie Woodie Mine Site, G45/39, G45/40, G46/4, M46/162, M46/93, G46/5, M45/600, M45/601, M45/602, M46/161, M45/637, M45/638, M45/639, M45/640, M45/641, M46/92, M45/433, M45/429, M45/430, M45/431, M45/432, M46/137, M45/517, M46/150, M45/107, M46/108, G45/38	
Duration of Licence	From 19 January 2012 to 18 January 2015		

This Licence is subject to the following terms, conditions and restrictions:

1 That should the licensee's draw adversely affect the aquifer or other users in the area, the Department of Water may reduce the amount that may be drawn.

2 The licensee is to comply with the "Operating Strategy for Pit Dewatering - Woodie Woodie Mine " as approved by the Department of Water on 2 December 2009 and any amendments made by or with the approval of the Department.

3 Should the monitoring at any time indicate a need for prompt action to prevent or reduce the effect of the licensee's draw on the underground resource, the licensee shall immediately report this to the Department of Water and advise the corrective measures proposed.

4 The Department of Water, at its discretion, may direct changes to be made to the monitoring programme at any time.

5 Approval by the Department of Water is to be obtained prior to the construction of additional and replacement wells and the modification or refurbishment of existing wells.

6 Every year the licensee must submit a groundwater monitoring summary prepared by a groundwater professional in accordance with Operational policy 5.12 - `Hydrogeological reporting associated with a groundwater well licence.' The report is due 31st March each year. The groundwater monitoring summary is to contain a summary of all monthly data and analysis of impacts from abstraction.

Government of **Western Australia**
Department of **Water**

Instrument No. GWL150949(4)

LICENCE TO TAKE WATER

Granted by the Minister under section 5C of the Rights in Water and Irrigation Act 1914

This Licence is subject to the following terms, conditions and restrictions:

7 Every 2 years the licensee must submit a groundwater monitoring review prepared by a groundwater professional in accordance with Operational policy 5.12 - `Hydrogeological reporting associated with a groundwater well licence'. The first report is due 31st March 2012 for the period ending 31st December 2011. The groundwater monitoring review is to contain a complete history of monitoring data and detailed analysis of impacts from abstraction.

End of terms, conditions and restrictions

APPENDIX III

LABORATORY CERTIFICATES

mpl Laboratories
Part of the Envirolab Group
ENVIROLAB GROUP
16 - 18 Hayden Court, Myaree, Western Australia 6154
PO Box 4023 Myaree BC, Western Australia 6960
Tel: +61 8 9317 2505 / Fax: +61 8 9317 4163
email: laboratory@mpl.com.au
www.envirolabservices.com.au
Envirolab Services (WA) Pty Ltd ABN 53 140 099 207

CERTIFICATE OF ANALYSIS 158920

Client:
Consolidated Minerals Ltd
PO Box 1220
WEST PERTH
WA 6872

Attention: [redacted]

Sample log in details:

Your Reference:	**Consolidated Minerals**
No. of samples:	2 Water
Date samples received:	25/11/2014
Date completed instructions received:	25/11/2014
Location:	

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:	2/12/14
Date of Preliminary Report:	Not issued
Issue Date:	2/12/14

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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

[redacted]

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Woodie Woodie Suite 5			
Our Reference:	UNITS	158920-1	158920-2
Your Reference	------------	BM Pit (Big Mack Pit)	THDW01 (Topvar Dewatering Bore)
Date Sampled	------------	24/11/2014	24/11/2014
Time Sampled		10:00	10:00
Type of sample		Water	Water
Inviron ID		161544	161545
pH in water	pH Units	7.8	8.3
Total Dissolved Solids (grav)	mg/L	480	590
Calcium - Dissolved	mg/L	42	43
Potassium - Dissolved	mg/L	3.0	3.6
Magnesium - Dissolved	mg/L	37	40
Sodium - Dissolved	mg/L	86	120
Hydroxide OH^- as $CaCO_3$	mg/L	<5	<5
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	<5	<5
Bicarbonate HCO_3 as $CaCO_3$	mg/L	330	330
Total Alkalinity as $CaCO_3$	mg/L	330	330
Chloride in water	mg/L	73	120
Sulphate in water	mg/L	33	64
Silica - Dissolved	mg/L	33	29
Aluminium-Dissolved	mg/L	<0.01	<0.01
Iron-Dissolved	mg/L	<0.01	<0.01
Manganese-Dissolved	mg/L	<0.005	<0.005
Hardness as $CaCO_3$	mg/L	260	270
Nitrate as NO_3	mg/L	7.0	6.5
Ammonia as N	mg/L	0.030	0.020
Total Nitrogen (Total N)	mg/L	1.7	1.5

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±5°C
METALS-020	Metals in soil and water by ICP-OES.
INORG-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320 B.
INORG-081	Chloride by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
INORG-081	Sulphate by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
INORG-081	Nitrate by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
INORG-057	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
INORG-055	Total Nitrogen by colourimetric analysis based on APHA 4500-P J, 4500-NO3 F.

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
pH in water	pH Units		INORG-001	[NT]	158920-1	7.8 || [N/T]	LCS-1	102.0%
Total Dissolved Solids (grav)	mg/L	5	INORG-018	<5	158920-1	480 || [N/T]	[NR]	[NR]
Calcium - Dissolved	mg/L	0.5	METALS-020	<0.5	158920-1	42 || 43 || RPD: 2	LCS-1	106%
Potassium - Dissolved	mg/L	0.5	METALS-020	<0.5	158920-1	3.0 || 3.0 || RPD: 0	LCS-1	100%
Magnesium - Dissolved	mg/L	0.5	METALS-020	<0.5	158920-1	37 || 37 || RPD: 0	LCS-1	104%
Sodium - Dissolved	mg/L	0.5	METALS-020	<0.5	158920-1	86 || 86 || RPD: 0	LCS-1	102%
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	5	INORG-006	<5	158920-1	<5 || [N/T]	LCS-1	100%
Bicarbonate HCO_3 as $CaCO_3$	mg/L	5	INORG-006	<5	158920-1	330 || [N/T]	LCS-1	100%
Total Alkalinity as $CaCO_3$	mg/L	5	INORG-006	<5	158920-1	330 || [N/T]	LCS-1	100%
Chloride in water	mg/L	1	INORG-081	<1	158920-1	73 || [N/T]	LCS-1	101%
Sulphate in water	mg/L	1	INORG-081	<1	158920-1	33 || [N/T]	LCS-1	104%
Silica - Dissolved	mg/L	0.2	METALS-020	<0.2	158920-1	33 || 33 || RPD: 0	LCS-1	100%
Aluminium-Dissolved	mg/L	0.01	Metals-022 ICP-MS	<0.01	158920-1	<0.01 || <0.01	LCS-1	110%
Iron-Dissolved	mg/L	0.01	Metals-022 ICP-MS	<0.01	158920-1	<0.01 || <0.01	LCS-1	106%
Manganese-Dissolved	mg/L	0.005	Metals-022 ICP-MS	<0.005	158920-1	<0.005 || <0.005	LCS-1	106%
Hardness as $CaCO_3$	mg/L	3	METALS-020	<3	158920-1	260 || 260 || RPD: 0	LCS-1	92%
Nitrate as NO_3	mg/L	0.5	INORG-081	<0.5	158920-1	7.0 || [N/T]	LCS-1	104%
Ammonia as N	mg/L	0.005	INORG-057	<0.005	158920-1	0.030 || [N/T]	LCS-1	120%
Total Nitrogen (Total N)	mg/L	0.1	INORG-055	<0.1	158920-1	1.7 || [N/T]	LCS-1	113%

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
pH in water	pH Units	[NT]	[NT]	[NR]	[NR]
Total Dissolved Solids (grav)	mg/L	[NT]	[NT]	[NR]	[NR]
Calcium - Dissolved	mg/L	[NT]	[NT]	158920-2	90%
Potassium - Dissolved	mg/L	[NT]	[NT]	158920-2	101%
Magnesium - Dissolved	mg/L	[NT]	[NT]	158920-2	94%
Sodium - Dissolved	mg/L	[NT]	[NT]	158920-2	102%
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Bicarbonate HCO_3 as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Client Reference: Consolidated Minerals

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Total Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Chloride in water	mg/L	[NT]	[NT]	[NR]	[NR]
Sulphate in water	mg/L	[NT]	[NT]	[NR]	[NR]
Silica - Dissolved	mg/L	[NT]	[NT]	158920-2	100%
Aluminium-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Iron-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Manganese-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Hardness as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Nitrate as NO_3	mg/L	[NT]	[NT]	[NR]	[NR]
Ammonia as N	mg/L	[NT]	[NT]	[NR]	[NR]
Total Nitrogen (Total N)	mg/L	[NT]	[NT]	158920-2	104%

Report Comments:

INS: Insufficient sample for this test; NT: Not tested; PQL: Practical Quantitation Limit; <: Less than; >: Greater than
RPD: Relative Percent Difference; NA: Test not required; LCS: Laboratory Control Sample;
NS: Not specified; NEPM: National Environmental Protection Measure

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however were analysed at a frequency to meet of exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD a matrix spike recoveries for the sample batch were within laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable
For VOCs in water samples, three vials are required for duplicate or spike analysis
Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spike and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics;
10-140% for SVOC and Speciated Phenols; and 40-120% for low level organics is acceptable.
Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and Speciated Phenols.
In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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Part of the Envirolab Group
ENVIROLAB GROUP

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email: laboratory@mpl.com.au
www.envirolabservices.com.au
Envirolab Services (WA) Pty Ltd ABN 53 140 099 207

CERTIFICATE OF ANALYSIS 159892

Client:
Consolidated Minerals Ltd
PO Box 1220
WEST PERTH
WA 6872

Attention: [redacted]

Sample log in details:

Your Reference:	**Woodie Woodie**
No. of samples:	2 Water
Date samples received:	16/12/2014
Date completed instructions received:	16/12/2014
Location:	

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by:	23/12/14
Date of Preliminary Report:	Not issued
Issue Date:	23/12/14

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Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

[redacted]

Woodie Woodie Suite 5 Our Reference: Your Reference	UNITS ------------	159892-1 BM Pit (Big Mack Pit)	159892-2 THDW01 (Topvar Dewatering Bore)
Date Sampled	------------	13/12/2014	13/12/2014
Time Sampled		13:50	13:50
Type of sample		Water	Water
Inviron ID		161571	161572
pH in water	pH Units	8.3	8.3
Total Dissolved Solids (grav)	mg/L	600	610
Calcium - Dissolved	mg/L	43	43
Potassium - Dissolved	mg/L	3.5	3.9
Magnesium - Dissolved	mg/L	40	40
Sodium - Dissolved	mg/L	120	120
Hydroxide OH^- as $CaCO_3$	mg/L	<5	<5
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	7	<5
Bicarbonate HCO_3 as $CaCO_3$	mg/L	330	340
Total Alkalinity as $CaCO_3$	mg/L	340	340
Chloride in water	mg/L	120	120
Sulphate in water	mg/L	63	63
Silica - Dissolved	mg/L	30	30
Aluminium-Dissolved	mg/L	<0.01	<0.01
Iron-Dissolved	mg/L	<0.01	<0.01
Manganese-Dissolved	mg/L	0.007	0.009
Hardness as $CaCO_3$	mg/L	270	270
Nitrate as NO_3	mg/L	6.5	6.5
Ammonia as N	mg/L	0.020	0.020
Total Nitrogen (Total N)	mg/L	1.5	1.6

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±5°C
METALS-020	Metals in soil and water by ICP-OES.
INORG-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320 B.
INORG-081	Chloride by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
INORG-081	Sulphate by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.
INORG-081	Nitrate by Ion Exchange Chromatography in accordance with APHA latest edition 4110B.
INORG-057	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
INORG-055	Total Nitrogen by colourimetric analysis based on APHA 4500-P J, 4500-NO3 F.

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
pH in water	pH Units		INORG-001	[NT]	159892-1	8.3 || [N/T]	LCS-1	101.0%
Total Dissolved Solids (grav)	mg/L	5	INORG-018	<5	159892-1	600 || [N/T]	LCS-1	95%
Calcium - Dissolved	mg/L	0.5	METALS-020	<0.5	159892-1	43 || 43 || RPD: 0	LCS-1	103%
Potassium - Dissolved	mg/L	0.5	METALS-020	<0.5	159892-1	3.5 || 3.6 || RPD: 3	LCS-1	97%
Magnesium - Dissolved	mg/L	0.5	METALS-020	<0.5	159892-1	40 || 40 || RPD: 0	LCS-1	101%
Sodium - Dissolved	mg/L	0.5	METALS-020	<0.5	159892-1	120 || 120 || RPD: 0	LCS-1	94%
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	5	INORG-006	<5	159892-1	7 || [N/T]	LCS-1	101%
Bicarbonate HCO_3 as $CaCO_3$	mg/L	5	INORG-006	<5	159892-1	330 || [N/T]	LCS-1	101%
Total Alkalinity as $CaCO_3$	mg/L	5	INORG-006	<5	159892-1	340 || [N/T]	LCS-1	101%
Chloride in water	mg/L	1	INORG-081	<1	159892-1	120 || 120 || RPD: 0	LCS-1	99%
Sulphate in water	mg/L	1	INORG-081	<1	159892-1	63 || 63 || RPD: 0	LCS-1	103%
Silica - Dissolved	mg/L	0.2	METALS-020	<0.2	159892-1	30 || 30 || RPD: 0	LCS-1	101%
Aluminium-Dissolved	mg/L	0.01	Metals-022 ICP-MS	<0.01	159892-1	<0.01 || [N/T]	LCS-1	108%
Iron-Dissolved	mg/L	0.01	Metals-022 ICP-MS	<0.01	159892-1	<0.01 || [N/T]	LCS-1	113%
Manganese-Dissolved	mg/L	0.005	Metals-022 ICP-MS	<0.005	159892-1	0.007 || [N/T]	LCS-1	102%
Hardness as $CaCO_3$	mg/L	3	METALS-020	<3	159892-1	270 || 270 || RPD: 0	LCS-1	89%
Nitrate as NO_3	mg/L	0.5	INORG-081	<0.5	159892-1	6.5 || 6.4 || RPD: 2	LCS-1	103%
Ammonia as N	mg/L	0.005	INORG-057	<0.005	159892-1	0.020 || 0.020 || RPD: 0	[NR]	[NR]
Total Nitrogen (Total N)	mg/L	0.1	INORG-055	<0.1	159892-1	1.5 || [N/T]	[NR]	[NR]

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
pH in water	pH Units	[NT]	[NT]	[NR]	[NR]
Total Dissolved Solids (grav)	mg/L	[NT]	[NT]	[NR]	[NR]
Calcium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Potassium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Magnesium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Sodium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Bicarbonate HCO_3 as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Woodie Woodie Suite 5	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Total Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Chloride in water	mg/L	[NT]	[NT]	159892-2	99%
Sulphate in water	mg/L	[NT]	[NT]	159892-2	109%
Silica - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Aluminium-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Iron-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Manganese-Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Hardness as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Nitrate as NO_3	mg/L	[NT]	[NT]	159892-2	124%
Ammonia as N	mg/L	[NT]	[NT]	[NR]	[NR]
Total Nitrogen (Total N)	mg/L	[NT]	[NT]	[NR]	[NR]

Report Comments:

INS: Insufficient sample for this test; NT: Not tested; PQL: Practical Quantitation Limit; <: Less than; >: Greater than
RPD: Relative Percent Difference; NA: Test not required; LCS: Laboratory Control Sample;
NS: Not specified; NEPM: National Environmental Protection Measure

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however were analysed at a frequency to meet of exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD a matrix spike recoveries for the sample batch were within laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable
For VOCs in water samples, three vials are required for duplicate or spike analysis
Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spike and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics;
10-140% for SVOC and Speciated Phenols; and 40-120% for low level organics is acceptable.
Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and Speciated Phenols.
In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.
When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

APPENDIX II

THDWB2 -5 Bore Completion Report





TOPVAR HUB DEWATERING

BORE COMPLETION REPORT – PHASE 2 DRILLING AND CONSTRUCTION PROGRAMME

REPORT FOR CONSOLIDATED MINERALS

JANUARY 2016

Rockwater
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

Report No. 150.2/16/01

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REVISION	AUTHOR	REVIEW	ISSUED
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1 INTRODUCTION

Consolidated Minerals (Consmin) is the parent company of Pilbara Manganese Pty Ltd (PMPL), which owns and operates the Woodie Woodie manganese mine, situated in the East Pilbara region of Western Australia (Fig. 1). Open pit mines within the Woodie Corridor typically produce large groundwater inflows that require dewatering. Dewatering to date has been achieved mainly by the use of in-pit sumps. Rockwater (2014) identified large-diameter, ex-pit dewatering bores as a suitable dewatering strategy for the Topvar Hub. In December 2014 the first bore of the programme, THDW01 was completed near the Topvar pit (Rockwater, 2015). This report details the construction of another four productions bore from September to December 2015.

2 GEOLOGY AND HYDROGEOLOGY

The Topvar project area (Fig. 1) is located in the Pilbara region of Western Australia within a large synclinal basin known regionally as the Oakover Syncline. The Oakover Syncline is a platform carbonate unit that unconformably overlies the Jeerinah Formation. The primary lithology is a unit identified as the Carawine Dolomite. Other rocks include the Pinjian Chert Breccia, Waltha Woora Sandstone, Paterson Formation (glacial deposits), Coondoon Formation, various younger Cainozoic sedimentary units (including the Oakover Formation) and the manganese deposits. The orebodies are within the Pinjian Chert Breccia of Proterozoic age and the underlying Carawine Dolomite units which are of Archaean age. The Mesoproterozoic Coondoon Formation, an extensional conglomerate, also hosts some minor ore bodies.

The Oakover Syncline is over 180 km long. The width of the basin is about 16 km near Woodie Woodie. The Carawine Dolomite, which underlies the Pinjian Chert Breccia, comprises bedded dolomite that is commonly silicified and contains various sedimentary structures and stromatolites. The Pinjian Chert Breccia, which unconformably overlies the dolomite, comprises chert fragments in a silicified matrix that is commonly broken, jointed and vuggy. The Waltha Woora Formation conformably overlies the Pinjin Chert Breccia, and is comprised predominantly of shale, silstone and sandstone beds and is commonly dolomitic. The Coondoon Formation lies unconformably on the Carawine Dolomite in local fault-bounded basins and is predominantly comprised of conglomerate, sedimentary breccia, poorly sorted ferruginous sandstone and siltstone.

Groundwater flow within the Woodie Woodie region has been heavily altered due to pit dewatering. Sub-regional groundwater flow is currently from the west towards the active (Big Mack pit) and inactive (Greensnakes pit) mine dewatering operations.

Pre-mining groundwater levels ranged 230 to 258 m AHD (GRM, 2013) and have been lowered to about 200 m AHD in mining regions over the last decade. Pre-mining groundwater flow was towards the Oakover River, which has a bed elevation at about 250 m to 254 m AHD west and north-west of Woodie Woodie.

The main aquifers are the Pinjan Chert Breccia and the Upper Carawine Dolomite. These units, along with various clay and altered zones within the dolomite, form the dissolution zone, which on a regional scale is the primary aquifer. The Jeerinah Formation, Lower Carawine Dolomite and Patterson Formation form aquitards within the Woodie Woodie area. The Pinjian Chert Breccia forms a major aquifer that is commonly confined by the Patterson Formation where it is present, but is otherwise unconfined.

The transmissivity of the Pinjian Chert Breccia is estimated to range from about 500 to over 2500 m^2/day. The Pinjian Chert Breccia is often vuggy, with voids either open or infilled with clay or other fine grained sediments. Vuggy Pinjian Chert Breccia often surrounds the manganese ore zones.

The Carawine Dolomite that has been assigned as two hydrogeological units: Upper Carawine Dolomite; and Lower Carawine Dolomite. The Upper Carawine Dolomite (often hematite altered), defined as the dolomite near the contact with the Pinjian Chert Breccia and/or manganese, forms another unconfined aquifer within the region. The transmissivity of the Upper Carawine Dolomite ranges from less than 100 m^2/day to over 2000 m^2/day. The higher permeability within the Upper Carawine Dolomite is controlled by discontinuities (including bedding planes and fractures) and vugs. The Lower Carawine Dolomite, defined as the dolomite zone furthest from the contact with the Pinjian Chert Breccia, is thought to be of lower permeability.

The specific yield for the two aquifers are likely to be low because of the low primary porosity, although values of up to 20% for the Carawine Dolomite and 10% for the Pinjian Chert Breccia have been quoted in historical reports and may be appropriate at localities with the greatest development of vugs. The confined storage (storativity) is likely to range between 1×10^{-4} and 1×10^{-6}.

The Woodie Woodie manganese deposits are highly heterogeneous and may either be of a lower or similar permeability to the main aquifers. In some areas manganese ore zones have been associated with major groundwater inflows, indicating higher permeability. This higher permeability appears to be associated with a significant zone of faulting, which extends between Cracker and Big Mack and possibly towards Radio Hill. In addition, there is some evidence that inflow rates at Cracker and Big Mack may have been exacerbated by drill holes left un-grouted, possibly linking the pits to not only the highly permeable manganese ore zones at depth, but also to the highly permeable Upper Carawine Dolomite.

Groundwater in the Woodie Woodie region typically has total dissolved solids (TDS) less than 1000 mg/L.

3 DRILLING AND BORE CONSTRUCTION

Drilling of production bores THDW02, THDW03, THDW04, and THDW05 was performed by Boart Longyear using conventional air-hammer, conventional mud-rotary, and Dual Tube Flooded Reverse (DTFR) methods. The bore locations are illustrated in Figure 2 and composite logs for the bores are presented as Figures 3 to 6. Drilling and bore construction details are presented in Table 1 and Appendix I. Drilling and bore construction was undertaken under Department of Water groundwater licence CAW181047 (Appendix I); groundwater extraction is undertaken under Licence to Take Water GWL150949.

Table 1 Bore construction details

Parameter	THDW02	THDW03	THDW04	THDW05
Easting (MGA)	316732.7	316925.5	317296.0	316679.6
Northing (MGA)	7610929.3	7610938.9	7610397.0	7609354.4
RL top of steel flange (m AHD)	291.89	284.27	287.16	295.82
Drilled depth (m bgl)	236.4	242.0	241.0	216.4
Cased depth (m bgl)	236.0	241.0	240.3	216.4
Casing (m bgl)	+0.31 to 107.7	+0.68 to 173.0	+0.41 to 118.0	+0.51 to 124.7
Screened interval (m bgl)	107.7 to 234.0	173.0 to 239.0	118.0 to 238.3	124.7 to 214.8
Airlift yield[1] (L/s)	28	65	40[2]	40[2]
Salinity as TDS[3] (mg/L)	494	431	614	^
Groundwater level (below 356 mm casing)[4]	105.82	98.45	101.04	105.45
Groundwater level (RL m AHD)[4]	186.07	185.82	186.12	190.37

1. Airlifted yield from constructed bore
2. Approximate; inconsistent data
3. Salinity as TDS calculated from field EC using a conversion factor of 0.625 (electrical conductivity)
4. Depth to groundwater as measured on 12 Jan 2016
^ Data unavailable at the time of report wrting

THDW02

Drilling commenced on 4 September 2015 with a 610 mm pre-collar being installed from 0 to 6.0 m and grouted in place. A 470 mm air-hammer hole was then drilled from 6.0 to 119 m. Drilling progressed as a 445 mm hole from 119 m to 236.4 m depth using Dual Tube Flooded Reverse (DTFR) rotary drilling methods. Drilling was ceased at 236.4 m due to slow penetration and poor hydrogeological conditions.

Installation of the production casing began on 22 September 2015. The casing string is comprised of blank 356 mm OD schedule 30 blank steel casing installed from 0.31 m above ground level to 107.7 m below ground level (bgl). A screened interval was installed from 107.7 to 234.0 m depth comprised of eleven 6.0 m long 356 mm OD, 1 mm aperture wire-wound stainless steel screens (collapse pressure 1975 kPa) interspersed with ten 6.03 m long blank steel lengths of casing. A drillable cement shoe is installed at the base of the stainless steel screens constructed from 2.0 m of blank steel casing with 0.6 m basal cement plug.

The bore was developed using reverse circulation and conventional air-lifting methods in addition to surging the screened interval. The bore was airlifted and developed from 25 to 27 September 2015 for a total of 9.5 hours. Airlifting was carried out until the discharge water was clear and sand free. A maximum airlift rate of about 28 L/s was produced from the completed bore. The field-measured electrical conductivity (EC) was 738 µS/cm; the static water level was 105.51 m bgl (186.07 m AHD) on 12 January 2016.

THDW03

Drilling commenced on 28 September 2015 with a 610 mm pre-collar being installed from 0 to 6.0 m and grouted in place. A 470 mm air-hammer hole was then drilled from 6.0 to 88.0 m. The fractured siltstone and sandstone units intercepted in this hole were eroding from the air-hammer drilling and the drill hole was becoming unstable. Drilling continued from 88.0 to 242.0 m using the DTFR rotary method.

Installation of the production casing began on 13 October 2015. The casing string is comprised of blank 356 mm OD schedule 30 blank steel casing installed from 0.68 m above ground level to 173.0 m bgl. A screened interval was installed from 173.0 to 239.0 m depth comprised of eleven 6.0 m long 356 mm OD, 1 mm aperture wire-wound stainless steel screens (collapse pressure 1975 kPa). A drillable cement shoes is installed at the base of the stainless steel screens constructed from 2.0 m blank of steel casing with 0.6 m basal cement plug.

THDW03 was developed using reverse circulation and conventional air-lifting methods in addition to surging the screened interval. The bore was airlifted and developed from 15 to 17 October 2015 for a total of 8.5 hours. Airlifting was carried out until the discharge water was clear and sand free. A maximum airlift rate of about 65 L/s was produced from the completed bore. The field-measured electrical conductivity (EC) was 777 µS/cm; the static water level was 97.77 m bgl (185.82 m AHD) on 12 January 2016.

THDW04

Drilling of THDW04 commenced on 18 October 2015 with a 610 mm pre-collar being installed from 0 to 6.0 m and grouted in place. The lithology at this depth was comprised of soft clayey material, with insufficient integrity to maintain a collar during air-hammer drilling. Mud rotary methods were employed from the top of the hole. A 445 mm conventional mud-rotary hole was drilled from 6.0 to 113.0 m, the stratigraphy intercepted was comprised of clay and sandstone intervals that had been significantly fractured. Significant mud losses were encountered as a result of the fracturing; therefore, most of the hole was drilled blind (whereby the cuttings are either lifted into an overlying cavity or they are ground down to a particle size that can be accommodated by the fractured formation). When drilling reached 113 m there was sufficient submergence below the phreatic surface to commence DTFR drilling. Drilling continued from 113 to 241 m with the DTFR method.

When removing the drill string and conducting a wiper run on the hole in preparation for casing installation hole stability issues were encountered at 105 m depth. Significant damage was done to some drill rods as the drill string was extracted past the unstable zone. After the drill string was removed to the surface it was observed that the hole had completely collapsed at 105 m and subsequent attempts to clear it failed. The hole was then reamed to 508 mm from 6 to 111 m and 473 mm OD conductor casing was installed. A wiper run was then completed which found that the hole was filled with collapsed formation from 170 to 241 m depth. This material was cleared from the hole using the DTFR method and the hole was conditioned prior to the installation of the production casing.

Installation of the production casing began on 19 November 2015. The casing string is comprised of 356 mm OD schedule 30 blank steel casing installed from 0.41 m above ground level to 118.0 m bgl. A screened interval was installed from 118.0 to 238.29 m depth comprised of eleven 6.0 m long 356 mm OD, 1 mm aperture wire-wound stainless steel screens (collapse pressure 1975 kPa) interspersed with nine 6.03 m long blank steel lengths of casing. A drillable cement shoes is installed at the base of the stainless steel screens constructed from 2.0 m of blank steel casing with 0.6 basal cement plug. Once the production casing was installed and the basal section gravel packed, the conductor casing was removed from the hole.

THDW04 was developed using reverse circulation and conventional air-lifting methods in addition to surging the screened interval. The bore was airlifted and developed from 23 to 25 November 2015 for a total of 22 hours. Airlifting was carried out until the discharge water was clear and sand free. A maximum airlift rate of about 40 L/s was produced from the completed bore. The field-measured electrical conductivity (EC) was 986 µS/cm; the static water level was 100.63 m bgl (186.12 m AHD) on 12 January 2016.

THDW05

Drilling of THDW05 commenced on 27 November 2015 with a 610 mm pre-collar being installed from 0 to 11.1 m and grouted in place. Cementing-advance techniques were required from 4.3 to 8.0 m due to the instability of the formation (unconsolidated fill). This issue resulted in significant project-delay.

A 508 mm conventional mud hole was then drilled to 38.0 m depth without issue. The hole was then continued on using DTFR drilling techniques to 68.0 m where mud circulation was lost and the drill method reverted to conventional mud. The 508 mm conventional mud hole was drilled to a total depth of 95 m. 473 mm OD steel conductor casing was installed to 94 m depth to isolate zones of instability intersected by the 508 mm hole. Drilling progressed from 95 m to 241 m depth (at 445 mm diameter), employing conventional mud methods from 95 to 130 m depth and DTFR drilling from 130 to 241 m.

Installation of the production casing began on 20 December 2015. The casing string is comprised of blank 356 mm OD schedule 30 blank steel casing installed from 0.51 m above ground level to 216.4 m bgl. A screened interval was installed from 124.7 to 214.8 m depth comprised of eleven 6.0 m long 356 mm OD, 1 mm aperture wire-wound stainless steel screens (collapse pressure 1975 kPa) interspersed with four 6.03 m long blank steel lengths of casing. A drillable cement shoes is installed at the base of the stainless steel screens constructed from 1.6 m of blank steel casing with 0.6 basal cement plug. The filter pack consisted of 37 tonnes of 3.2 to 6.4 mm graded gravel, filling the annulus to a depth of 57.5 m.

THDW05 was developed using reverse circulation and conventional air-lifting methods in addition to surging the screened interval. The bore was airlifted and developed from 5 to 7 January 2016 for a total of 22.25 hours. Airlifting was carried out until the discharge water was clear and sand free. The airlift yield could not be quatified using v-notch measurements; however, visual estimates suggest about 40 L/s. The static water level was 104.94 m bgl (190.37 m AHD) on 12 January 2016.

4 TEST PUMPING

4.1 FIELD METHODOLOGY

Test pumping of the four bores was conducted in two phases, with bores THDW02 and THDW03 completed in November 2015 and bores THDW04 and THDW05 completed in January 2016.

Pumping tests were conducted by Western Irrigation under the supervision of Rockwater personnel. They consisted of a 4x1 hour step-rate test and a 7 hour constant-rate test for each bore. The step-rate tests were undertaken to assess well-efficiency and to assess the appropriate pumping rate for the constant-rate test. Constant-rate tests were conducted to help assess maximum operational pumping rates.

Individual pumping tests are described below.

THDW02
The pumping test for bore THDW02 was conducted on 30 October 2015. A step-rate pumping test was conducted at dewatering bore THDW02 comprised of four successive one hour steps of increasing flow rates of 45, 55, 65 and 75 L/s. The final step of the test was extended for a further six hours of pumping at 75 L/s to provide data for constant-rate analysis. Total drawdown at the end of the test was 12.51 m. Groundwater levels were also monitored in proximal bore THDW02 (190 m to the east).

THDW03
A step-rate test with rates of 25, 35, 50 and 60 L/s was conducted on THDW03 on 1 November 2015. The results the step-rate test was used to select a rate of 55 L/s for the 7 hour constant-rate test conducted on 2 November 2015. At the end in of the pumping test THDW03 had drawndown 33.66 m, however recovered to the groundwater level recovered to 0.56 m below the static water level within 30 seconds from the end of the test. Groundwater levels were and also recorded in proximal bore THDW02 (190 m to the west).

THDW04
The pumping test for bore THDW04 was conducted on 16 January 2016. A step-rate pumping test was conducted with four successive one-hour steps of increasing flow rates of 39, 50, 62 and 71 L/s. The final step of the test was extended for a further six hours of pumping at 70 L/s to provide data for constant-rate analysis. Total drawdown at the end of the test was 5.26 m.

THDW05

The pumping test for bore THDW05 was conducted on 13 and 14 January 2016. Testing commenced with a step-rate test, with rates of 40, 51, 60 and 63 L/s. These data were used to select the constant-rate test rate (59 L/s). The constant-rate test was undertaken for 7 hours. At the completion of the pumping test THDW05 had drawn down 23.83 m.

4.2 ASSESSMENT RESULTS

An inverse-modelling assessment of aquifer performance data was undertaken using AQTESOLV software (Appendix III). Curve-matching techniques were employed to assess the bore and aquifer characteristics of each bore. Assessment parameters include:

- Confined boundary conditions. Actual aquifer characteristics are likely to include semi-confined or (locally) unconfined characteristics; however, for the relatively short duration of the tests the pumping test results best matched confined conditions.
- The Dougherty-Babu algorithm was employed for bores THDW02-THDW04. This algorithm is an analytical solution for unsteady flow to a fully or partially penetrating, finite-diameter bore with bore-storage and bore 'skin' in a homogeneous, isotropic confined aquifer.
- Bore THDW05 showed a poor match to the Dougherty-Babu algorithm. This divergence may be due to the dominant role that a discrete fracture zone (or zones) play in near-well inflow. The Gringarten (Vertical) analytical solution better matched the constant-rate field data and so was employed in the assessment of THDW05. The Gringarten solution is for unsteady flow to a fully penetrating bore intersecting a single infinite-conductivity vertical fracture in an anisotropic confined aquifer. The pumped bore bisects the fracture which is represented in the solution by a fully penetrating vertical plane source oriented parallel to the x axis.

Assessment results are summarised in Table 2 and shown in Appendix III.

Table 2 Test pumping data

Bore	Aquifer parameters		Bore parameters					Max. Q[6] (L/s)	Drawdown estimate (m)[7]
	Transmissivity (m^2/day)	Specific Storage	C[1]	P[2]	Sw[3]	B[4]	WE[5]		
THDW02	700	0.0053	0.0869	2.5	-2.3	0.9023	99.0%	167	36.7
THDW03	1400	0.009	0.386	2.701	8.8	5.255	41.7%	90	65.1
THDW04	2257	0.022	0.0152	3	1.97	0.56	53.6%	167	20.9
THDW05	709	0.001	0.291	3	-0.4	1.85	32.7%	90	55.8

1. C= Nonlinear well loss coefficient
2. P = Nonlinear well loss exponent
3. Sw = wellbore skin factor (dimensionless)
4. B = Y-intercept of simulated step-rate drawdown
5. WE = Well efficiency (%)
6. Q = Pumping rate. The maximum (short term) pumping rate is assessed based on the bore parameters and subsequent drawdown assessment (see adjacent column). The maximum pumping rate is limited by the capacity of the nominated pumps (Schlumberger REDA pumps) and the bore and aquifer characteristics. The long-term borefield-wide pumping requirements (based on dewatering-target projections) are described in Rockwater (2014). Actual pumping rates will decrease during borefield

operation due to long-term drawdown. Maximum pumping rates are provided for initial variable speed drive (VSD) settings only.

7. Based solving the Jacob-Rorabaugh Step Test Model [s(t) = BQ + CQP] where Q is the maximum pumping rate (see adjacent column) and the Jacob-Rorabaugh are as described in the relevant cell in Table 2.

5 WATER QUALITY

Water samples were collected by Rockwater on completion of the test pumping. Water pH, salinity and temperature were measured in the field with calibrated instruments. All samples were chilled before being transported by Consolidated Minerals to MPL, a NATA-accredited laboratory, for analyses. The results of the analyses are presented in Table 3. Laboratory certificates are included as Appendix IV. These data show that the groundwater samples are of bicarbonate type, with salinities in the order of 400 mg/L. Groundwater samples are slightly alkaline, with pHs in the order of 8 pH units.

Table 3 Laboratory analysed water chemistry

Analyte	Units	Bore[1]	
		THDW02	THDW03
Field pH	pH	7.02	7.05
Field EC @ 25ºC	µS/cm	738	777
Field Temperature	°C	33.4	34.5
pH	pH Unit	7.9	8.0
Total Dissolved Solids (grav)	mg/L	400	420
Total Hardness as $CaCO_3$	mg/L	270	300
Hydroxide Alkalinity as $CaCO_3$	mg/L	<5	<5
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	310	330
Total Alkalinity as $CaCO_3$	mg/L	310	330
Sulphate as $SO4^{2-}$	mg/L	20	15
Chloride	mg/L	43	40
Calcium	mg/L	47	52
Magnesium	mg/L	38	41
Sodium	mg/L	73	67
Potassium	mg/L	3.0	2.8
Iron – Dissolved	mg/L	<0.01	<0.01
Aluminum – Dissolved	mg/L	<0.01	<0.01
Silica – Dissolved	mg/L	34	39
Ammonia as N	mg/L	<0.005	0.007
Manganese	mg/L	<0.005	<0.005
Total Nitrogen (Total N)	mg/L	2.5	2.2

1. Data for bore THDW04 and THDW05 were unavailable at the time of report writing

6 SUMMARY AND RECOMMENDATIONS

- Four production bores (THDW02-05) were successfully drilled and constructed, ranging in depth from 216.4 to 241.0 m. This drilling programme follows on from the first phase of the borefield drilling programme (THDW01), as described in Rockwater (2015).
- The 2015 phase of borefield (bores THDW02-05) was undertaken using the DTFR drilling method whilst the 2013 phase of the borefield (THDW01) was undertaken using the Dual Rotary (DR) drilling method. Both methods have their strengths and weaknesses: DR generally performed better in above-watertable drilling and in drilling very hard strata; DTFR performs better in below-watertable drilling where strata are not exceedingly hard. The programme-average for bore installation was 31 days per bore, including mobilisation and demobilisation.
- Recommended maximum pumping rates of the four bores range from 90 L/s at THDW03 and THDW05 to 167 L/s at THDW02 and THDW04. The pumping test data suggest a combined maximum dewatering rate (including bore THDW01) of 634 L/s for the borefield.

[redacted]

REFERENCES

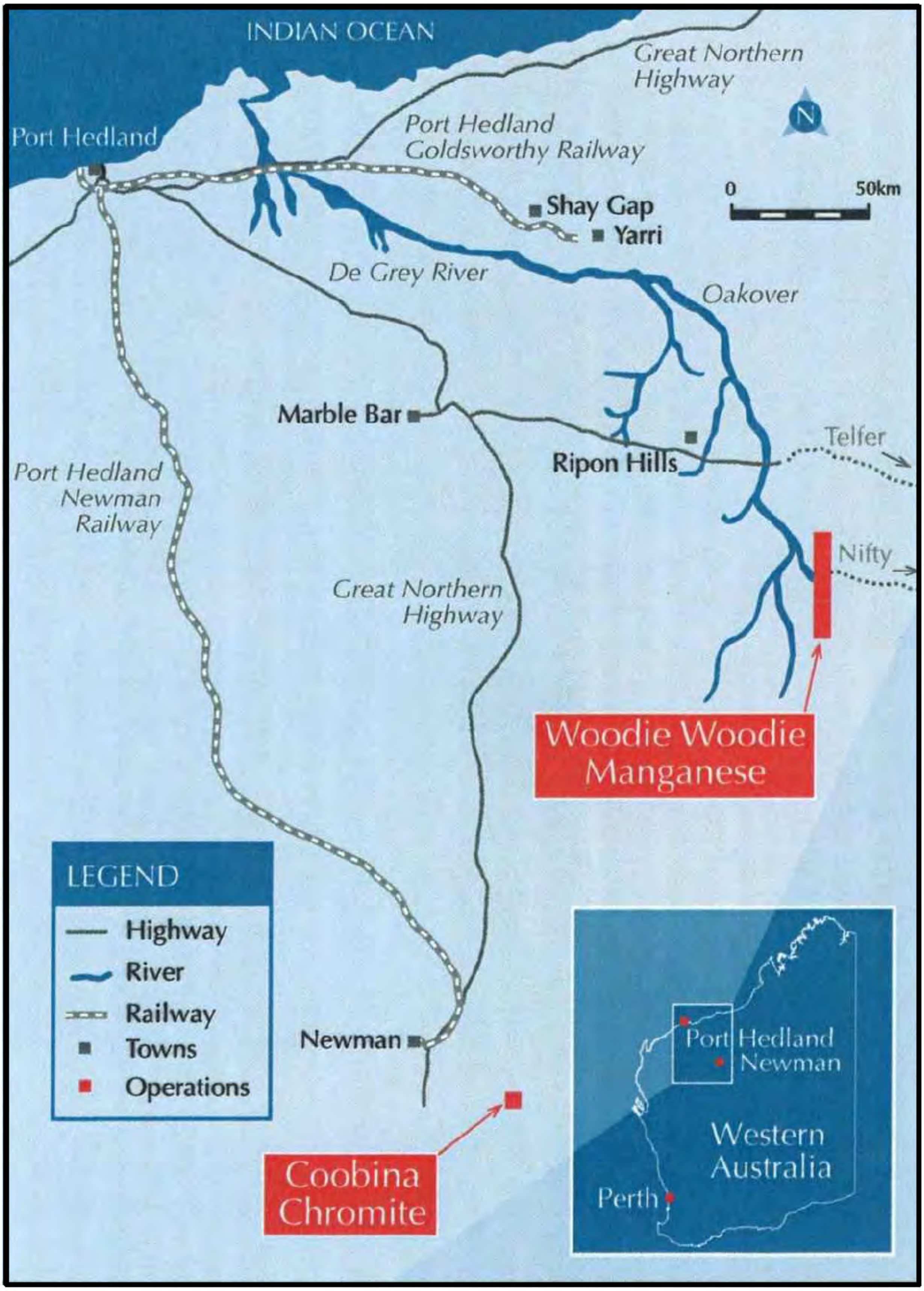
GROUNDWATER RESOURCE MANAGEMENT (GRM) 2013, Woodie Woodie Manganese Project Groundwater Monitoring Review Jan 2012 to Dec 2012, Prepared for Pilbara Manganese Pty Ltd, March 2013.

ROCKWATER 2014, Conceptual design of the Topvar Dewatering Borefield, unpublished report for Pilbara Manganese Pty Ltd, Report Ref. 150-2/14-04, October 2014.

ROCKWATER 2015, Topvar Hub dewatering, bore completion report THDW01, unpublished report for Pilbara Manganese Pty Ltd, Report Ref. 150-2/15-01, January 2015.

FIGURES

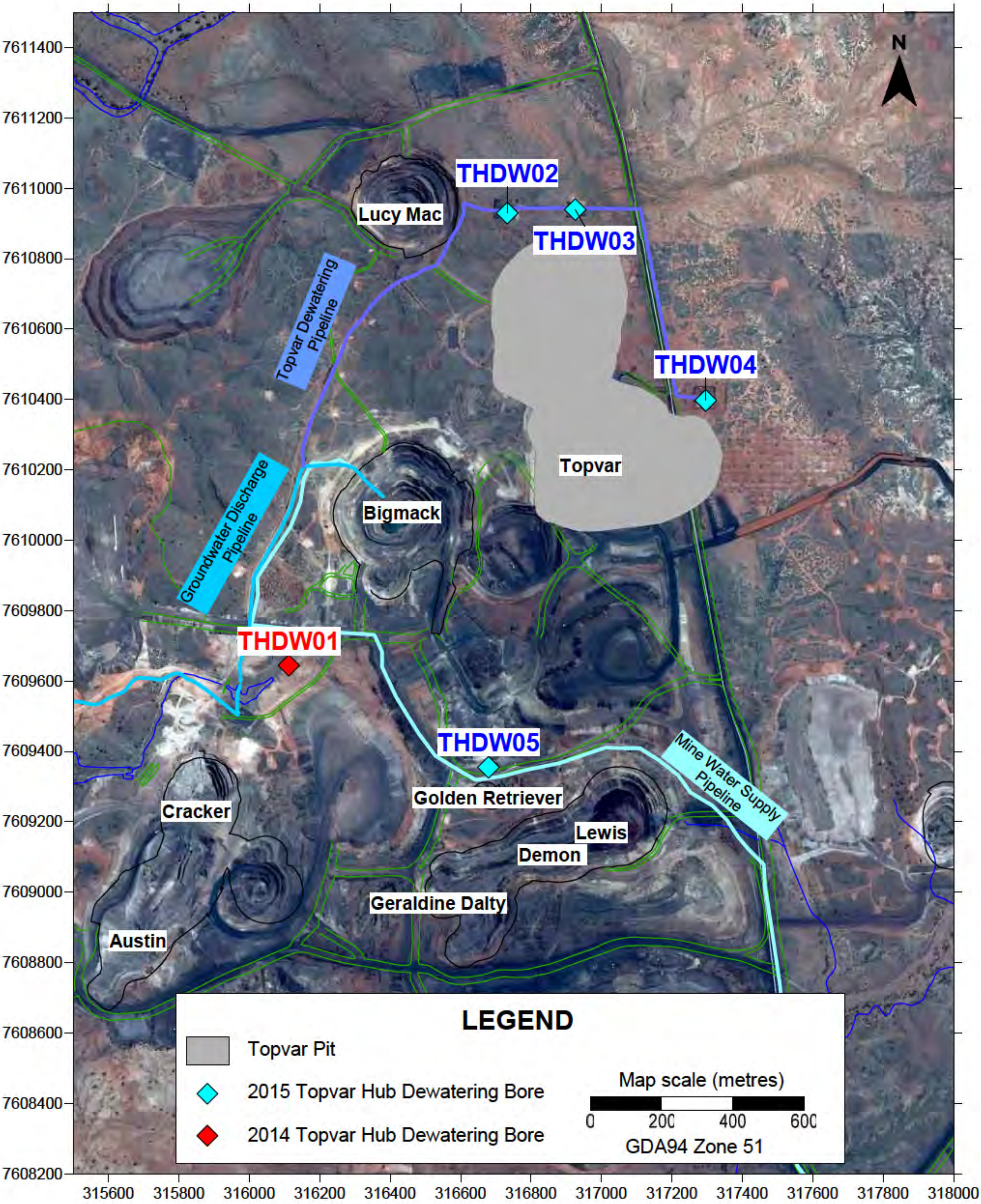
Figure 1



150-2/Surfer/16-01/Figure 01 General locality.srf

Client: Consolidated Minerals Ltd Project : Topvar Hub Dewatering Date : January 2016 Dwg. No: 150.2/16/1-1	SITE LOCALITY Rockwater PROPRIETARY LIMITED

Figure 2



150-2/Surfer/16-01/Figure 02 Bore locality.srf

Client: Consolidated Minerals Ltd

Project : Topvar Hub Dewatering

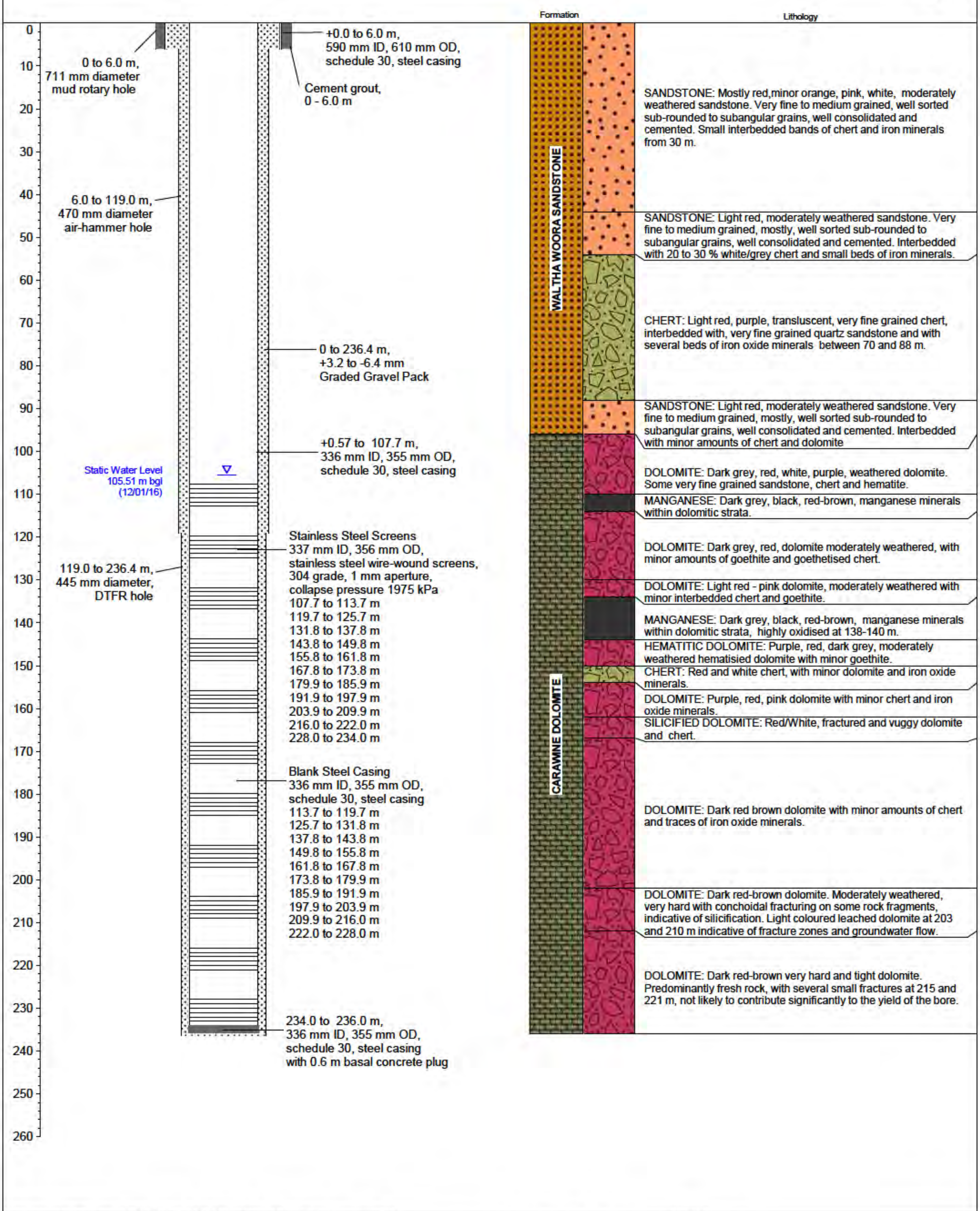
Date : January 2016

Dwg. No: 150.2/16/1-2

BORE LOCALITY MAP

Rockwater PROPRIETARY LIMITED

Figure 3



Construction Date:	04/09/2015 to 27/09/2015	Depth Drilled (m bgl):	236.4	SWL (m bgl) (January 2016):	105.51
Easting (m MGA):	316,732.7	Top of Casing (m agl):	0.31	Water Chemistry (September 2015):	738 µS/cm, 7.02 pH
Northing (m MGA):	7,610,929.3	Cased Depth (m bgl):	236.0	Airlift (L/s):	28.0
Ground Level (m AHD)	291.58	Screened Interval (m bgl):	107.7 to 234.0		

150-2/Strater/2014.12 THDW01/THDW01.str

Client: Consolidated Minerals

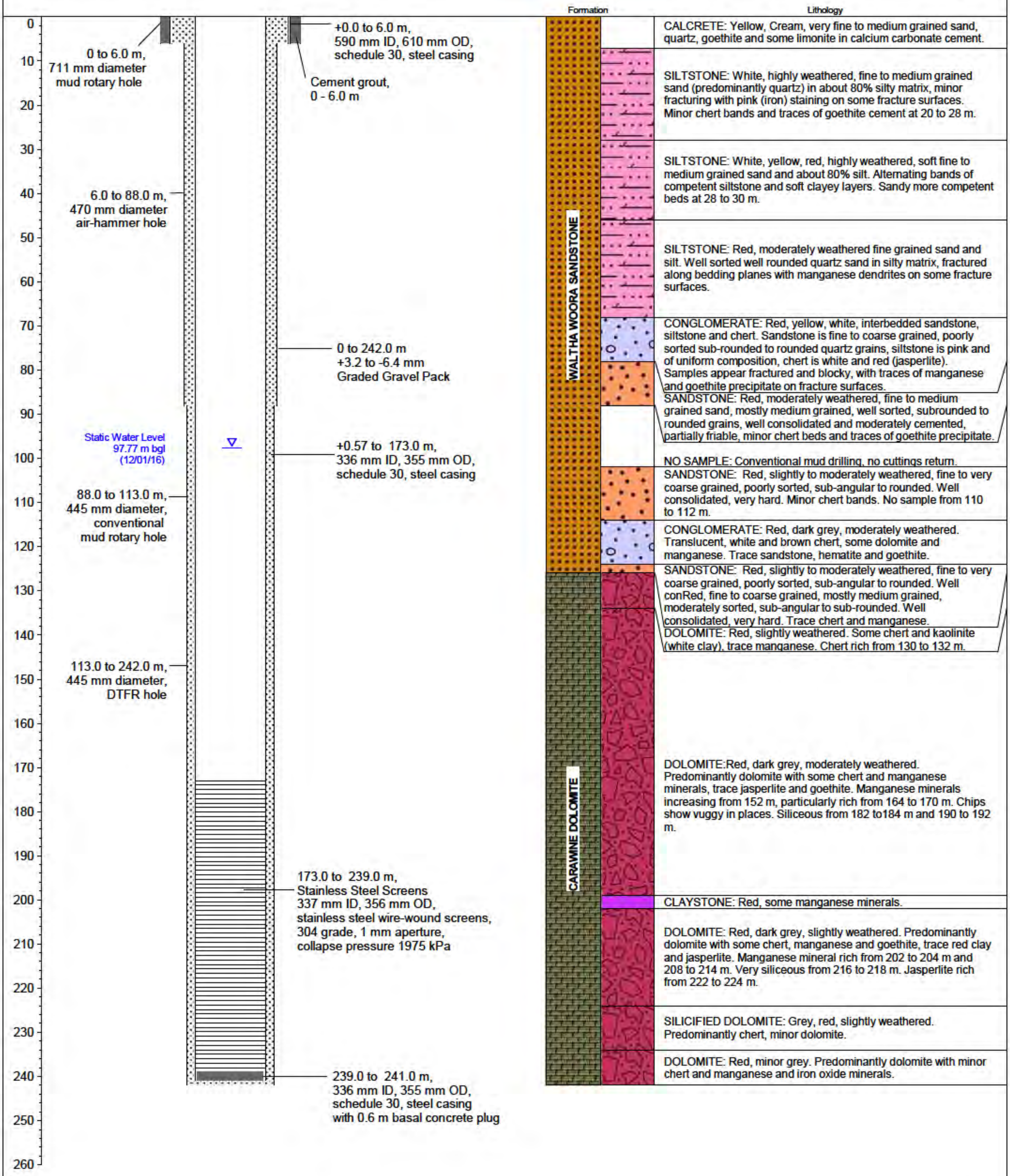
Project: Topvar Hub Dewatering - Bore Completion Report Phase 2

Date: January 2016

Dwg. No.: 150-2/16/1-3

COMPOSITE LOG
THDW02

Figure 4



Construction Date:	28/09/2015 to 17/10/2015	Depth Drilled (m bgl):	242	SWL (m bgl) (January 2016):	97.77
Easting (m MGA):	316,925.5	Top of Casing (m agl):	0.68	Water Chemistry (October 2015):	777 µS/cm; 7.05 PH
Northing (m MGA):	7,610,938.9	Cased Depth (m bgl):	241.0	Airlift (L/s):	65
Ground Level (m AHD)	283.59	Screened Interval (m bgl):	173.0 to 239.0		

150-2/Strater/2014.12 THDW01/WoodieTopva

Client: Consolidated Minerals

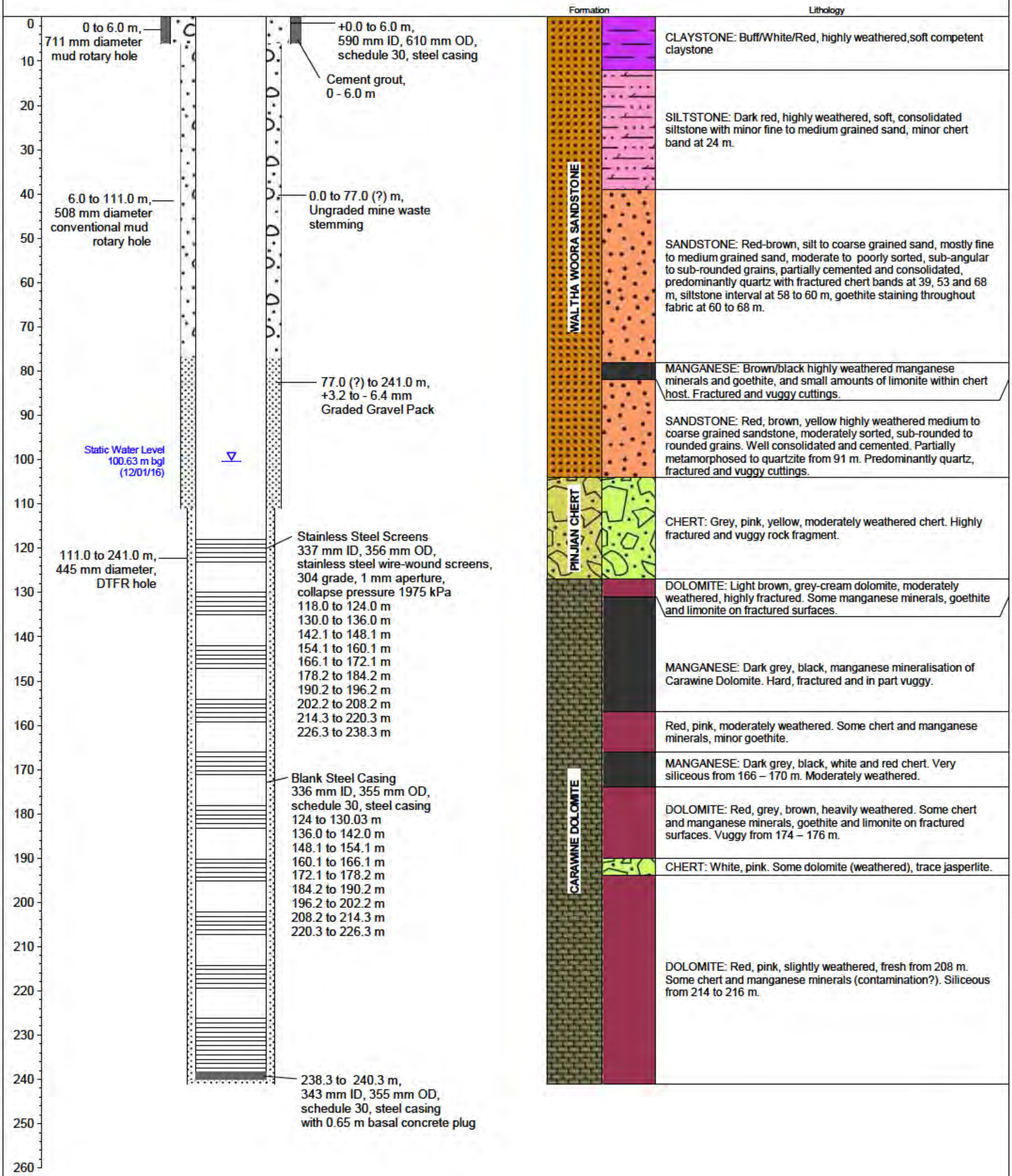
Project: Topvar Hub Dewatering - Bore Completion Report Phase 2

Date: January 2016

Dwg. No.: 150-2/16/1-4

COMPOSITE LOG
THDW03

Figure 5



Construction Date	18/10/2015 to 25/11/2015	Depth Drilled (m bgl):	241
Easting (m MGA):	317,296.0	Top of Casing (m agl):	0.41
Northing (m MGA):	7,610,397.0	Cased Depth (m bgl):	240.3
Ground Level (m AHD)	286.75	Screened Interval (m bgl):	118.0 - 238.3

SWL (m bgl) (January 2016):	100.63
Water Chemistry (November 2014):	590 mg/L TDS; pH 8.3
Airlift (L/s):	115

150-2/Strater/2014.12 THDW01/THDW01.str

Client: Consolidated Minerals

Project: Topvar Hub Dewatering - Bore Completion Report Phase 2

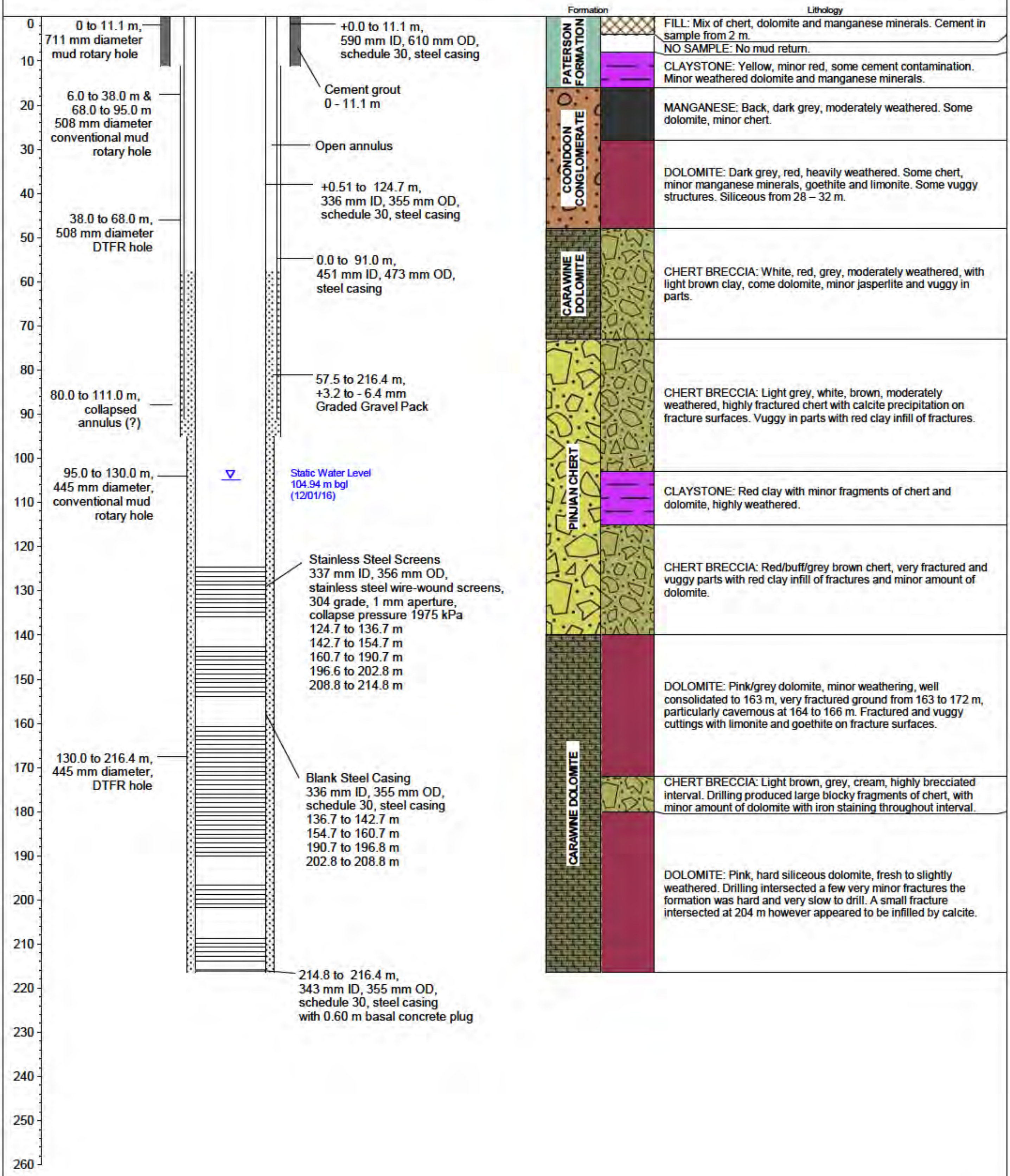
Date: January 2016

Dwg. No.: 150-2/16/1-5

COMPOSITE LOG
THDW04

Rockwater

Figure 6



Construction Date	30/10/2014 to 14/12/2014	Depth Drilled (m bgl):	216.4	SWL (m bgl) (December 2014):	104.94
Easting (m MGA):	316,679.6	Top of Casing (m agl):	0.51	Water Chemistry (November 2014):	590 mg/L TDS; pH 8.3
Northing (m MGA):	7,609,354.4	Cased Depth (m bgl):	216.4	Airlift (L/s):	~40
Ground Level (m AHD)	295.31	Screened Interval (m bgl):	124.7- 214.8		

150-2/Strater/2014.12 THDW01/THDW01.str

Client: Consolidated Minerals

Project: Topvar Hub Dewatering - Bore Completion Report Phase 2

Date: January 2016

Dwg. No.: 150-2/16/1-6

COMPOSITE LOG
THDW05

APPENDIX I

BORE COMPLETION DATA

	ROCKWATER Pty Ltd **Consultant Hydrogeologists** 76 Jersey Street, Jolimont WA 6014	**DRILLING, BORE CONSTRUCTION DATA and LITHOLOGICAL LOGS** **THDW02**

PROJECT:	TOPVAR HUB DEWATERING
STATUS:	Production Bore (unequipped)
MGA COORDINATES (GPS):	316,732.7 mE, 7,610,929.3 mN
REFERENCE POINT:	Steel flange
ELEVATION:	291.89 m AHD
DATE COMMENCED:	04/09/2015
DATE COMPLETED:	27/09/2015 (drilling completed 21/9/2015)
DRILLING CONTRACTOR	Boart Longyear
DRILLING RIG:	Schramm T130 - Dual Tube Flooded Reverse
DEPTH DRILLED:	236.4 m
DRILLING DETAILS:	0 to 6.0 m, 711 mm diameter, mud-rotary hole 6.0 to 119.0 m, 470 mm diameter, conventional air-hammer 119.0 to 236.4 m 445 mm diameter, Dual Tube Flooded Reverse (DTFR)
SURFACE CASING:	0.0 to 6.0 m, 610 mm OD, 590 mm ID (24" Sched. 30) steel casing

PRODUCTION BORE DATA – THDW02 (continued)

CASING:	+0.31to 107.7 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 107.7 to 234.0 m, 356 mm OD, 337 mm ID (14") grade 304 stainless steel wire-wound screens, 1 mm aperture. 11 x 6.0 m screens interspersed with 10 x 6.03 m 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 234.0 to 236.0 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank with 0.6 m cement plug 235.4 to 236.0.
GRAVEL PACK:	0.0 to 236.4 m +3.2 - 6.4 mm Graded Gravel Pack
STATIC WATER LEVEL (12 January 2016):	105.82 m below top of casing
AIRLIFT YIELD:	28.0 L/s
SALINITY/pH/TEMPERATURE:	738 uS/cm @ 25°C, pH 7.02

Lithology:

Depth		Lithology	Description
From	To		
0	44	SANDSTONE	Mostly, red, minor orange, pink, white, moderately weathered sandstone. Very fine to medium grained, well sorted sub-rounded to subangular grains, well consolidated and cemented. Small interbedded bands of chert and iron minerals from 30 m.
44	54	SANDSTONE	Light red, moderately weathered sandstone. Very fine to medium grained, mostly, well sorted sub-rounded to subangular grains, well consolidated and cemented. Interbedded with 20 to 30 % white/grey chert and small beds of iron minerals.
54	88	CHERT	Light red, purple, translucent, very fine grained chert,

Depth		Lithology	Description
From	To		
			interbedded with, very fine grained quartz sandstone and with, several beds of iron oxide minerals between 70 and 88 m.
88	96	SANDSTONE	Light red, moderately weathered sandstone. Very fine to medium grained, mostly, well sorted sub-rounded to subangular grains, well consolidated and cemented. Interbedded with minor amounts of chert and dolomite
96	110	DOLOMITE	Dark grey, red, white, purple, weathered dolomite. Some very fine grained sandstone, chert and hematite.
110	114	MANGANESE MINERALS	Dark grey, black, red-brown, manganese minerals within dolomitic strata.
114	130	DOLOMITE	Dark grey, red, dolomite moderately weathered, with minor amounts of goethite and goethetised chert.
130	134	DOLOMITE	Light red - pink dolomite, moderately weathered with minor interbedded chert and goethite.
134	144	MANGANESE MINERALS	Dark grey, black, red-brown, manganese minerals within dolomitic strata, highly oxidised at 138-140 m
144	150	HEMATITIC DOLOMITE	Purple, red, dark grey, moderately weathered hematisied dolomite with minor goethite.
150	154	CHERT	Red and white chert, with minor dolomite and iron oxide minerals.
154	162	DOLOMITE	Purple, red, pink some chert and iron oxide minerals,
162	167	SILICIFIED DOLOMITE	Red/White, fractured and vuggy dolomite and chert
167	202	DOLOMITE	Dark red brown dolomite with minor amounts of chert and traces of iron oxide minerals.
202	212	DOLOMITE	Dark red-brown dolomite. Moderately weathered, very hard with conchoidal fracturing on some rock fragments, indicative of silicification. Light coloured leached dolomite at 203 and 210 m indicative of fracture zones and groundwater flow.
212	236.4	DOLOMITE	Dark red-brown very hard and tight dolomite. Predominantly fresh rock, with several small fractures at 215 and 221 m, not likely to contribute significantly to the yield of the bore.
End of Hole 236.4			

	ROCKWATER Pty Ltd **Consultant Hydrogeologists** 76 Jersey Street, Jolimont WA 6014	**DRILLING, BORE CONSTRUCTION DATA and LITHOLOGICAL LOGS** **THDW03**

PROJECT:	TOPVAR HUB DEWATERING
STATUS:	Production Bore (unequipped)
MGA COORDINATES (GPS):	316,925.5 mE, 7,610,938.9 mN
REFERENCE POINT:	Steel flange
ELEVATION:	284.27 m AHD
DATE COMMENCED:	28/9/2015
DATE COMPLETED:	17/10/2015 (drilling completed 12/10/2015)
DRILLING CONTRACTOR	Boart Longyear
DRILLING RIG:	Schramm T130 - Dual Tube Flooded Reverse
DEPTH DRILLED:	242.0 m
DRILLING DETAILS:	0 to 6.0 m, 711 mm diameter, mud-rotary hole 6.0 to 88.0 m, 470 mm diameter, conventional air-hammer 88.0 to 113.0 m 445 mm diameter, conventional mud-rotary 113.0 to 242.0 m 445 mm diameter, Dual Tube Flood Reverse (DTFR)
SURFACE CASING:	0.0 to 6.0 m, 610 mm OD, 590 mm ID (24" Sched. 30) steel casing

PRODUCTION BORE DATA – THDW03 (continued)

CASING:	+0.68 to 173.0 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 173.0 to 239.0 m, 356 mm OD, 337 mm ID (14") grade 304 stainless steel wire-wound screens, 1 mm aperture. 11 x 6.0 m screens interspersed with 10 x 6.03 m 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 239.0 to 241.0 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank with 0.6 m cement plug 240.4 to 241.0.
GRAVEL PACK:	0.0 to 241.0 m +3.2 - 6.4 mm Graded Gravel Pack
STATIC WATER LEVEL (12 January 2016):	98.45 m below top of casing
AIRLIFT YIELD:	65.0 L/s
SALINITY/pH/TEMPERATURE:	777 uS/cm @ 25°C, pH 7.05

Lithology:

Depth		Lithology	Description
From	To		
0	7	CALCRETE	Yellow, Cream, very fine to medium grained sand, quartz, goethite and some limonite in calcium carbonate cement.
7	28	SILTSTONE	White, highly weathered, fine to medium grained sand (predominantly quartz) in about 80% silty matrix, minor fracturing with pink (iron) staining on some fracture surfaces. Minor chert bands and traces of goethite cement at 20 to 28 m.
28	46	SILTSTONE	White, yellow, red, highly weathered, soft fine to medium grained sand and about 80% silt. Alternating bands of competent siltstone and soft clayey layers.

Depth		Lithology	Description
From	To		
			Sandy more competent beds at 28 to 30 m.
46	68	SILTSTONE	Red, moderately weathered fine grained sand and silt. Well sorted well rounded quartz sand in silty matrix, fractured along bedding planes with manganese dendrites on some fracture surfaces.
68	78	CONGLOMERATE	Red, yellow, white, interbedded sandstone, siltstone and chert. Sandstone is fine to coarse grained, poorly sorted sub-rounded to rounded quartz grains, siltstone is pink and of uniform composition, chert is white and red (jasperlite). Samples appear fractured and blocky, with traces of manganese and goethite precipitate on fracture surfaces.
78	94	SANDSTONE	Red, moderately weathered, fine to medium grained sand, mostly medium grained, well sorted, subrounded to rounded grains, well consolidated and moderately cemented, partially friable, minor chert beds and traces of goethite precipitate.
94	102	NO SAMPLE	Conventional mud drilling, no cuttings return.
102	114	SANDSTONE	Red, slightly to moderately weathered, fine to very coarse grained, poorly sorted, sub-angular to rounded. Well consolidated, very hard. Minor chert bands. No sample from 110 to 112 m.
114	124	CONGLOMERATE	Red, dark grey, moderately weathered. Translucent, white and brown chert, some dolomite and manganese. Trace sandstone, hematite and goethite.
124	126	SANDSTONE	Red, fine to coarse grained, mostly medium grained, moderately sorted, sub-angular to sub-rounded. Well consolidated, very hard. Trace chert and manganese.
126	134	QUARTZITE	Red, slightly weathered. Some chert and kaolinite (white clay), trace manganese. Chert rich from 130 to 132 m.
134	199	DOLOMITE	Red, dark grey, moderately weathered. Predominantly dolomite with some chert and manganese minerals, trace jasperlite and goethite. Manganese minerals increasing from 152 m, particularly rich from 164 to 170 m. Chips show vuggy in places. Siliceous from 182 to184 m and 190 to 192 m.
199	202	CLAYSTONE	Red, some manganese minerals.
202	224	DOLOMITE	Red, dark grey, slightly weathered. Predominantly dolomite with some chert, manganese and goethite, trace red clay and jasperlite. Manganese mineral rich

Depth		Lithology	Description
From	To		
			from 202 to 204 m and 208 to 214 m. Very siliceous from 216 to 218 m. Jasperlite rich from 222 to 224 m.
224	234	SILICIFIED DOLOMITE	Grey, red, slightly weathered. Predominantly chert, minor dolomite.
234	242	DOLOMITE	Red, minor grey. Predominantly dolomite with minor chert and manganese and iron oxide minerals.
End of Hole 242.0 m			

	ROCKWATER Pty Ltd Consultant Hydrogeologists 76 Jersey Street, Jolimont WA 6014	DRILLING, BORE CONSTRUCTION DATA and LITHOLOGICAL LOGS THDW04

PROJECT:	TOPVAR HUB DEWATERING
STATUS:	Production Bore (unequipped)
MGA COORDINATES (GPS):	317,296.0 mE, 7,610,397.0 mN
REFERENCE POINT:	Steel flange
ELEVATION:	287.16 m AHD (12/01/16)
DATE COMMENCED:	18/10/2015
DATE COMPLETED:	25/11/2015 (drilling completed 18/11/2015)
DRILLING CONTRACTOR	Boart Longyear
DRILLING RIG:	Schramm T130 - Dual Tube Flooded Reverse
DEPTH DRILLED:	241.0 m
DRILLING DETAILS:	0 to 6.0 m, 711 mm diameter, mud-rotary hole 6.0 to 111.0 m, 508 mm diameter, conventional mud-rotary 111.0 to 241.0 m 445 mm diameter, Dual Tube Flood Reverse (DTFR)
SURFACE CASING:	0.0 to 6.0 m, 610 mm OD, 590 mm ID (24" Sched. 30) steel casing

PRODUCTION BORE DATA – THDW04 (continued)

CASING:	+0.41 to 118.0 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank
	118.00 to 238.3 m, 356 mm OD, 337 mm ID (14") grade 304 stainless steel wire-wound screens, 1 mm aperture. 11 x 6.0 m screens interspersed with 10 x 6.03 m 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank
	238.3 to 240.3 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank with 0.6 m cement plug 239.7 to 240.3.
GRAVEL PACK:	0.0 to ~80.4 m Mine waste stemming (variable diameter)
	~80.4 to 241.0 m +3.2 - 6.4 mm Graded Gravel Pack
STATIC WATER LEVEL (12 January 2016):	101.04 m below top of casing
AIRLIFT YIELD:	~40.0 L/s
SALINITY/pH/TEMPERATURE:	Data unavailable at the time of report writing

Lithology:

Depth		Lithology	Description
From	To		
0	12	CLAYSTONE	Buff/White/Red, highly weathered, soft competent claystone.
12	39	SILTSTONE	Dark red, highly weathered, soft, consolidated siltstone with minor fine to medium grained sand, minor chert band at 24 m.
39	41	CHERT	Red/grey, hard, fractured chert band, within highly a weathered siltstone matrix.
41	50	SANDSTONE	Dark red, silt to medium grained sand, mostly fine grained sand, moderately sorted, sub-angular to sub-rounded grains, partially cemented and consolidated, predominantly quartz with small fractured chert bands.
50	53	CHERT	White/ red/ grey hard, fractured chert band within highly weathered siltstone matrix.
53	58	SANDSTONE	Dark brown/red medium to coarse grained sandstone, moderately sorted, sub-rounded to rounded grains. Well consolidated and cemented, predominantly quartz with goethite precipitation throughout fabric. Moderately weathered and fractured.
58	60	SILTSTONE	Dark red, highly weathered, soft, consolidated siltstone with traces of very fine grained quartz sand.
60	68	SANDSTONE	Red-brown medium to coarse grained sandstone, moderately sorted, sub-angular to rounded grains. Well consolidated and cemented, predominantly quartz with some goethite precipitation, fractured and vuggy.
68	70	CHERT	Grey/ white/ red, highly fractured chert band with traces of goethite on fracture surfaces.
70	78	SANDSTONE	Red-brown highly weathered fine to medium grained sandstone, moderately sorted, sub-rounded to rounded grains. Well consolidated and cemented, predominantly quartz, fractured and vuggy.
78	82	MANGANESE MINERALS	Brown/black highly weathered manganese minerals and goethite, and small amounts of limonite within chert host. Fractured and vuggy with minor amount of limonite.
82	91	SANDSTONE	Red, brown, yellow highly weathered medium to coarse grained sandstone, moderately sorted, sub-rounded to rounded grains. Well consolidated and cemented. Fractured rock fragments with goethite, limonite and manganese minerals on fracture surfaces.

Depth From	Depth To	Lithology	Description
91	104	SANDSTONE	Pink/Grey medium to coarse grained sandstone, mostly coarse grained, well sorted, sub-rounded to rounded grains. Well consolidated and cemented and partially metamorphosed to quartzite. Large fractured rock fragments with limonite precipitation on some fracture surfaces.
104	127	CHERT	Grey, pink, yellow, moderately weathered chert. Highly fractured and vuggy rock fragments with limonite precipitation on fracture surfaces and minor dolomite bands.
127	131	DOLOMITE	Light brown, grey-cream dolomite, moderately weathered, highly fractured. Some manganese minerals, goethite and limonite on fracture surfaces.
131	157	MANGANESE MINERALS	Dark grey, black, manganese mineralisation of Carawine Dolomite. Hard, fractured and in part vuggy. Botryoidal mineral texture observed on some cuttings, indicative of fractured ground.
157	166	DOLOMITE	Red, pink, moderately weathered. Some chert and manganese minerals, minor goethite.
166	174	MANGANESE MINERALS	Dark grey, black, white and red chert. Very siliceous from 166 – 170 m. Moderately weathered.
174	190	DOLOMITE	Red, grey, brown, heavily weathered. Some chert and manganese minerals, goethite and limonite on fractured surfaces at 174-176 m.
190	194	CHERT	White, pink. Some dolomite (weathered), trace jasperlite.
194	241	DOLOMITE	Red, pink, slightly weathered, fresh from 208 m. Some chert and manganese minerals (potentially due to sample-contamination). Siliceous from 214 to 216 m.
End of Hole 241.0 m			

	ROCKWATER Pty Ltd Consultant Hydrogeologists 76 Jersey Street, Jolimont WA 6014	DRILLING, BORE CONSTRUCTION DATA and LITHOLOGICAL LOGS THDW05

PROJECT:	TOPVAR HUB DEWATERING
STATUS:	Production Bore (unequipped)
MGA COORDINATES (GPS):	316,679.6 mE, 7,609,354.4 mN
REFERENCE POINT:	Steel flange
ELEVATION:	295.82 m AHD (12/01/16)
DATE COMMENCED:	27/11/2015
DATE COMPLETED:	07/01/2016 (drilling completed 18/12/2015)
DRILLING CONTRACTOR	Boart Longyear
DRILLING RIG:	Schramm T130 - Dual Tube Flooded Reverse
DEPTH DRILLED:	216.4 m
DRILLING DETAILS:	0 to 11.1 m, 711 mm diameter, mud-rotary hole 6.0 to 38.0 m, 508 mm diameter, conventional mud-rotary 38.0 to 68.0 m, 508 mm diameter, Dual Tube Flood Reverse (DTFR) 68.0 to 95.0 m, 508 mm diameter, conventional mud-rotary 95.0 to 130.0 m, 445 mm diameter, conventional mud-rotary

PRODUCTION BORE DATA – THDW05 (continued)

DRILLING DETAILS	130.0 to 216.4 m 445 mm diameter, DTFR
SURFACE CASING:	0.0 to 11.10 m, 610 mm OD, 590 mm ID (24" Sched. 30) steel casing
CONDUCTOR CASING:	0.0 to 91.0 m,473 mm OD, 451 mm ID (18 5/8") steel casing
CASING:	+0.51 to 124.7 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 124.7 to 214.8 m, 356 mm OD, 337 mm ID (14") grade 304 stainless steel wire-wound screens, 1 mm aperture. 11 x 6.0 m screens interspersed with 10 x 6.03 m 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank 214.8 to 216.4 m, 356 mm OD, 336 mm ID (14" Sched. 30) steel casing, blank with 0.6 m cement plug 215.8 to 216.4.
GRAVEL PACK:	57.5 to 216.4 m +3.2 - 6.4 mm Graded Gravel Pack
STATIC WATER LEVEL (12 January 2016):	105.45 m below top of casing
AIRLIFT YIELD:	~40.0 L/s
SALINITY/pH/TEMPERATURE:	944 uS/cm @ 25°C, 590 mg/L TDS/ pH 8.3

PRODUCTION BORE DATA – THDW05 (continued)

Lithology:

Depth		Lithology	Description
From	**To**		
0	4	FILL	Mix of chert, dolomite and manganese minerals. Cement in sample from 2 m.
4	8	NO SAMPLE	
8	16	CLAYSTONE	Yellow, minor red, some cement contamination. Minor weathered dolomite and manganese minerals.
16	28	MANGANESE MINERALS	Back, dark grey, moderately weathered. Some dolomite, minor chert.
28	48	DOLOMITE	Dark grey, red, heavily weathered. Some chert, minor manganese minerals, goethite and limonite. Some vuggy structures. Siliceous from 28 – 32 m.
48	73	CHERT BRECCIA	White, red, grey, moderately weathered, with light brown clay, come dolomite, minor jasperlite and vuggy in parts.
73	103	CHERT BRECCIA	Light grey, white, brown, moderately weathered, highly fractured chert with calcite precipitation on fracture surfaces. Vuggy in parts with red clay infill of fractures.
103	115	CLAYSTONE	Red clay with minor fragments of chert and dolomite, highly weathered.
115	140	CHERT BRECCIA	Red/buff/grey brown chert, very fractured and vuggy parts with red clay infill of fractures and minor amount of dolomite.
140	172	DOLOMITE	Pink/grey dolomite, minor weathering, well consolidated to 163 m, very fractured ground from 163 to 172 m, particularly cavernous at 164 to 166 m. Fractured and vuggy cuttings with limonite and goethite on fracture surfaces.
172	180	CHERT BRECCIA	Light brown, grey, cream, highly brecciated interval. Drilling produced large blocky fragments of chert, with minor amount of dolomite with iron staining throughout interval.
180	216.4	DOLOMITE	Pink, hard siliceous dolomite, fresh to slightly weathered. Drilling intersected a few very minor fractures the formation was hard and very slow to drill. A small fracture intersected at 204 m however appeared to be infilled by calcite.
End of Hole 216.4 m			

APPENDIX II

BORE CONSTRUCTION LICENCE

Government of Western Australia
Department of Water

looking after all our water needs

Our ref: RF8835
Enquiries: [redacted]
Tel:

[redacted]
Pilbara Manganese Pty Ltd
PO Box 1220
WEST PERTH WA 6872

[redacted]

Re: Issue of a licence under the *Rights in Water and Irrigation Act 1914*
Property: M45/430, M45/431 and M45/639

Please find enclosed the following:

- Your licence to construct or alter a well *(CAW181047)*

Please take time to read these documents as they contain important information about your rights and responsibilities.

It was noted during assessment that there are registered sites of Aboriginal Heritage Significance within the project area. Please be advised that it is your responsibility to ensure appropriate consultation with any affected Traditional Owners and adequate referral to the Department of Indigenous Affairs (DIA) is made, to ensure full compliance with the *Aboriginal Heritage Act 1972.*

It was also identified that there are Priority Threatened Fauna (mammals) located within the project area. Please be advised that you are required to contact the Department of Environment and Conservation on (08) 9182 2000 for further advice prior to taking out the activities.

If you have any queries about this or any other water licensing matter please contact the Karratha office on 9144 0200.

Yours sincerely,

[redacted]

19 May 2015

Pilbara Region
Lot 4608 Cherratta Road KIE
Karratha Western Australia 6714
PO Box 836 Karratha Western Australia 6714
Telephone (08) 9144 0200 Facsimile (08) 9144 2610
www.water.wa.gov.au

File No: RF8835

Government of **Western Australia**
Department of **Water**

Instrument No. CAW181047(1)

LICENCE TO CONSTRUCT OR ALTER WELL

Granted by the Minister under section 26D of the Rights in Water and Irrigation Act 1914

Licensee(s)	Pilbara Manganese Pty Ltd	
Description of Water Resource	Pilbara Hamersley - Fractured Rock	
Location of Well(s)	M45/430, M45/431, M45/639	
Authorised Activities	**Activity**	**Location of Activity**
	Construct 8 non-artesian well(s).	M45/430, M45/431, M45/639
Duration of Licence	From 19 May 2015 to 18 May 2017	

This Licence is subject to the following terms, limitations and conditions:

1 The well must be constructed by a driller having a current class 1 water well drillers certificate issued by the Western Australian branch of the Australian Drilling Industry Association or equivalent certification recognised nationally by the Australian Drilling Industry Association.

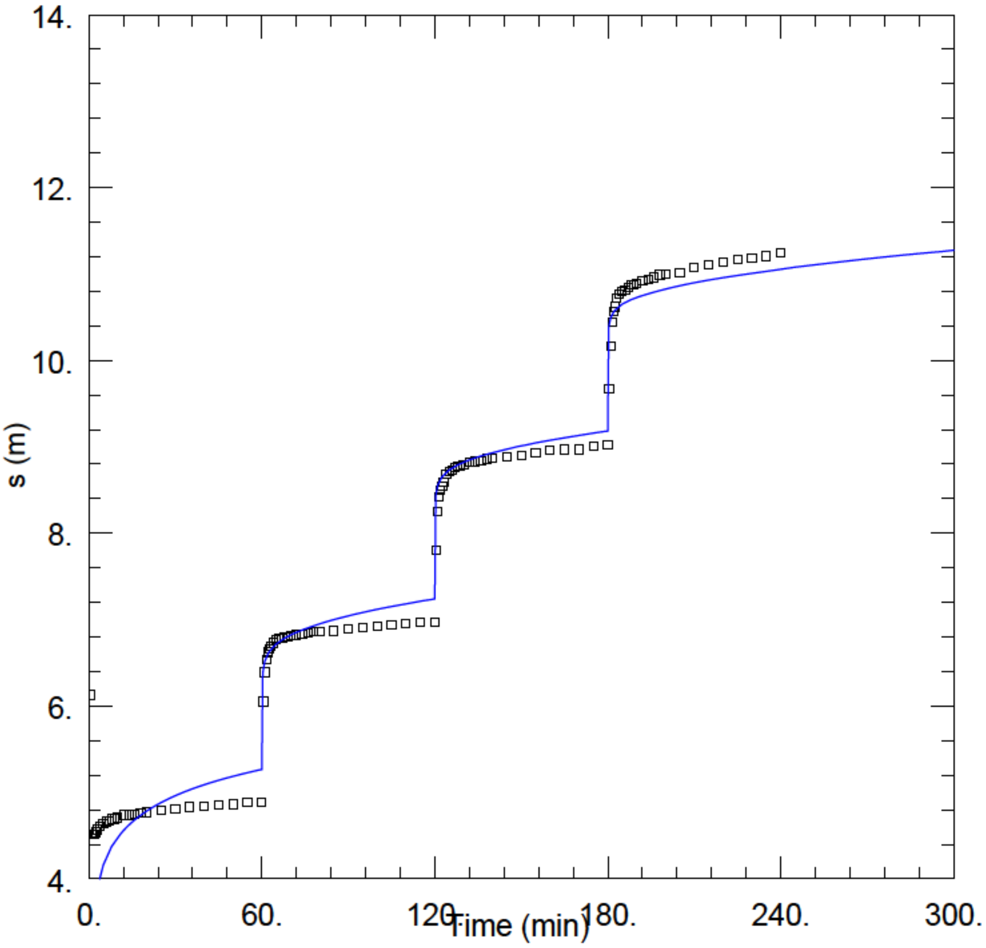
2 No well shall be constructed within 400 metres of an existing well without the written permission of the owner of that well.

End of terms, limitations and conditions

This Licence is granted subject to the Rights in Water and Irrigation Regulations 2000.

APPENDIX III

PUMPING TEST ANALYSES



THDW02 STEP RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW02
Test Date: 30/10/15

AQUIFER DATA

Saturated Thickness: 162. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW02	7610929.338	316732.723

Observation Wells

Well Name	X (m)	Y (m)
□ THDW02	7610929.338	316732.723

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 700. m^2/day
Kz/Kr = 1.
r(w) = 0.25 m
C = 0.08686 min^2/m^5

S = 0.0005821
Sw = -2.334
r(c) = 0.16 m
P = 2.5

Step Test Model: Jacob-Rorabaugh
Time (t) = 1. min Rate (Q) in cu. m/min

$s(t) = 0.9023Q + 0.08686Q^{2.5}$
W.E. = 98.97% (Q from last step)

Data Set: I:\150-2\Data\Test Pumping\THDW02\THDW02 SRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 30/10/15
Test Well: THDW02

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW02

X Location: 7610929.338 m
Y Location: 316732.723 m

Casing Radius: 0.16 m
Well Radius: 0.25 m

Fully Penetrating Well

No. of pumping periods: 4

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	44.5	60.	54.77	120.	64.02	180.	72.11

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW02

X Location: 7610929.338 m
Y Location: 316732.723 m

Radial distance from THDW02: 0. m

Fully Penetrating Well

No. of Observations: 104

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	6.13	40.	4.84	78.	6.86	129.	8.78	184.	10.77
1.	4.51	45.	4.85	80.	6.86	130.	8.79	185.	10.8
1.5	4.51	50.	4.86	85.	6.87	132.	8.82	186.	10.82
2.	4.52	55.	4.88	90.	6.89	134.	8.83	187.	10.85
2.5	4.54	60.	4.89	95.	6.91	136.	8.84	188.	10.87
3.	4.57	60.5	6.05	100.	6.93	138.	8.86	189.	10.88
4.	4.61	61.	6.39	105.	6.94	140.	8.87	190.	10.89
5.	4.64	61.5	6.54	110.	6.95	145.	8.89	192.	10.92
6.	4.66	62.	6.62	115.	6.97	150.	8.9	194.	10.94
7.	4.67	62.5	6.66	120.	6.97	155.	8.93	196.	10.96
8.	4.69	63.	6.69	120.5	7.8	160.	8.96	198.	10.99
9.	4.69	64.	6.73	121.	8.25	165.	8.97	200.	11.
10.	4.71	65.	6.77	121.5	8.42	170.	8.97	205.	11.02
12.	4.74	66.	6.78	122.	8.5	175.	9.01	210.	11.08
14.	4.74	67.	6.78	122.5	8.54	180.	9.02	215.	11.11
16.	4.75	68.	6.8	123.	8.59	180.5	9.67	220.	11.14
18.	4.76	69.	6.8	124.	8.68	181.	10.17	225.	11.17
20.	4.77	70.	6.81	125.	8.72	181.5	10.45	230.	11.19
25.	4.79	72.	6.82	126.	8.73	182.	10.57	235.	11.21
30.	4.81	74.	6.83	127.	8.76	182.5	10.62	240.	11.24
35.	4.83	76.	6.85	128.	8.77	183.	10.72		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	700.	m^2/day
S	0.0005821	
Kz/Kr	1.	
Sw	-2.334	
r(w)	0.25	m
r(c)	0.16	m
C	0.08686	min^2/m^5
P	2.5	

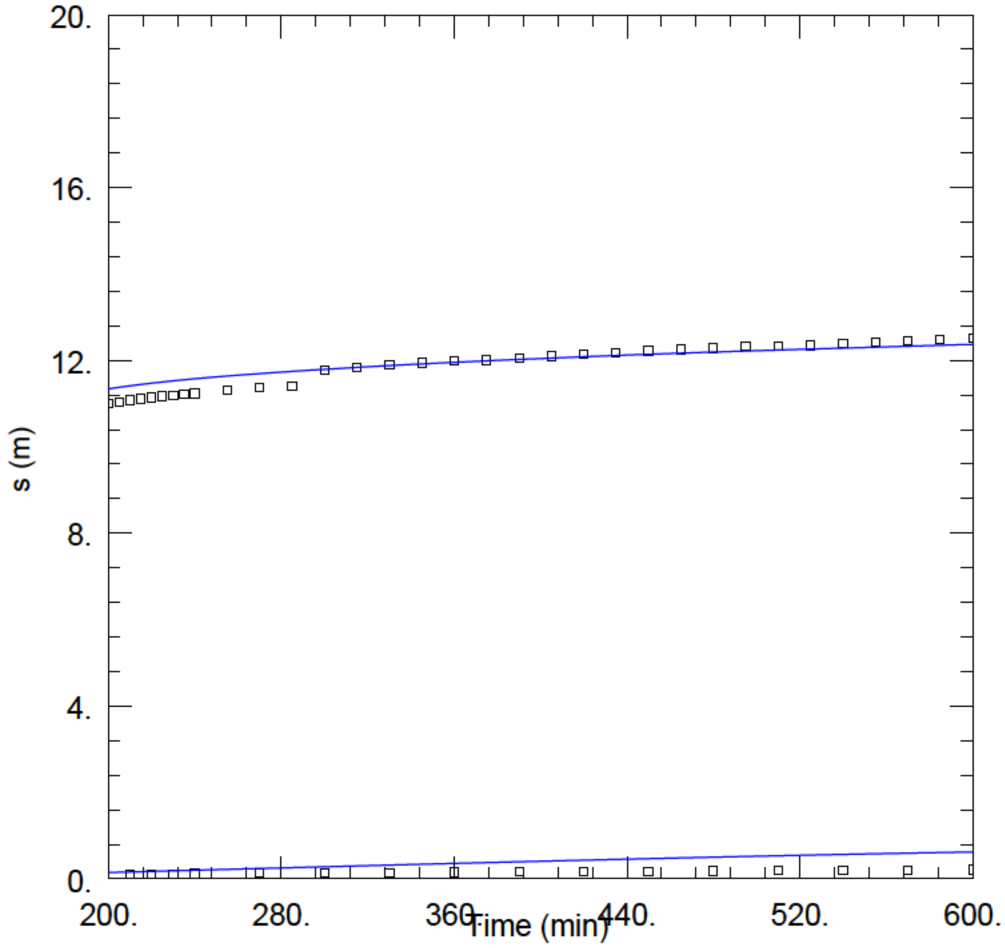
K = T/b = 4.321 m/day (0.005001 cm/sec)
Ss = S/b = 3.593E-6 1/m

STEP TEST ANALYSIS RESULTS

Jacob-Rorabaugh Step Test Model: $s(t) = BQ + CQ^P$
t = 1.min
Q in cu.m/min
B = 0.9023
C = 0.08686
P = 2.5

Eden-Hazel Step Test Model: $s(t) = (a + b\log_{10}(t))Q + CQ^P$
Q in cu.m/min
a = 1.688
b = 0.377
C = 0.08686
P = 2.5

Well Efficiency: 98.97% (Q from last step)



THDW02 CONSTANT RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW02
Test Date: 30/10/15

AQUIFER DATA

Saturated Thickness: 162. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW02	7610929.338	316732.723

Observation Wells

Well Name	X (m)	Y (m)
□ THDW03	7610938.938	316925.491
□ THDW02	7610929.338	316732.723

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 700. m^2/day
Kz/Kr = 1.
r(w) = 0.168 m

S = 0.00912
Sw = 0.1975
r(c) = 0.168 m

Data Set: I:\150-2\Data\Test Pumping\THDW02\THDW02 CRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 30/10/15
Test Well: THDW03

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW02

X Location: 7610929.338 m
Y Location: 316732.723 m

Casing Radius: 0.168 m
Well Radius: 0.168 m

Partially Penetrating Well
Depth to Top of Screen: 30. m
Depth to Bottom of Screen: 162. m

No. of pumping periods: 4

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	44.5	60.	54.77	120.	64.02	180.	72.11

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: THDW03

X Location: 7610938.938 m
Y Location: 316925.491 m

Radial distance from THDW02: 193.0068958 m

Partially Penetrating Well
Depth to Top of Screen: 96. m
Depth to Bottom of Screen: 162. m

No. of Observations: 35

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
10.	0.03	80.	0.06	150.	0.09	230.	0.11	420.	0.17
20.	0.04	90.	0.06	160.	0.09	240.	0.12	450.	0.17
30.	0.04	100.	0.07	170.	0.1	270.	0.13	480.	0.18
40.	0.04	110.	0.07	180.	0.1	300.	0.14	510.	0.19
50.	0.05	120.	0.07	190.	0.1	330.	0.14	540.	0.2
60.	0.05	130.	0.08	210.	0.11	360.	0.15	570.	0.2
70.	0.06	140.	0.08	220.	0.11	390.	0.16	600.	0.21

Observation Well No. 2: THDW02

X Location: 7610929.338 m
Y Location: 316732.723 m

Radial distance from THDW02: 0. m

Partially Penetrating Well
Depth to Top of Screen: 30. m
Depth to Bottom of Screen: 162. m

No. of Observations: 127

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
1.	4.51	61.	6.39	121.	8.25	181.	10.17	270.	11.36
1.5	4.51	61.5	6.54	121.5	8.42	181.5	10.45	285.	11.41
2.	4.52	62.	6.62	122.	8.5	182.	10.57	300.	11.78
2.5	4.54	62.5	6.66	122.5	8.54	182.5	10.62	315.	11.83
3.	4.57	63.	6.69	123.	8.59	183.	10.72	330.	11.89
4.	4.61	64.	6.73	124.	8.68	184.	10.77	345.	11.94
5.	4.64	65.	6.77	125.	8.72	185.	10.8	360.	11.99
6.	4.66	66.	6.78	126.	8.73	186.	10.82	375.	12.01
7.	4.67	67.	6.78	127.	8.76	187.	10.85	390.	12.06
8.	4.69	68.	6.8	128.	8.77	188.	10.87	405.	12.1
9.	4.69	69.	6.8	129.	8.78	189.	10.88	420.	12.14
10.	4.71	70.	6.81	130.	8.79	190.	10.89	435.	12.17
12.	4.74	72.	6.82	132.	8.82	192.	10.92	450.	12.22
14.	4.74	74.	6.83	134.	8.83	194.	10.94	465.	12.25
16.	4.75	76.	6.85	136.	8.84	196.	10.96	480.	12.28
18.	4.76	78.	6.86	138.	8.86	198.	10.99	495.	12.33
20.	4.77	80.	6.86	140.	8.87	200.	11.	510.	12.34

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
25.	4.79	85.	6.87	145.	8.89	205.	11.02	525.	12.35
30.	4.81	90.	6.89	150.	8.9	210.	11.08	540.	12.4
35.	4.83	95.	6.91	155.	8.93	215.	11.11	555.	12.42
40.	4.84	100.	6.93	160.	8.96	220.	11.14	570.	12.46
45.	4.85	105.	6.94	165.	8.97	225.	11.17	585.	12.49
50.	4.86	110.	6.95	170.	8.97	230.	11.19	600.	12.51
55.	4.88	115.	6.97	175.	9.01	235.	11.21		
60.	4.89	120.	6.97	180.	9.02	240.	11.24		
60.5	6.05	120.5	7.8	180.5	9.67	255.	11.31		

SOLUTION

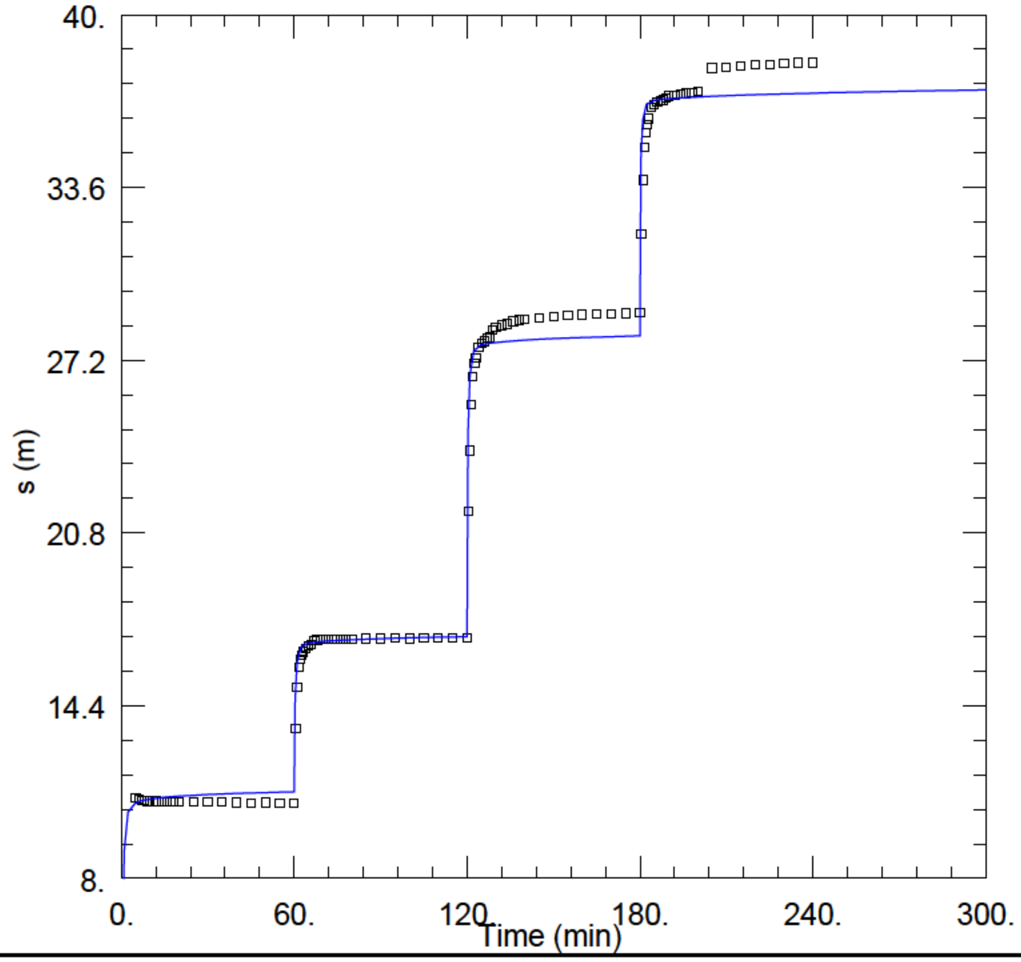
Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	700.	m^2/day
S	0.00912	
Kz/Kr	1.	
Sw	0.1975	
r(w)	0.168	m
r(c)	0.168	m

K = T/b = 4.321 m/day (0.005001 cm/sec)
Ss = S/b = 5.63E-5 1/m



THDW03 STEP RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW03
Test Date: 1/11/15

AQUIFER DATA

Saturated Thickness: 162. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW03	7610938.938	316925.491

Observation Wells

Well Name	X (m)	Y (m)
□ THDW03	7610938.938	316925.491

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 1239.6 m^2/day
Kz/Kr = 1.
r(w) = 0.25 m
C = 0.3856 min^2/m^5

S = 0.001
Sw = 8.785
r(c) = 0.16 m
P = 2.701

Step Test Model: Jacob-Rorabaugh
Time (t) = 1. min Rate (Q) in cu. m/min

$s(t) = 5.255Q + 0.3856Q^{2.701}$
W.E. = 41.7% (Q from last step)

Data Set: I:\150-2\Data\Test Pumping\THDW03\THDW03 SRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 1/11/15
Test Well: THDW03

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW03

X Location: 7610938.938 m
Y Location: 316925.491 m

Casing Radius: 0.16 m
Well Radius: 0.25 m

Partially Penetrating Well
Depth to Top of Screen: 96. m
Depth to Bottom of Screen: 162. m

No. of pumping periods: 4

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	25.04	60.	34.94	120.	50.44	180.	60.47

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW03

X Location: 7610938.938 m
Y Location: 316925.491 m

Radial distance from THDW03: 0. m

Partially Penetrating Well
Depth to Top of Screen: 96. m
Depth to Bottom of Screen: 162. m

No. of Observations: 97

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
5.	10.97	61.	15.09	100.	16.89	136.	28.65	187.	36.81
6.	10.92	61.5	15.82	105.	16.9	138.	28.7	188.	36.84
7.	10.89	62.	16.13	110.	16.9	140.	28.71	189.	36.94
8.	10.87	62.5	16.27	115.	16.9	145.	28.76	190.	36.99
9.	10.86	63.	16.39	120.	16.9	150.	28.82	192.	37.01
10.	10.86	64.	16.52	120.5	21.62	155.	28.87	194.	37.05
12.	10.86	65.	16.62	121.	23.84	160.	28.89	196.	37.09
14.	10.85	66.	16.65	121.5	25.55	165.	28.9	198.	37.12
16.	10.84	67.	16.8	122.	26.58	170.	28.92	200.	37.16
18.	10.84	68.	16.84	122.5	27.07	175.	28.94	205.	38.03
20.	10.85	69.	16.85	123.	27.3	180.	28.95	210.	38.06
25.	10.82	70.	16.86	124.	27.69	180.5	31.86	215.	38.09
30.	10.82	72.	16.85	125.	27.84	181.	33.88	220.	38.15
35.	10.82	74.	16.86	126.	27.9	181.5	35.09	225.	38.17
40.	10.8	76.	16.86	127.	28.03	182.	35.62	230.	38.2
45.	10.79	78.	16.87	128.	28.06	182.5	35.93	235.	38.23
50.	10.8	80.	16.87	129.	28.3	183.	36.15	240.	38.23
55.	10.79	85.	16.89	130.	28.42	184.	36.57		
60.	10.79	90.	16.89	132.	28.49	185.	36.69		
60.5	13.55	95.	16.9	134.	28.54	186.	36.76		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1239.6	m^2/day
S	0.001	
Kz/Kr	1.	
Sw	8.785	
r(w)	0.25	m
r(c)	0.16	m
C	0.3856	min^2/m^5
P	2.701	

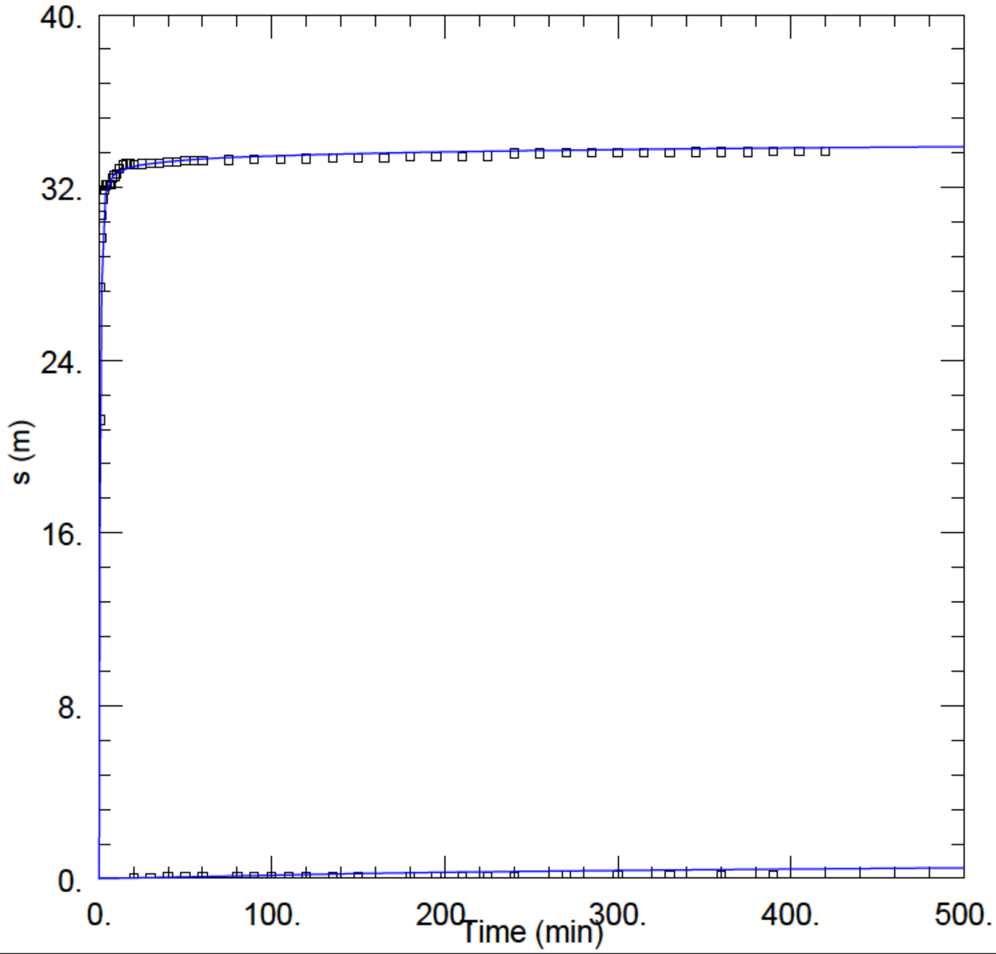
K = T/b = 7.652 m/day (0.008857 cm/sec)
Ss = S/b = 6.173E-6 1/m

STEP TEST ANALYSIS RESULTS

Jacob-Rorabaugh Step Test Model: $s(t) = BQ + CQ^P$
t = 1.min
Q in cu.m/min
B = 5.255
C = 0.3856
P = 2.701

Eden-Hazel Step Test Model: $s(t) = (a + b \log_{10}(t))Q + CQ^P$
Q in cu.m/min
a = 0.9561
b = 0.2129
C = 0.3856
P = 2.701

Well Efficiency: 41.7% (Q from last step)



THDW03 CONSTANT RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW03
Test Date: 02/11/15

AQUIFER DATA

Saturated Thickness: 162. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW03	7610938.938	316925.491

Observation Wells

Well Name	X (m)	Y (m)
THDW03	7610938.938	316925.491
THDW02	7610929.338	316732.723

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 1401.5 m^2/day
Kz/Kr = 1.
r(w) = 0.25 m

S = 0.005297
Sw = 19.92
r(c) = 0.16 m

Data Set: I:\150-2\Data\Test Pumping\THDW03\THDW03 CRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 02/11/15
Test Well: THDW03

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW03

X Location: 7610938.938 m
Y Location: 316925.491 m

Casing Radius: 0.16 m
Well Radius: 0.25 m

Partially Penetrating Well
Depth to Top of Screen: 96. m
Depth to Bottom of Screen: 162. m

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (L/sec)
0.	54.14

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: THDW03

X Location: 7610938.938 m
Y Location: 316925.491 m

Radial distance from THDW03: 0. m

Partially Penetrating Well
Depth to Top of Screen: 96. m
Depth to Bottom of Screen: 162. m

No. of Observations: 50

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	21.23	8.	32.44	35.	33.13	135.	33.36	285.	33.6
1.	27.37	9.	32.54	40.	33.17	150.	33.37	300.	33.6
1.5	29.65	10.	32.63	45.	33.19	165.	33.39	315.	33.6
2.	30.73	12.	32.89	50.	33.23	180.	33.41	330.	33.61
2.5	31.48	14.	33.06	55.	33.23	195.	33.41	345.	33.65
3.	31.87	16.	33.08	60.	33.23	210.	33.41	360.	33.65
4.	32.11	18.	33.08	75.	33.28	225.	33.46	375.	33.65
5.	32.16	20.	33.07	90.	33.3	240.	33.59	390.	33.66
6.	32.16	25.	33.09	105.	33.31	255.	33.59	405.	33.66
7.	32.15	30.	33.13	120.	33.34	270.	33.6	420.	33.66

Observation Well No. 2: THDW02

X Location: 7610929.338 m
Y Location: 316732.723 m

Radial distance from THDW03: 193.0068958 m

Fully Penetrating Well

No. of Observations: 22

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
20.	0.04	80.	0.07	135.	0.08	225.	0.1	360.	0.12
30.	0.04	90.	0.07	150.	0.08	240.	0.1	390.	0.13
40.	0.05	100.	0.07	180.	0.09	270.	0.11		
50.	0.06	110.	0.07	195.	0.1	300.	0.11		
60.	0.06	120.	0.08	210.	0.1	330.	0.12		

SOLUTION

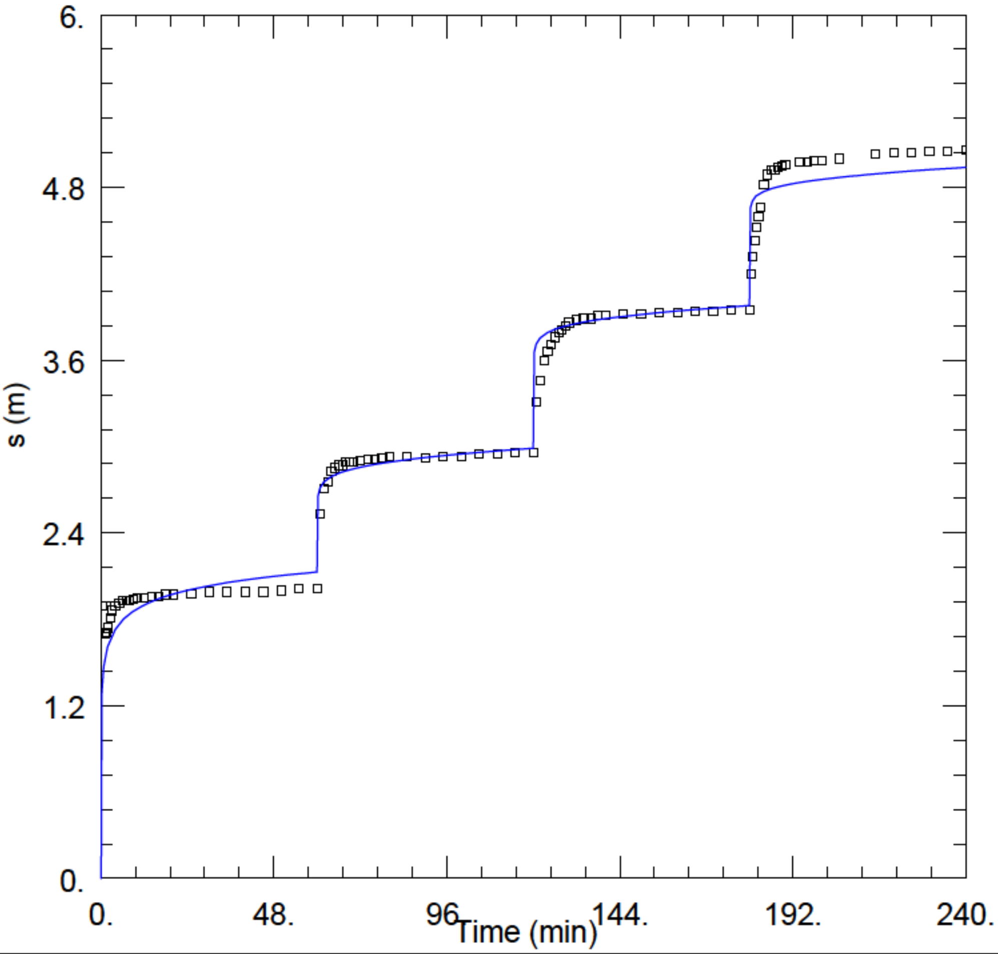
Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	1401.5	m^2/day
S	0.005297	
Kz/Kr	1.	
Sw	19.92	
r(w)	0.25	m
r(c)	0.16	m

K = T/b = 8.651 m/day (0.01001 cm/sec)
Ss = S/b = 3.27E-5 1/m



THDW04 STEP RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW04
Test Date: 16/01/16

AQUIFER DATA

Saturated Thickness: 162. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW04	1	1

Observation Wells

Well Name	X (m)	Y (m)
□ THDW04	1	1

SOLUTION

Aquifer Model: Confined

Solution Method: Dougherty-Babu

T = 2257. m^2/day
Kz/Kr = 1.
r(w) = 0.168 m
C = 0.01524 min^2/m^5

S = 0.2827
Sw = 1.095
r(c) = 0.168 m
P = 3.

Step Test Model: Jacob-Rorabaugh
Time (t) = 1. min Rate (Q) in cu. m/min

$s(t) = 0.5596Q + 0.01524Q^{3.}$
W.E. = 53.57% (Q from last step)

Data Set: I:\150-2\Data\Test Pumping\THDW04\THDW04 SRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 16/01/16
Test Well: THDW04

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW04

X Location: 1. m
Y Location: 1. m

Casing Radius: 0.168 m
Well Radius: 0.168 m

Partially Penetrating Well
Depth to Top of Screen: 17.37 m
Depth to Bottom of Screen: 137.7 m

No. of pumping periods: 4

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	39.12	60.	50.23	120.	61.62	180.	71.13

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW04

X Location: 1. m
Y Location: 1. m

Radial distance from THDW04: 0. m

Partially Penetrating Well
Depth to Top of Screen: 17.37 m
Depth to Bottom of Screen: 137.7 m

No. of Observations: 96

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	1.89	35.	1.99	80.	2.93	134.	3.89	186.	4.92
1.	1.7	40.	1.99	85.	2.93	136.	3.89	187.	4.92
1.5	1.71	45.	1.99	90.	2.92	138.	3.91	188.	4.94
2.	1.74	50.	2.	95.	2.93	140.	3.91	189.	4.95
2.5	1.81	55.	2.01	100.	2.93	145.	3.92	190.	4.96
3.	1.86	60.	2.01	105.	2.95	150.	3.92	194.	4.98
4.	1.89	61.	2.53	110.	2.95	155.	3.93	196.	4.98
5.	1.91	62.	2.71	115.	2.96	160.	3.93	198.	4.99
6.	1.93	63.	2.75	120.	2.96	165.	3.94	200.	4.99
7.	1.93	64.	2.83	121.	3.31	170.	3.94	205.	5.
8.	1.93	65.	2.85	122.	3.46	175.	3.95	215.	5.03
9.	1.94	66.	2.87	123.	3.6	180.	3.95	220.	5.04
10.	1.95	67.	2.87	124.	3.66	180.5	4.2	225.	5.04
12.	1.95	68.	2.89	125.	3.71	181.	4.32	230.	5.05
14.	1.96	69.	2.89	126.	3.76	181.5	4.43	235.	5.05
16.	1.96	70.	2.89	127.	3.79	182.	4.52	240.	5.06
18.	1.97	72.	2.9	128.	3.81	182.5	4.6		
20.	1.97	74.	2.91	129.	3.84	183.	4.66		
25.	1.98	76.	2.91	130.	3.86	184.	4.82		
30.	1.99	78.	2.92	132.	3.88	185.	4.89		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	2257.	m^2/day
S	0.2827	
Kz/Kr	1.	
Sw	1.095	
r(w)	0.168	m
r(c)	0.168	m
C	0.01524	min^2/m^5
P	3.	

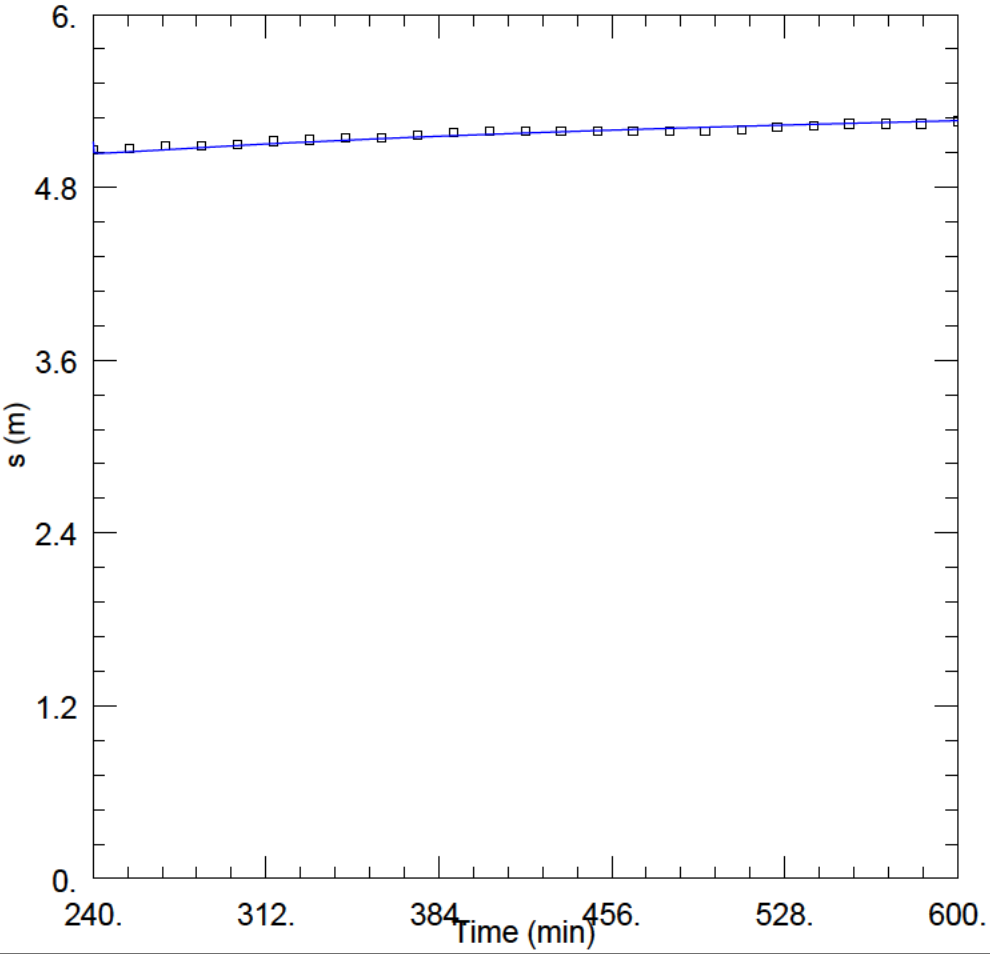
K = T/b = 13.93 m/day (0.01613 cm/sec)
Ss = S/b = 0.001745 1/m

STEP TEST ANALYSIS RESULTS

Jacob-Rorabaugh Step Test Model: $s(t) = BQ + CQ^P$
t = 1.min
Q in cu.m/min
B = 0.5596
C = 0.01524
P = 3.

Eden-Hazel Step Test Model: $s(t) = (a + b \log_{10}(t))Q + CQ^P$
Q in cu.m/min
a = 0.3093
b = 0.1169
C = 0.01524
P = 3.

Well Efficiency: 53.57% (Q from last step)



~~THDW04 CONSTANT RATE PUMPING TEST ANALYSIS~~

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW04
Test Date: 16/01/16

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW04	1	1

Observation Wells

Well Name	X (m)	Y (m)
□ THDW04	1	1

SOLUTION

Aquifer Model: Confined
Solution Method: Dougherty-Babu

T = 2257. m^2/day
Kz/Kr = 1.
r(w) = 0.168 m
S = 0.0001
Sw = 0.4592
r(c) = 0.168 m

Data Set: I:\150-2\Data\Test Pumping\THDW04\THDW04 CRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 16/01/16
Test Well: THDW04

AQUIFER DATA

Saturated Thickness: 162. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW04

X Location: 1. m
Y Location: 1. m

Casing Radius: 0.168 m
Well Radius: 0.168 m

Partially Penetrating Well
Depth to Top of Screen: 17.37 m
Depth to Bottom of Screen: 137.7 m

No. of pumping periods: 5

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	39.12	60.	50.23	120.	61.62	180.	71.13	240.	69.75

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW04

X Location: 1. m
Y Location: 1. m

Radial distance from THDW04: 0. m

Partially Penetrating Well
Depth to Top of Screen: 17.37 m
Depth to Bottom of Screen: 137.7 m

No. of Observations: 121

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	1.89	60.	2.01	122.	3.46	182.	4.52	300.	5.1
1.	1.7	61.	2.53	123.	3.6	182.5	4.6	315.	5.12
1.5	1.71	62.	2.71	124.	3.66	183.	4.66	330.	5.13
2.	1.74	63.	2.75	125.	3.71	184.	4.82	345.	5.14
2.5	1.81	64.	2.83	126.	3.76	185.	4.89	360.	5.14
3.	1.86	65.	2.85	127.	3.79	186.	4.92	375.	5.16
4.	1.89	66.	2.87	128.	3.81	187.	4.92	390.	5.18
5.	1.91	67.	2.87	129.	3.84	188.	4.94	405.	5.19
6.	1.93	68.	2.89	130.	3.86	189.	4.95	420.	5.19
7.	1.93	69.	2.89	132.	3.88	190.	4.96	435.	5.19
8.	1.93	70.	2.89	134.	3.89	192.	4.85	450.	5.19
9.	1.94	72.	2.9	136.	3.89	194.	4.98	465.	5.19
10.	1.95	74.	2.91	138.	3.91	196.	4.98	480.	5.19
12.	1.95	76.	2.91	140.	3.91	198.	4.99	495.	5.19
14.	1.96	78.	2.92	145.	3.92	200.	4.99	510.	5.2
16.	1.96	80.	2.93	150.	3.92	205.	5.	525.	5.22
18.	1.97	85.	2.93	155.	3.93	215.	5.03	540.	5.23
20.	1.97	90.	2.92	160.	3.93	220.	5.04	555.	5.24
25.	1.98	95.	2.93	165.	3.94	225.	5.04	570.	5.24
30.	1.99	100.	2.93	170.	3.94	230.	5.05	585.	5.24
35.	1.99	105.	2.95	175.	3.95	235.	5.05	600.	5.26
40.	1.99	110.	2.95	180.	3.95	240.	5.06		
45.	1.99	115.	2.96	180.5	4.2	255.	5.07		
50.	2.	120.	2.96	181.	4.32	270.	5.09		
55.	2.01	121.	3.31	181.5	4.43	285.	5.09		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Dougherty-Babu

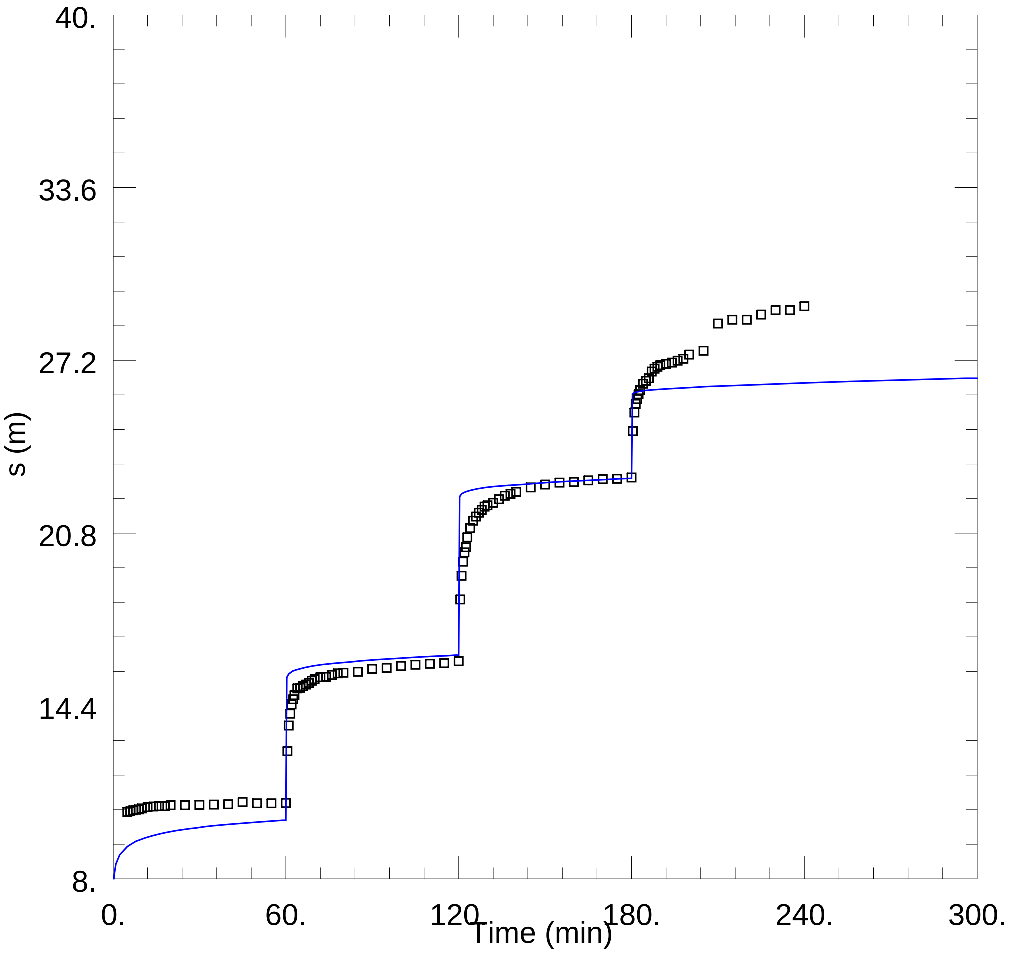
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	2257.	m^2/day
S	0.0001	
Kz/Kr	1.	

Sw	0.4592	
r(w)	0.168	m
r(c)	0.168	m

K = T/b = 13.93 m/day (0.01613 cm/sec)
Ss = S/b = 6.173E-7 1/m



THDW05 STEP RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW05
Test Date: 13/01/16

AQUIFER DATA

Saturated Thickness: 109. m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW05	9192.346	6543.333

Observation Wells

Well Name	X (m)	Y (m)
□ THDW05	9192.346	6543.333

SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Step Test)

T = 708.8 m^2/day
Sw = -0.4189
P = 3.

S = 0.001
C = 0.2916 min^2/m^5

Step Test Model: Jacob-Rorabaugh
Time (t) = 1. min Rate (Q) in cu. m/min

$s(t) = 1.85Q + 0.2916Q^{3.}$
W.E. = 32.7% (Q from last step)

Data Set: I:\150-2\Data\Test Pumping\THDW05\THDW05 SRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 13/01/16
Test Well: THDW05

AQUIFER DATA

Saturated Thickness: 109. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW05

X Location: 9192.346 m
Y Location: 6543.333 m

Casing Radius: 0.17 m
Well Radius: 0.17 m

Partially Penetrating Well
Depth to Top of Screen: 19. m
Depth to Bottom of Screen: 109. m

No. of pumping periods: 4

Pumping Period Data

Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)	Time (min)	Rate (L/sec)
0.	40.19	60.	50.91	120.	59.57	180.	63.41

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW05

X Location: 9192.346 m
Y Location: 6543.333 m

Radial distance from THDW05: 0. m

Partially Penetrating Well
Depth to Top of Screen: 19. m
Depth to Bottom of Screen: 109. m

No. of Observations: 97

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
5.	10.47	61.	13.67	100.	15.88	136.	22.19	187.	26.79
6.	10.49	61.5	14.11	105.	15.92	138.	22.26	188.	26.89
7.	10.53	62.	14.45	110.	15.96	140.	22.33	189.	26.96
8.	10.55	62.5	14.64	115.	15.98	145.	22.49	190.	27.02
9.	10.57	63.	14.8	120.	16.06	150.	22.6	192.	27.07
10.	10.6	64.	15.05	120.5	18.34	155.	22.67	194.	27.12
12.	10.65	65.	15.07	121.	19.22	160.	22.7	196.	27.19
14.	10.67	66.	15.13	121.5	19.74	165.	22.76	198.	27.26
16.	10.68	67.	15.19	122.	20.09	170.	22.8	200.	27.42
18.	10.69	68.	15.25	122.5	20.28	175.	22.82	205.	27.56
20.	10.72	69.	15.33	123.	20.65	180.	22.86	210.	28.57
25.	10.72	70.	15.39	124.	20.99	180.5	24.58	215.	28.71
30.	10.73	72.	15.46	125.	21.26	181.	25.27	220.	28.71
35.	10.75	74.	15.48	126.	21.41	181.5	25.59	225.	28.9
40.	10.76	76.	15.55	127.	21.56	182.	25.77	230.	29.06
45.	10.84	78.	15.6	128.	21.66	182.5	25.94	235.	29.06
50.	10.79	80.	15.63	129.	21.78	183.	26.1	240.	29.2
55.	10.79	85.	15.67	130.	21.83	184.	26.33		
60.	10.8	90.	15.77	132.	21.92	185.	26.44		
60.5	12.72	95.	15.81	134.	22.06	186.	26.54		

SOLUTION

Pumping Test
Aquifer Model: Confined
Solution Method: Theis (Step Test)

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	708.8	m^2/day
S	0.001	
Sw	-0.4189	
C	0.2916	min^2/m^5
P	3.	

K = T/b = 6.503 m/day (0.007527 cm/sec)
Ss = S/b = 9.174E-6 1/m

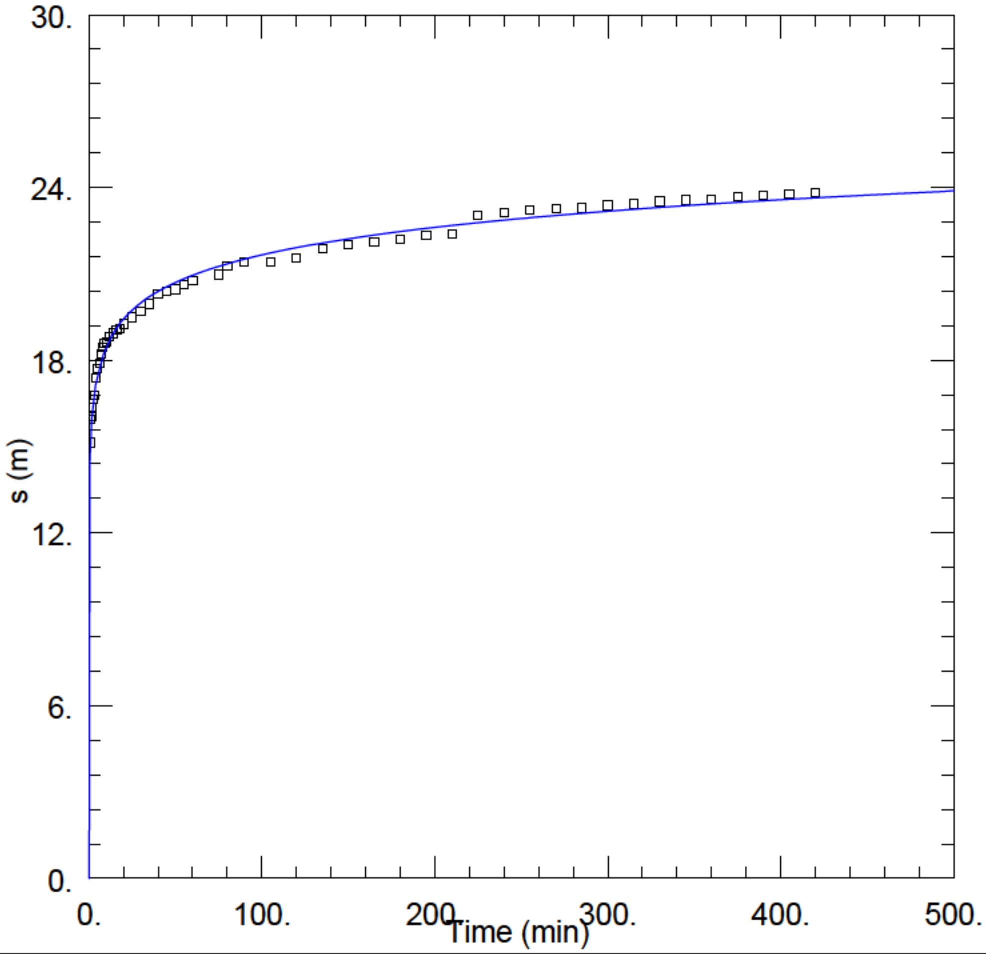
STEP TEST ANALYSIS RESULTS

Jacob-Rorabaugh Step Test Model: $s(t) = BQ + CQ^P$

$t = 1.\text{min}$
Q in cu.m/min
$B = 1.85$
$C = 0.2916$
$P = 3.$

Eden-Hazel Step Test Model: $s(t) = (a + b \log_{10}(t))Q + CQ^P$
Q in cu.m/min
$a = 1.706$
$b = 0.3723$
$C = 0.2916$
$P = 3.$

Well Efficiency: 32.7% (Q from last step)



THDW05 CONSTANT RATE PUMPING TEST ANALYSIS

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Well: THDW05
Test Date: 14/10/15

AQUIFER DATA

Saturated Thickness: 109. m

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
THDW05	316679.6	7609354.4

Observation Wells

Well Name	X (m)	Y (m)
□ THDW05	316679.6	7609354.4

SOLUTION

Aquifer Model: Fractured

Solution Method: Gringarten (Vertical)

Kx = 9.174 m/day
Ky/Kx = 0.08633

Ss = 8.58E-7 m^{-1}
Lf = 2.065 m

Data Set: I:\150-2\Data\Test Pumping\THDW05\THDW05 CRT.aqt

PROJECT INFORMATION

Company: Rockwater
Client: Cons Mins
Project: 150-2
Location: Woodie Woodie
Test Date: 14/10/15
Test Well: THDW05

AQUIFER DATA

Saturated Thickness: 109. m
Anisotropy Ratio (Kz/Kr): 0.001
Slab Block Thickness: 1. m
Spherical Block Diameter: 1. m
Fracture Length: 2.065 m
Fracture Radius: 98.03 m

PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: THDW05

X Location: 316679.6 m
Y Location: 7609354.4 m

Casing Radius: 0.2849 m
Well Radius: 0.02801 m

Partially Penetrating Well
Depth to Top of Screen: 19. m
Depth to Bottom of Screen: 109. m

No. of pumping periods: 1

Pumping Period Data

Time (min)	Rate (L/sec)
0.	59.08

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: THDW05

X Location: 316679.6 m
Y Location: 7609354.4 m

Radial distance from THDW05: 0. m

Partially Penetrating Well
Depth to Top of Screen: 19. m
Depth to Bottom of Screen: 109. m

No. of Observations: 51

Observation Data

Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	15.13	9.	18.59	45.	20.39	165.	22.11	330.	23.52
1.	15.94	10.	18.64	50.	20.47	180.	22.21	345.	23.57
1.5	16.03	12.	18.83	55.	20.64	195.	22.32	360.	23.58
2.	16.37	14.	18.93	60.	20.77	210.	22.38	375.	23.67
2.5	16.64	16.	19.04	75.	20.97	225.	23.05	390.	23.74
3.	16.79	18.	19.11	80.	21.29	240.	23.13	405.	23.76
4.	17.38	20.	19.26	90.	21.4	255.	23.22	420.	23.83
5.	17.7	25.	19.49	105.	21.4	270.	23.26		
6.	17.88	30.	19.7	120.	21.55	285.	23.29		
7.	18.23	35.	19.96	135.	21.89	300.	23.38		
8.	18.45	40.	20.31	150.	22.01	315.	23.43		

SOLUTION

Pumping Test
Aquifer Model: Fractured
Solution Method: Gringarten-Witherspoon w/vertical fracture

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
Kx	9.174	m/day
Ss	8.58E-7	m^{-1}
Ky/Kx	0.08633	
Lf	2.065	m

K = 0.01062 cm/sec
T = K*b = 1000. m²/day (115.7 sq. cm/sec)

APPENDIX IV

LABORATORY CERTIFICATES

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CERTIFICATE OF ANALYSIS 173868

Client:
Consolidated Minerals Ltd
PO Box 1220
WEST PERTH
WA 6872

Attention: [redacted]

Sample log in details:

Your Reference:	**Woodie Woodie**
No. of samples:	2 Water
Date samples received:	24/11/2015
Date completed instructions received:	24/11/2015
Location:	

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last pages of this report for any comments relating to the results.

Report Details:

Date results requested by:	30/11/15
Date of Preliminary Report:	Not issued
Issue Date:	30/11/15

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025.
Tests not covered by NATA are denoted with *.

Results Approved By:

[redacted]

ACCREDITED FOR TECHNICAL COMPETENCE

Miscellaneous Inorganics			
Our Reference:	UNITS	173868-1	173868-2
Your Reference	-------------	THDW02 Topvar Dewatering Hub Bore 2	THDW03 Topvar Dewatering Hub Bore 3
Inviron ID	------------	161874	161875
Date Sampled		30/10/2015	30/10/2015
Type of sample		Water	Water
Date prepared	-	25/11/2015	25/11/2015
Date analysed	-	25/11/2015	25/11/2015
pH	pH Units	7.9	8.0
Total Dissolved Solids (grav)	mg/L	400	420
Total Nitrogen	mg/L	2.5	2.2
Ammonia as N	mg/L	<0.005	0.007

Client Reference: Woodie Woodie

Ionic Balance			
Our Reference:	UNITS	173868-1	173868-2
Your Reference	-------------	THDW02	THDW03
		Topvar Dewatering Hub Bore 2	Topvar Dewatering Hub Bore 3
Inviron ID	------------	161874	161875
Date Sampled		30/10/2015	30/10/2015
Type of sample		Water	Water
Date prepared	-	24/11/2015	24/11/2015
Date analysed	-	24/11/2015	24/11/2015
Calcium - Dissolved	mg/L	47	52
Potassium - Dissolved	mg/L	3.0	2.8
Magnesium - Dissolved	mg/L	38	41
Sodium - Dissolved	mg/L	73	67
Bicarbonate HCO_3 as $CaCO_3$	mg/L	310	330
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	<5	<5
Hydroxide OH^- as $CaCO_3$	mg/L	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	310	330
Chloride	mg/L	43	40
Sulphate	mg/L	20	15
Ionic Balance	%	6.2	5.5
Hardness as $CaCO_3$	mg/L	270	300

Dissolved Metals in Water			
Our Reference:	UNITS	173868-1	173868-2
Your Reference	-------------	THDW02 Topvar Dewatering Hub Bore 2	THDW03 Topvar Dewatering Hub Bore 3
Inviron ID	------------	161874	161875
Date Sampled		30/10/2015	30/10/2015
Type of sample		Water	Water
Date prepared	-	27/11/2015	27/11/2015
Date analysed	-	27/11/2015	27/11/2015
Silica*	mg/L	34	39
Aluminium-Dissolved	mg/L	<0.01	<0.01
Iron-Dissolved	mg/L	<0.01	<0.01
Manganese-Dissolved	mg/L	<0.005	<0.005

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode base on APHA latest edition, Method 4500-H+. Please note that the results for water analyses may be indicative only, as analysis can be completed outside of the APHA recommended holding times. Soils are reported from a 1:5 water extract unless otherwise specified.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±5°C
INORG-055	Total Nitrogen by colourimetric analysis based on APHA 4500-P J, 4500-NO3 F.
INORG-057	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
METALS-020	Metals in soil and water by ICP-OES.
INORG-006	Alkalinity - determined titrimetrically based on APHA latest edition, Method 2320-B. Soils reported from a 1:5 water extract unless otherwise specified.
INORG-081	Anions - a range of anions are determined by Ion Chromatography based on APHA latest edition Method 4110 -B. Soils and other sample types reported from a water extract unless otherwise specified (standard soil extract ratio 1:5).
INORG-040	Ion Balance Calculation: Cations in water by ICP-OES; Anions in water by IC; Alkalinity in water by Titration using APHA methods.
METALS-008	Hardness calculated from Calcium and Magnesium as per APHA latest edition 2340B.
Metals-022	Determination of various metals by ICP-MS.

QUALITY CONTROL Miscellaneous Inorganics	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			25/11/2015	[NT]	[NT]	LCS-1	25/11/2015
Date analysed	-			25/11/2015	[NT]	[NT]	LCS-1	25/11/2015
pH	pH Units		INORG-001	[NT]	[NT]	[NT]	LCS-1	105%
Total Dissolved Solids (grav)	mg/L	5	INORG-018	<5	[NT]	[NT]	[NR]	[NR]
Total Nitrogen	mg/L	0.1	INORG-055	<0.1	[NT]	[NT]	LCS-1	105%
Ammonia as N	mg/L	0.005	INORG-057	<0.005	[NT]	[NT]	LCS-1	93%

QUALITY CONTROL Ionic Balance	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			24/11/2015	[NT]	[NT]	LCS-1	24/11/2015
Date analysed	-			24/11/2015	[NT]	[NT]	LCS-1	24/11/2015
Calcium - Dissolved	mg/L	0.5	METALS-020	<0.5	[NT]	[NT]	LCS-1	114%
Potassium - Dissolved	mg/L	0.5	METALS-020	<0.5	[NT]	[NT]	LCS-1	107%
Magnesium - Dissolved	mg/L	0.5	METALS-020	<0.5	[NT]	[NT]	LCS-1	109%
Sodium - Dissolved	mg/L	0.5	METALS-020	<0.5	[NT]	[NT]	LCS-1	104%
Bicarbonate HCO_3 as $CaCO_3$	mg/L	5	INORG-006	<5	[NT]	[NT]	LCS-1	106%
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	5	INORG-006	<5	[NT]	[NT]	LCS-1	106%
Total Alkalinity as $CaCO_3$	mg/L	5	INORG-006	<5	[NT]	[NT]	LCS-1	106%
Chloride	mg/L	1	INORG-081	<1	[NT]	[NT]	LCS-1	102%
Sulphate	mg/L	1	INORG-081	<1	[NT]	[NT]	LCS-1	100%
Hardness as $CaCO_3$	mg/L	3	METALS-008	3	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Dissolved Metals in Water	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			27/11/2015	[NT]	[NT]	LCS-1	27/11/2015
Date analysed	-			27/11/2015	[NT]	[NT]	LCS-1	27/11/2015
Silica*	mg/L	0.2	METALS-020	<0.2	[NT]	[NT]	LCS-1	104%
Aluminium-Dissolved	mg/L	0.01	Metals-022	<0.01	[NT]	[NT]	[NR]	[NR]
Iron-Dissolved	mg/L	0.01	Metals-022	<0.01	[NT]	[NT]	[NR]	[NR]
Manganese-Dissolved	mg/L	0.005	Metals-022	<0.005	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Ionic Balance	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	173868-1	24/11/2015
Date analysed	-	[NT]	[NT]	173868-1	24/11/2015
Calcium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Potassium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Magnesium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Sodium - Dissolved	mg/L	[NT]	[NT]	[NR]	[NR]
Bicarbonate HCO_3 as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Carbonate CO_3^{2-} as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Total Alkalinity as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]
Chloride	mg/L	[NT]	[NT]	173868-1	104%
Sulphate	mg/L	[NT]	[NT]	173868-1	103%
Hardness as $CaCO_3$	mg/L	[NT]	[NT]	[NR]	[NR]

Report Comments:

Definitions:

NT: Not tested NA: Test not required INS: Insufficient sample for this test PQL: Practical Quantitation Limit
<: Less than >: Greater than RPD: Relative Percent Difference LCS: Laboratory Control Sample
NS: Not Specified NEPM: National Environmental Protection Measure NR: Not Reported

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

APPENDIX III

2018 Modelling Report

WOODIE WOODIE MINE

NUMERICAL MODELLING OF PIT DEWATERING MAY 2018–DEC 2020

REPORT FOR
CONSOLIDATED MINERALS LIMITED

JUNE 2018

Report No 150-2/18-03

Rockwater
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

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REVISION	AUTHOR	REVIEW	AUTHORISED	ISSUED
0	MT	IBdR	PdB	6 June 2018

1. INTRODUCTION

Consolidated Minerals (CML) operates the Woodie Woodie manganese mine in the East Pilbara region of Western Australia (Figure 1). Mining operations have occurred since 1952, including various periods in Care and Maintenance. The most recent period of Care and Maintenance occurred from January 2016 to September 2017.

Woodie Woodie open pit mining operations can require extremely high rates of dewatering. For example, during the peak of mining in late 2012, about 2200 L/s of dewatering was required to keep three of the main pits sufficiently dry to enable mining.

Dewatering operations recommenced in September 2017 to facilitate the latest phase of mining. CML's dewatering planning is ongoing, with dewatering infrastructure planning requiring predictive modelling tools to assess future dewatering requirements. CML engaged Rockwater to develop a numerical model of the greater Woodie Woodie aquifer system using the FEFLOW finite-element modelling platform. This report describes the model and the results of a modelling assessment used to predict the rates of dewatering required until December 2020.

2. SITE SETTING

2.1. CLIMATE AND PHYSIOGRAPHY

Rainfall in the Woodie Woodie mining region is associated with monsoonal troughs or tropical cyclones, with the majority of rain falling from December to March. Average annual rainfall is 373 mm at the Telfer Airstrip and 426 mm at the Nifty Copper Mine. Annual pan evaporation rate at Telfer Airstrip is 4137 mm (Table 1).

Table 1 – Rainfall and evaporation data

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)[1]	63.0	100.1	71.9	19.2	19.5	13.2	12.2	4.8	2.2	3.1	15.6	48.5	373.3
Rainfall (mm)[2]	63.6	101.3	125.4	17.8	16.6	12.9	20.6	6.4	3.5	5.0	18.5	34.2	425.8
Evaporation (mm)[1]	443.3	374.1	381.3	321.0	241.8	192.0	213.9	260.4	336.0	440.2	465.0	468.1	4137

1. Source: Telfer airport (Bureau of Meteorology Site 013030, 100 km east of Woodie Woodie, 1974–2018)
2. Source: Nifty Copper Mine (Bureau of Meteorology Site 04103, 33 km east of Woodie Woodie, 1996–2013)

The Woodie Woodie mine corridor is about 3 km wide and extends from the Radio Hill pit in the north to the Canyon pit in the south (Figure 1). Topography across the corridor ranges from: about 300 m AHD in the south and east; about 280 m AHD in the north; and about 265 m AHD west of the mine on the alluvial flood plains (Figure 2).

The Woodie Woodie mine is located on the eastern margin of the Oakover Drainage Basin, with the Great Sandy Desert to the east. The upper reaches of the Oakover River are about 170 km south of the Woodie Woodie mine. The Oakover River flows north into the De Grey River. Tributaries to the Oakover River in the Woodie Woodie area include the Davis River, Warri Warri Creek, Brumby Creek, and Woodie Woodie Creek (Figure 2). Numerous semi-permanent pools and rock holes occur along the Oakover River and its tributaries, indicating a shallow depth to groundwater in these locations.

2.2. GEOLOGY AND HYDROGEOLOGY

Regional geological setting

The Woodie Woodie mining centre is located close to the eastern margin of the Pilbara Craton in the north-eastern part of the Hamersley Basin (also known as the Mount Bruce Supergroup [Williams, 1989]). At Woodie Woodie, the Hamersley Basin comprises the basal Fortescue Group, a volcano-sedimentary package, which is conformably overlain by the Carawine Dolomite (Hamersley Group) (Figure 3).

The Fortescue Group and the Carawine Dolomite were deposited in a broad extensional basin, known as the Oakover Basin, in the Woodie Woodie mining area (Figure 4). The Carawine Dolomite is overlain by a thick weathering carapace of chert breccia (Pinjian Chert Breccia), which is overlain by sedimentary breccia, conglomerate, sandstone (including the Waltha Woora Sandstone), shale and dolomite of the Manganese Subgroup.

Manganese mineralisation is likely to have a hydrothermal origin and is associated with major faulting (Jones, 2010). Mineralisation is hosted within the Carawine Dolomite, Pinjian Chert Breccia and basal sedimentary units of the Manganese Subgroup.

The Woodie Woodie region has undergone a number of orogenic and basin forming events. The geological evolution of extensional and compressional faulting has been affected by the region's proximity to the margin of the Pilbara Craton. Deep drilling and detailed mapping along the margins of the Oakover Basin suggests that the basin is a half-graben (Figure 4), with the dolomite thicknesses increasing markedly to the east (Jones, 2011). This interpretation contrasts with previous descriptions of the Oakover Basin by Hickman (1978). Jones (2011) outlines a structural framework (Figure 5; Jones [2015]) that is dominated by major NNW-trending faults connected to lesser second and third order ENE-trending faults which are typically sub-vertical to steeply dipping.

Local hydrogeology

Groundwater flow in the Woodie Woodie mine region is dominated by: faults and fractures in the Carawine Dolomite; and the highly permeable Pinjian Chert Breccia, which is highly porous and vuggy, especially where mineralised.

Mapping by CML (Figure 6) show that the base of the Pinjian Chert aquifer generally extends to 180 m RL, but is locally deeper; reaching <30 m RL at Canyon. Transmissivities in the chert of up to 1500–2000 m^2/d have been reported by GRM (2004). These data are supported by drilling data collected during the dewatering bore construction program, when transmissivities of 700–1400 m^2/d were reported (Rockwater, 2015; 2016).

Jones' (2011) interpretation of historical drilling data included a semi-quantitative assessment of aquifer properties. The assessment ascribed groundwater-inflow values based on drilling observations and other data such as minerals-exploration geophysics datasets. These data (Figure 7) show variations in hydraulic properties that broadly coincide with the mapped structural trends.

Aquifer recharge occurs via direct rainfall infiltration, with preferential recharge occurring along surface water drainage features, faults and lineaments. Recharge rates are estimated to be about 11 mm/yr (0.00003 m/d) using chloride mass balance assessments (Equation 1):

$$Recharge\ rate\ (m/yr) = \frac{Prec\ .\ Rc}{Gc}$$ **Equation 1**

where:

- **Prec.** is the long term average rainfall (about 0.4 m/yr [Section 2.1]);
- **Rc** is the rainfall chloride concentrations (3 mg/L [CSIRO, 2011]); and
- **Gc** is the groundwater chloride concentrations (110 mg/L [GRM, 2011]).

Mine-corridor scale hydraulic gradients are typically very flat, with a hydraulic gradient typically of about 0.0002 m/m beyond the influence of mine dewatering. This is largely due to the high (net) hydraulic conductivities in the Woodie Woodie aquifer system in the mine corridor.

The pre-mining water table was about 257 m AHD (GRM, 2004), with regional groundwater flow from south to north (Figure 8). In January 2018 groundwater levels were at about 190 m AHD in the mine corridor (Figure 9), based on the Woodie Woodie monitoring bore network (Figure 10).

The basal Fortescue Group, including the Jeerinah Formation and Maddina basalt, have negligible permeability and are interpreted to be aquicludes (GRM, 2004).

3. DEWATERING OPERATIONS

3.1. HISTORICAL DEWATERING

Dewatering has occurred at Woodie Woodie since the 1960s. There are limited reliable dewatering data prior to 1999. The Department of Water and Environmental Regulation's (DWER) groundwater licence allocation for dewatering purposes is 63 GL/a (groundwater licence GWL65080). Peak periods of dewatering in late 2012 (Table 2) ranked Woodie Woodie amongst the world's top ten dewatering mines. A summary of dewatering data is presented in Figure 11 (1999–2012) and Figure 12 (2012–2018).

Dewatering from the 1960s until 2015 was undertaken via sump pumping in active and abandoned mine pits. For example, in 2012 a team of over 15 dewatering personnel was employed to maintain Greensnake and Big Mack pit pontoon pumps. This process led to significant mining delays and costs.

Some attempts at bore dewatering were made prior to 2015; however, when operating, bores' contribution to dewatering was relatively small, due to their: small diameters (typically ≤200 mm ND) and therefore their reduced capacity to accommodate large-capacity submersible pumps; and the late stage at which they were commissioned relative to the commencement of mining below the water table.

Table 2 – Summary of recent historical dewatering volumes

Calendar year	Total dewatering volume (GL)
2012	42.8
2013	35.8
2014	31.2
2015	11.4
2016	5.2
2017	6.8
2018	2.8[A]

A. To the end of March 2018

Present-day dewatering infrastructure (Figure 13) includes:

- A network of five high-capacity dewatering bores (Table 3) – one (THDW01) of which was drilled in 2014 (Rockwater, 2015)] and four of which (THDW02–5) were drilled in 2015 (Rockwater, 2016).
- A pipeline system connecting the dewatering bore sites to a point of discharge along Brumby Creek. This pipeline system was commissioned in July 2015 (though the Big Mack-to-bulk supply pond pipeline was installed prior to this date).
- Pontoon pumps and associated infrastructure in Big Mack pit.

Bore THDW01 has operated since 2015, including operation during the last Care and Maintenance period (to maintain supply to the ore processing plant and assist with the operation of Warrawagine Station's centre-pivot agricultural scheme). Commissioning for dewatering bores THDW02–05's pumping infrastructure will be completed in June 2018.

Table 3 – Summary of existing production bores

Production bore	Co-ordinates[A]		Elevation (m AHD)		Bore depth[C]	Screen interval[C]	Bore yield (L/s)
	Northing	Easting	Ground level	TOC			
THDW01	315,972	7,609,489	279.3	291.9	244.0	172.0-244.0	167[B]
THDW02	316,733	7,610,929	291.9	291.9	236.0	107.7-234.0	167[B]
THDW03	316,926	7,610,939	284.3	284.3	241.0	173.0-239.0	90
THDW04	317,296	7,610,397	287.2	287.2	240.3	118.0-238.3	167[B]
THDW05	316,680	7,609,355	295.8	295.8	216.8	124.7-214.8	90

A. MGA94, Zone 51

B. Flows limited by the pump and bore infrastructure. All bore yields are based on pumping test data outlined in Rockwater (2015; 2016)

C. Units: metres below ground level

3.2. BASE-OF-PIT PROGRESSION

Woodie Woodie mine schedules are continually refined. The mine schedule for which this modelling assessment is based upon is summarised in Table 4, including key dates and depth targets to the end of 2020. Dewatering targets are currently largely driven by progression of the Topvar and Cracker pits. The most recent revision of the mine schedule requires a dewatering focus on Topvar pit, whereas the June 2017 mine schedule was more affected by Cracker pit.

Table 4 – Current forecasted mining RL requirements to 2020

Pit	Jan 2018 groundwater level (m RL)	Base of mining dates and depths	
		Date	Depth (m RL)[A]
Hunter	214	May-18[A]	189[B]
Topvar	187	Dec-20	138 *(156)*
Cracker	197	Oct-20	150 *(140)*
Chris D	~200	Dec-20	186

A. Values in brackets and italics were previously forecast in a preliminary (June 2017) mine schedule

B. Now delayed

4. NUMERICAL MODEL

4.1. PREVIOUS ASSESSMENTS

In 2012 Rockwater developed a first-stage groundwater model for Woodie Woodie dewatering assessments. This model was developed using the Visual MODFLOW modelling code (Rockwater, 2012). The Visual MODFLOW model was used for various dewatering-options assessments until 2017, by which stage the model had reached the limit of its capabilities. This capability limit was reached because: the model had reached its practical limit with respect to the number of model cells; it had overly lengthy model run times; and software limitations. The Visual MODFLOW model had a run time of about 1–2 days per dewatering scenario.

4.2. MODEL OBJECTIVE

This modelling assessment has been undertaken to assist in dewatering planning and flow predictions. New model code (FEFLOW) has been employed as opposed to an updated version of the historical model code (Visual MODFLOW) to facilitate:

- Improved representation of discrete fault structures as identified in regional- and local- scale mapping (Figure 5);
- Improved representation of extraction from point sources, such as pits and bores;
- Incorporation of data collected post-2012, including the dewatering production bores' construction data (Rockwater,2015 & 2016);
- Faster run times via the adoption of a finite element mesh; and
- Updated model-calibration, incorporating post-2012 dewatering rates and water level monitoring data.

4.3. MODEL DESCRIPTION

This assessment was undertaken using FEFLOW v2017 7.1 modelling code. FEFLOW is the industry-standard finite-element three-dimensional groundwater-flow model code. The model's supermesh extends from 280,600–323,000 mE and 7,562,700–7,643,500 mN (Figure 3) and consists of 304,236 model elements.

The model domain includes regional flow contribution from south of the Woodie Woodie region and seepage into and out of creeks which cross the model domain. Three dimensional presentations of the model structure are presented as Figure 14 and Figure 15.

The model consists of two layers:

- Layer 1 primarily represents the highly permeable Pinjian Chert Breccia. The layer-top surface is based on regional and mine-scale topographic data. The layer-bottom surface is based on CML's gridded surface representing the top of the Carawine Dolomite in the Woodie Woodie Mine area (Figure 6). The layer-bottom surface is assigned an RL of 180 m outside of the Woodie Woodie Mine area.
- Layer 2 represents the Carawine Dolomite. The base of Layer 2 extends to -100 m RL.

Interpreted fractures and lineaments (Figure 5) were incorporated into the Super-element Mesh to facilitate grid-refinement along these corridors. Interpreted faults and lineaments intersect both Layer 1 and Layer 2 in the model. Three levels of faults were incorporated and included varying fault thicknesses:

- Regional faults (200 m thickness);
- Woodie Woodie mine corridor faults (50 m thickness); and
- Topvar/Cracker region faults (25 m thickness).

The following boundary conditions were employed in the model:

- Constant head boundary conditions are set at the northern and southern boundaries, simulating the north-to-south flow of groundwater.
- Eastern and western boundaries were set as no-flow boundaries, representing the impermeable Fortescue Group.
- The main drainage systems (Figure 2) and in-pit dewatering were simulated using the fluid transfer boundary condition with ground elevation or pit level set as the reference head.
- Dewatering bore extraction was simulated using the multi-layer well code.
- Recharge was set at 0.00003 m/d (see Section 2.2) across the model domain surface.
- Pre-mining water levels (Figure 8) were used in the steady-state calibration.

Model run times are about one hour for a typical dewatering scenario, compared to 1–2 days for an equivalent dewatering scenario using the previous model platform.

4.4. MODEL CALIBRATION

Model calibration was completed in three stages (Table 5):

Table 5 – Model-calibration stages

Stage	Stage name	Stage details
1	Steady-state	Modelled steady-state pre-mining groundwater levels were compared with the interpreted pre-mining groundwater levels shown in Figure 8. Recharge was set at 0.00003 m/d and the hydraulic properties were altered to broadly match the observed groundwater head distribution.
2	Transient I (Historic dewatering)	Modelled transient heads for the period of January 1999 to March 2012 were compared with monitoring data (mining level data limited)
3	Transient II (Recent dewatering)	Modelled transient heads for the period of April 2012 to March 2018 were compared with monitoring data (mining level data reliable)

Each model-calibration stage involved a two-step process:

1. The model was initially calibrated via manual-input iterative parameter updates. Calibration was undertaken until a close correspondence between model-calculated and measured dewatering outflows and groundwater levels was achieved.

2. Further model-calibration was achieve with the assistance of parameter estimation software PEST. This tool was also used to explore model-sensitivity.

The following parameters were varied during model calibration: hydraulic conductivity, specific yield and specific storage. Recharge was not varied during model-calibration.

Calibration hydrographs for the transient model runs are presented in Appendix I. Measured versus modelled groundwater levels at the end of the historical calibration (Stage 2, Table 5) have a standardised root mean square (SRMS) error of 1.5% (Figure 16). For the recent period of calibration, the average SRMS errors were 1.4% for modelled groundwater levels and 5.7% for the modelled dewatering rates.

4.5. CALIBRATED MODEL PARAMETERS

Calibration model parameters (Table 6; Figure 17 and Figure 18 [Layer 1]; Figure 19 [Layer 2]) suggest:

- The contrast between high-transmissivity fault zones and host rock is significant.
- Low-conductivity fault/lineament zones exist west and south of the Woodie Woodie mine corridor.
- A low hydraulic conductivity zone exists in the region of monitoring bore WWMB10. This low zone represents the reduced transmissivity on the margin of the aquifer system.
- A high hydraulic conductivity zone exists in the Cracker-Big Mack-Topvar region (the 'Cracker pit region' in Table 6).

4.6. PREDICTIVE MODELLING ASSESSMENTS

The calibrated FEFLOW model was used to assess the dewatering requirements for the Cracker, Topvar and Chris D pits. Various scenarios were trialled until the dewatering targets were achieved using the least number of bores possible.

Modelled time-series groundwater levels are presented for Cracker (Figure 20), Topvar (Figure 21) and Chris D (Figure 22) pits. These data are also presented in plan view format for selected dates: December 2018 (Figure 23), December 2019 (Figure 24) and December 2020 (Figure 25). These are also presented in local (Topvar Hub) scale in Figure 26, Figure 27 and Figure 28.

The dewatering outcomes from various dewatering scenarios were assessed based on their ability to meet the mine schedules shown in Figure 20–Figure 22 and summarised in Table 4. Pumping from the five existing bores was trialled first. Additional bore locations (Table 7; Figure 9) were then chosen based on their proximity to major fault structures and Topvar and Cracker pits.

Modelled dewatering rates for existing and new dewatering bores (Table 8) are based on current pumping capacities and predicted future pumping capacities. Actual pumping rates for future bores (Table 7) will be re-assessed after bore construction and test-pumping.

Table 6 – Post-calibration model parameters

Unit	Zone	Zone ID	Layer	Hydraulic Conductivity[A] (m/d)	Specific Yield (dimensionless)	Specific Storage (1/m)
Pinjian Chert Breccia	Bulk	1	1	1	0.1	1.00E-06
	High-inflow zones[B]	2		25	0.2	1.00E-05
	Cracker pit region	3		80	0.2	1.00E-05
Carawine Dolomite	Northern model region	4	2	0.1	0.05	1.00E-06
	Mine corridor & southern region	5		0.5	0.05	1.00E-06
	Cracker pit region	6		5	0.2	1.00E-05
	Area around WWMB 10	7	1 & 2	0.005	0.05	1.00E-06
High K faults	Regional	8	1 & 2	50	0.2	1.00E-05
	Mine corridor	9		100	0.2	1.00E-05
Low K faults	Mine corridor (west)	10	1 & 2	0.001	0.05	1.00E-06
	Mine corridor (south)	11		0.1	0.05	1.00E-06

A: Horizontal hydraulic conductivity; vertical hydraulic conductivity is approximated as 10% of the horizontal hydraulic conductivity

B: Based on the interpretation shown in Figure 7

Table 7 – Modelled additional bores

Bore	mE	mN	Commencing
Topvar1	316,600	7,610,240	Mid-May 2019
Topvar2	316,545	7,609,745	
Topvar3	316,960	7,609,945	
Cracker1	315,945	7,608,865	January 2020

The predictive modelling scenarios suggest that three additional bores will be required in CY2018 to dewater the current Topvar mining target, with another bore required by January 2020 to reach the Cracker dewatering target. Dewatering extraction is expected to peak at about 1200 L/s in 2020. Modelled groundwater drawdown (Figure 23–Figure 28) is relatively broad-scale within the greater Topvar Hub region.

Table 8 – Modelled dewatering rates

Dewatering site	Details
THDW01	Pumping at 150 L/s
Big Mack (sump)	Pumping to 181 m RL
THDW03 and THDW05	Pumping at 150 L/s from mid-May 2018
THDW02 and THDW04	Pumping at 90 L/s from mid-May 2018
New bores (Table 7)	Pumping at 150 L/s per bore

4.7. MODEL PARAMETER SENSITIVITY AND UNCERTAINTY ANALYSIS

Model sensitivity and uncertainty are a function of:

- Model-construction geometries, assumptions and boundary conditions;
- Model units' hydraulic properties; and
- Aquifer heterogeneity.

Assessments of hydraulic properties' contribution to model uncertainty requires an adequate monitoring network, especially for highly heterogeneous aquifers such as the Woodie Woodie aquifer system. The Woodie Woodie monitoring network (Figure 10) is relatively sparse, considering the scale of the dewatering operations and the fracture-dominated nature of groundwater flow. Parameter sensitivity with respect to predicted dewatering rates has been undertaken by considering a variety of aquifer parameter values (Table 9) and comparing predicted dewatering rates. Dewatering rates are assessed by considering Drain cell boundary conditions that match the pit-progressions shown in Figure 20–Figure 22. The model results (Table 9) suggest that the predicted dewatering rates are most sensitive to hydraulic conductivity values. Hydraulic conductivity is extremely heterogeneous in the Woodie Woodie mining area and there is considerable uncertainty regarding its spatial representation, especially since the high values observed are difficult to test with conventional discrete-measurement methods. A nominal range of 50–200% of the adopted range of hydraulic conductivity values has been employed to assess potential output-sensitivities. This range of bulk hydraulic conductivities is likely to represent the extremity of likely bulk values, considering the magnitude of historical dewatering (Table 2) that was employed in model-calibration. Parameter uncertainty is likely to benefit from testing of the of the soon-to-be-commissioned production bores THDW02–5

Varying the bulk hydraulic conductivity of layer 2 within the mine corridor (Table 9) results in total a range of dewatering rates from +22% to -14%. The majority of historic dewatering has not extended below Pinjian Chert (model layer 1) level; therefore, only limited operational-calibration data exist for this layer.

Table 9 – Predictive dewatering parameter sensitivity

Uncertainty scenario	Change in parameter[1]	Total Extraction (GL) (2018–2020)				Change in dewatering
		Big Mack	Topvar	Cracker	Total	
Base case	-	25.1	26.6	10.7	62.4	-
Hydraulic conductivity, Zones[2] 1-11	200%	43.3	45.1	16.3	104.7	168%
	50%	14.3	17.7	6.2	38.2	61%
Hydraulic conductivity, Zone[2] 5	200%	31.2	32.8	12.0	76.1	122%
	50%	21.0	23.4	9.1	53.5	86%
Specific Yield, Zones[2] 1-11	200%	27.4	33.6	12.6	73.6	118%
	50%	22.7	23.2	9.1	55.0	88%
Specific Storage, Zones[2] 1-11	1000%	26.7	28.2	11.0	65.9	106%
	10%	24.8	26.1	10.6	61.5	99%

1. Preliminary, indicative range, based on likely parameter SD (TBC following further drilling assessments). Percentage refers to the change in the parameter from the base case value
2. As described in Table 6

4.8. ASSESSMENT OF DEWATERING METHODOLOGY BASED ON MODEL RESULTS AND MINING PARAMETERS

The model results show that a broad cone of depression will be produced by extraction from the Big Mac pit and the complement of five existing and four proposed dewatering bores. Dewatering can be achieved at a variety of locations, as long as the proposed location is within the Topvar Hub region and as long as it is connected to a high-transmissivity structure. The cone of depression should also be sufficient to allow mining of other pits within the Topvar Hub region, providing hat the total extraction rate is maintained.

Dewatering has historically occurred via sump dewatering and more recently from bores. The efficacy of these dewatering techniques is largely dictated by their impact on mining operations, including mining costs. Ex-pit dewatering bores can decouple dewatering operations from mining operations whilst sump dewatering offer a lower-CAPEX dewatering option. Other advantages of ex-pit dewatering bores are: ease of operation and maintenance of fixed-plant equipment; the ability to minimise the total extraction rate by starting to pump well before a pit reaches the water table; and the ability to lower groundwater levels to well below the pit floor, thereby increasing safety and decreasing the cost of blasting, excavation and haulage.

Dewatering bores typically require a comparatively long planning and logistics timeframe. An assessment of bore commissioning timeframes (Table 10) suggests that initial planning tasks should commence in July 2018 to achieve the dewatering targets outlined in Table 4.

Table 10 – Indicative timing assessment

Task	Weeks	From	To
Submit drilling tender & receive tender responses	4	1-Jul-18	29-Jul-18
Drill bores	12	29-Jul-18	21-Oct-18
Assess bore capacity	4	21-Oct-18	18-Nov-18
Choose pumps + supplier	4	18-Nov-18	16-Dec-18
Pump delivery timeframe	16	16-Dec-18	7-Apr-19
Pump installation and commissioning	4	7-Apr-19	5-May-19

Additional monitoring bores are recommended to: improve the model's representation of key aquifer regions and; improve dewatering-tracking and regulatory reporting. The recommended monitoring points (Table 11; Figure 10) are an initial assessment; additional monitoring locations may be required.

Table 11 – Recommended additional monitoring bore sites

Site ID	Co-ordinates (GDA94, Zn 51) mE	mN	Collar RL	SWL Jan 2018	Bore depth (m)	Comment
A	317,274	7,609,884	287	188	179	Near (dry) bore BMMB2
B	318,235	7,610,240	294	189	169	Replacement for CD Nth
C	316,529	7,612,208	289	195	144	Near WWMB02 (damaged)
D-1	317,743	7,599,248	280	234	76	Near Jewel Fault
D-2	315,449	7,595,850	320	263	97	Near Jewel Fault

Further model-recalibration and assessments are recommended in the five existing bores' post-commissioning months and after the drilling, construction and testing of the additional proposed bores.

5. SUMMARY AND CONCLUSIONS

The 2018 FEFLOW model is based on an updated representation of the Woodie Woodie aquifer system and uses a mesh that is better suited to the modelling of flow within discrete fracture zones. Model run times are about one hour for a typical dewatering scenario, compared to 1–2 days for an equivalent dewatering scenario with the previous model platform. This updated modelling capability enables better options-assessments for dewatering scenarios.

Model-calibration was performed in steady-state and via transient dewatering data from 1999 onwards (dewatering volumes and monitoring data). The calibration workflow included parameter estimation via PEST code. Model results have SRMS errors of 1.5% (calibration to 2012), 1.4% (calibration to 2012–2017) and 5.7% (calibration to pumping rates).

Predictive modelling scenarios suggest that three additional production bores will be required in CY2018 to achieve the current Topvar pit dewatering target, with another bore being required by January 2020 to reach the Cracker pit dewatering target. Dewatering extraction is expected to peak at about 1200 L/s in 2020. Modelled groundwater drawdown is relatively broad-scale within the greater Topvar Hub region. Mine planning can therefore benefit from mutual-interference dewatering. Dewatering can be achieved at a variety of locations, as long as the proposed location is within the Topvar Hub region and as long as it is connected to a high-transmissivity structure.

Dewatering has historically occurred via sump dewatering and more recently via bore dewatering. The efficacy of dewatering techniques is largely dictated by their impact on mining operations, including mining costs. Ex-pit dewatering bores can decouple dewatering operations from mining operations, although sump dewatering offers a lower-CAPEX dewatering option

Dewatering bores typically require a comparatively long planning and logistics timeframe. An assessment of bore commissioning timeframes suggests that initial planning tasks should commence in July 2018 to achieve the Topvar Hub dewatering targets.

Additional monitoring bores are recommended to improve the model's representation of key aquifer regions, and improve dewatering-tracking and regulatory reporting.

Dated: 6 June 2018

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Rockwater Pty Ltd

Ian Brandes

Ian Brandes de Roos
Principal Hydrogeologist

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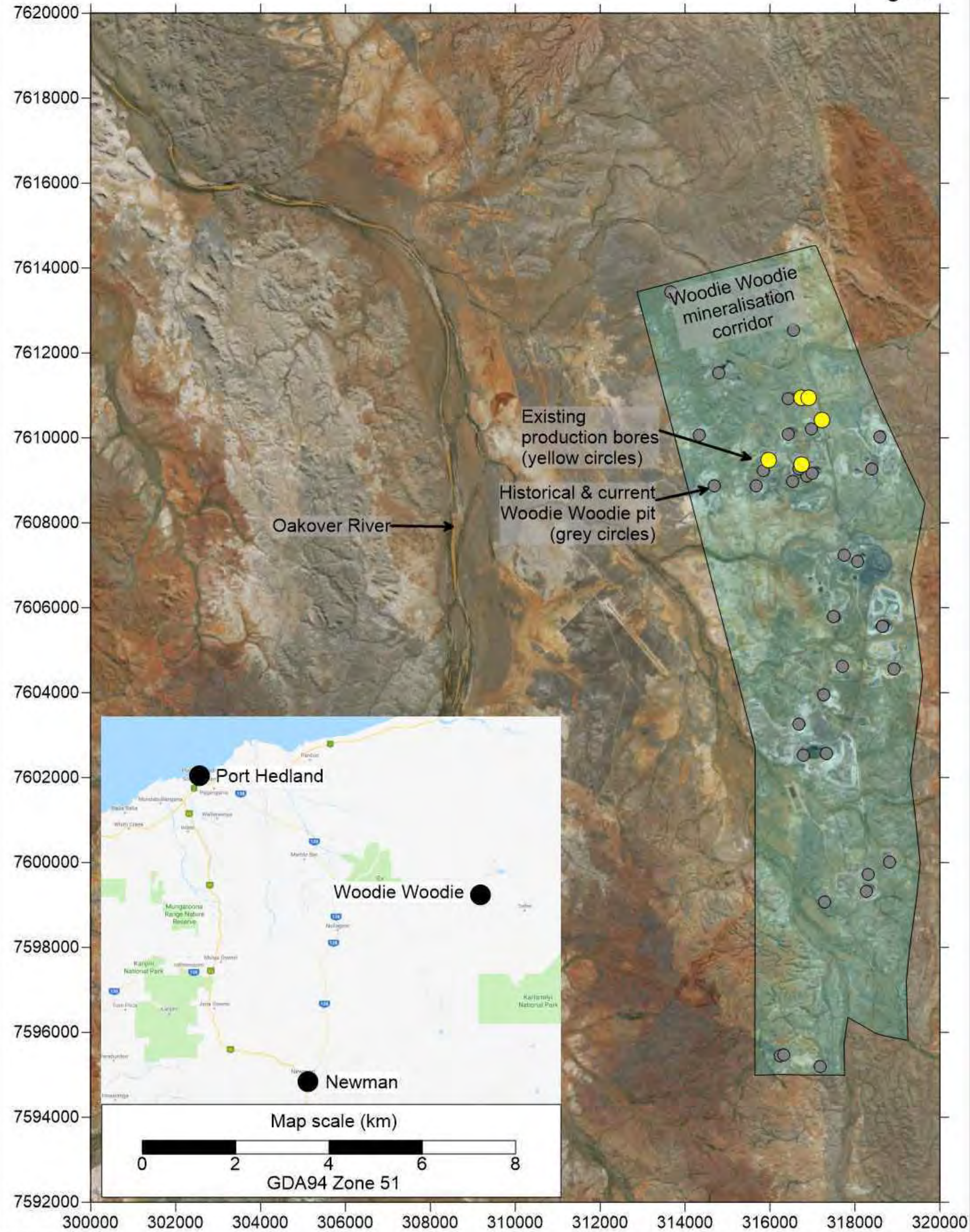
FIGURES

Figure 1



150-2/Surfer/Figure 1.srf

CLIENT:	Consolidated Minerals
PROJECT:	Woodie Woodie modelling assessment
DATE:	May 2018
Dwg. No:	150-2/18/3-01

Site location

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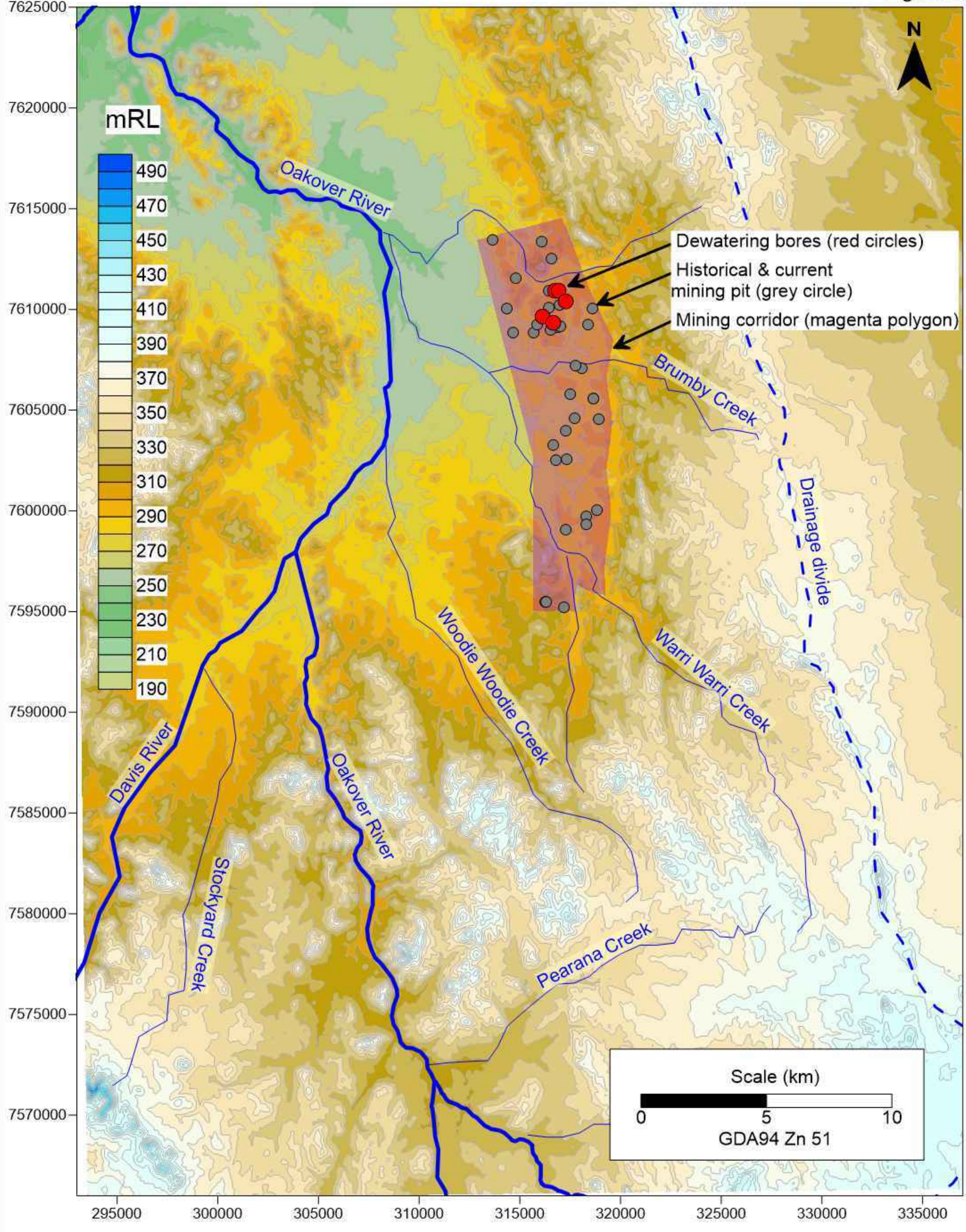
Figure 2



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Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-2

Regional topography and drainage

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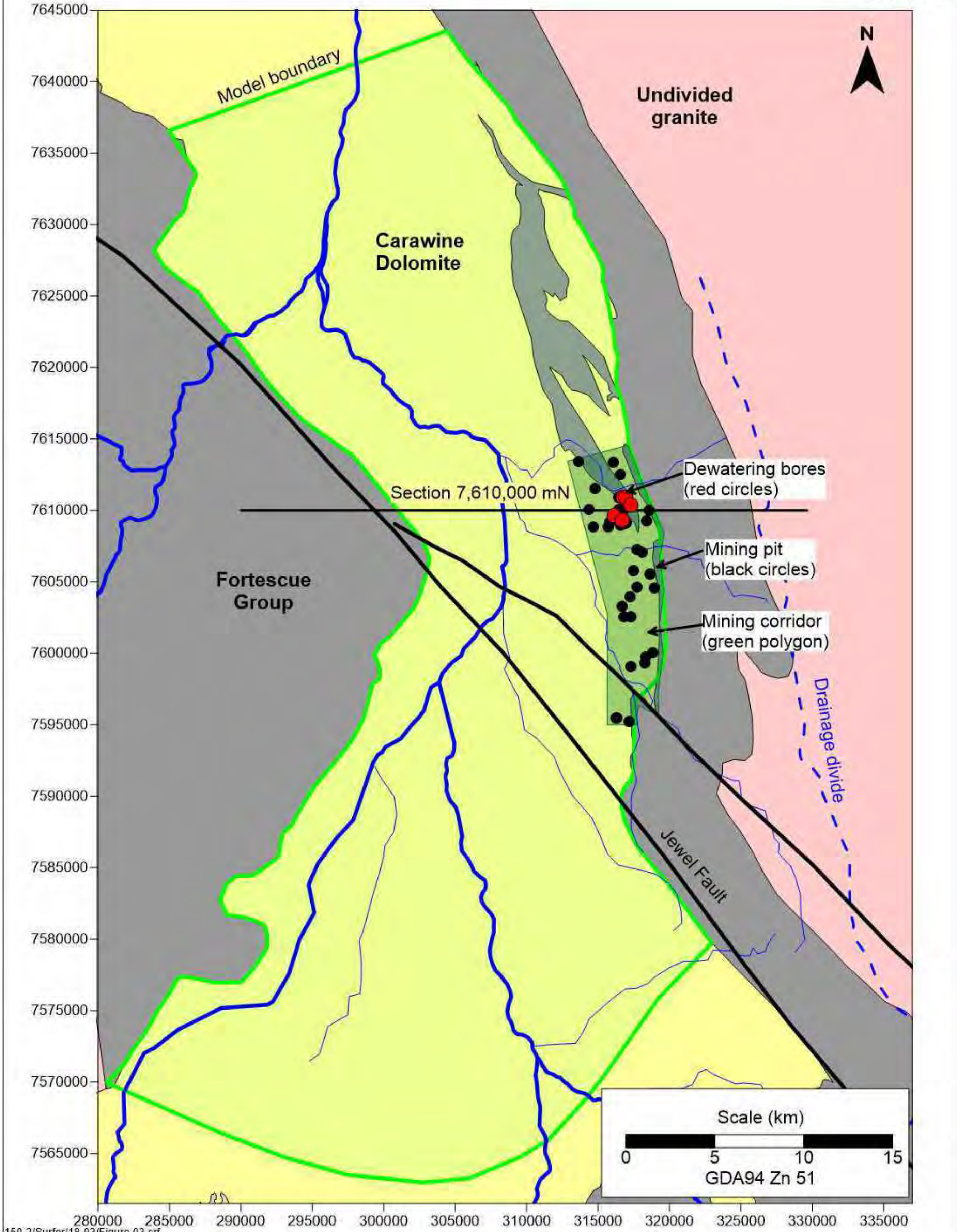
Figure 3



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Date: May 2018

Dwg. No: 150-2/18/03-3

Regional geological units

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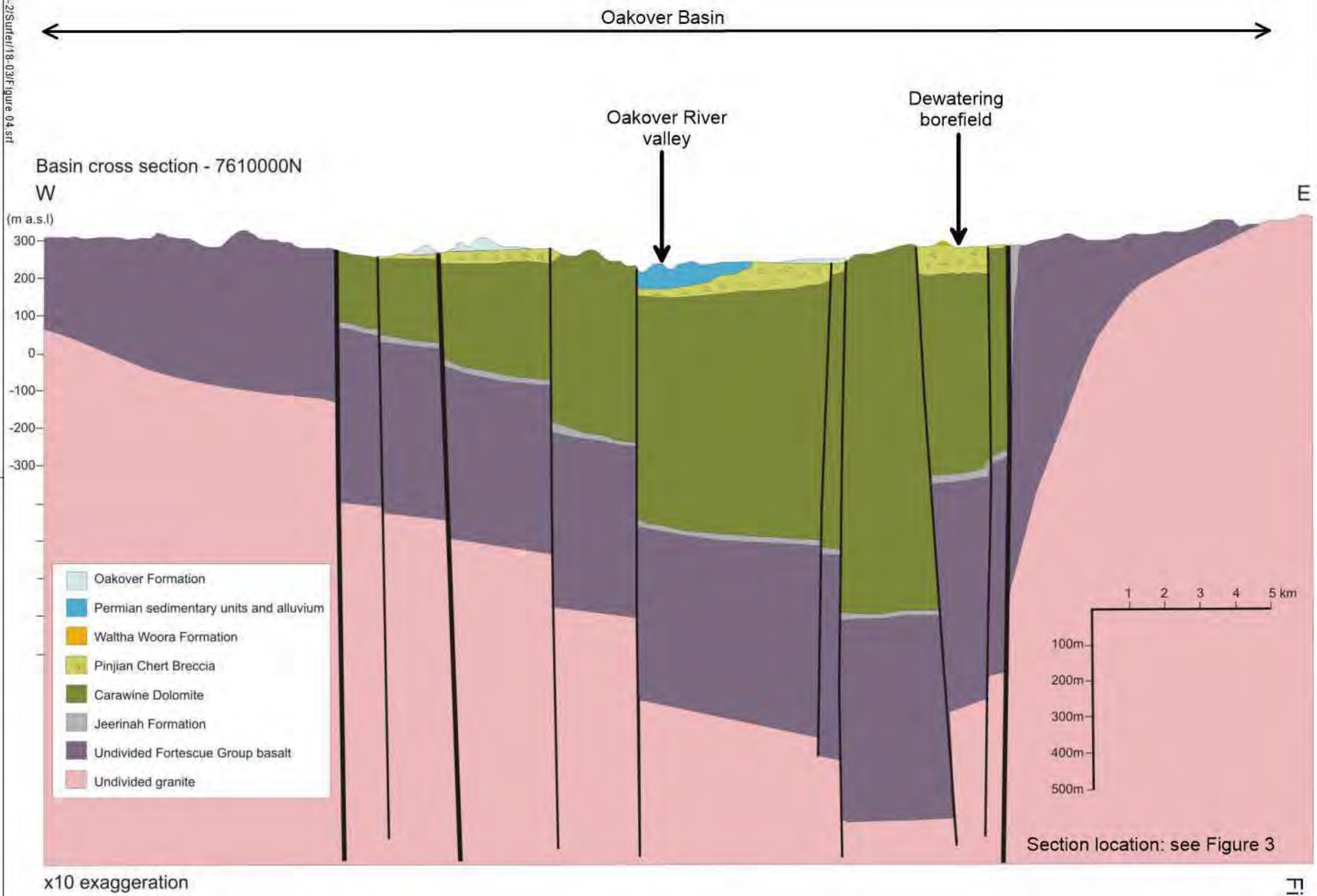

Figure 4

150-2/Surfer/18-03/Figure 04.srf

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Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-4

Geological cross section 7,610,000 mN

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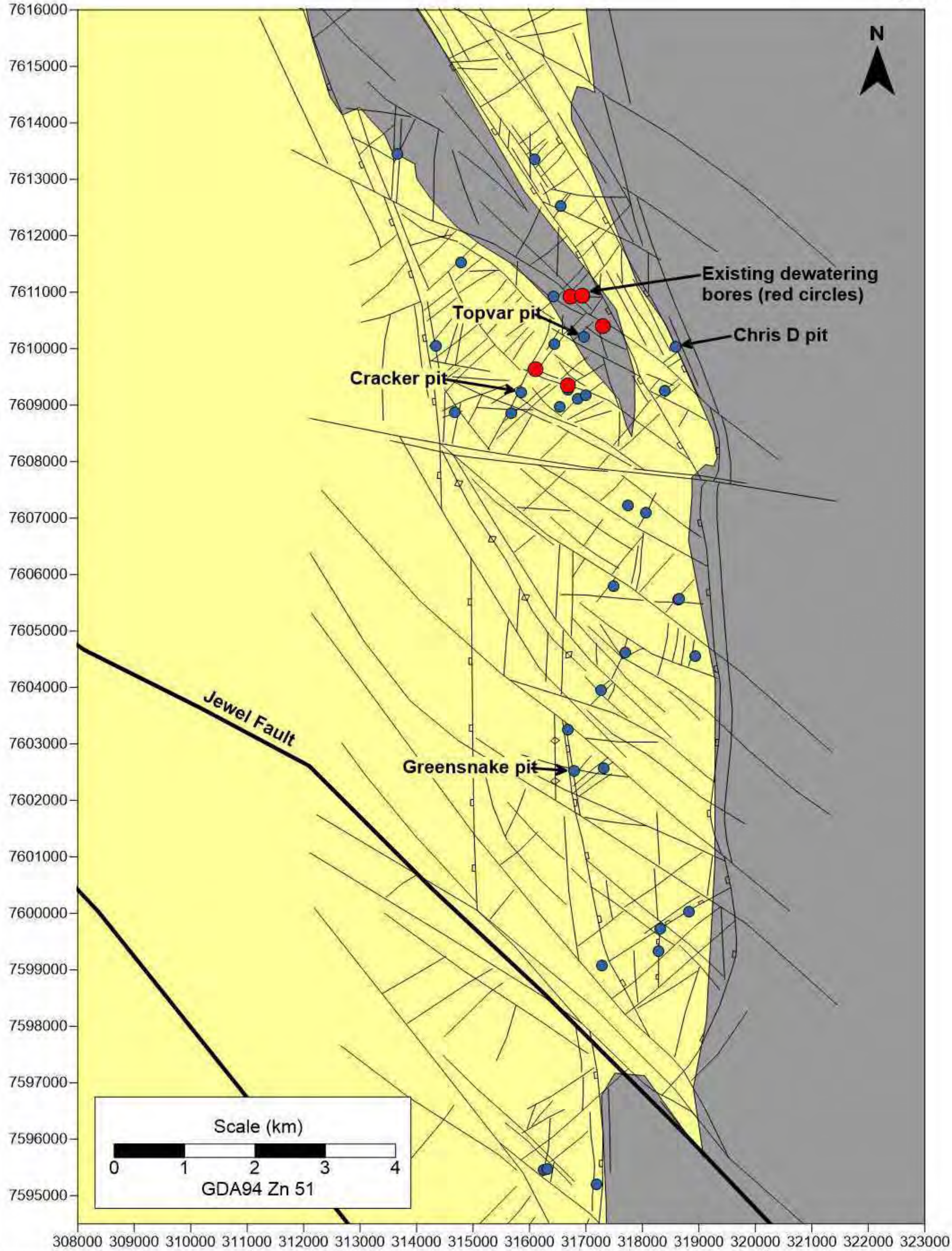
Figure 5



150-2/Surfer/18-03/Figure 05.srf

Client: Consolidated Minerals Limited

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-5

Interpreted faults and lineaments

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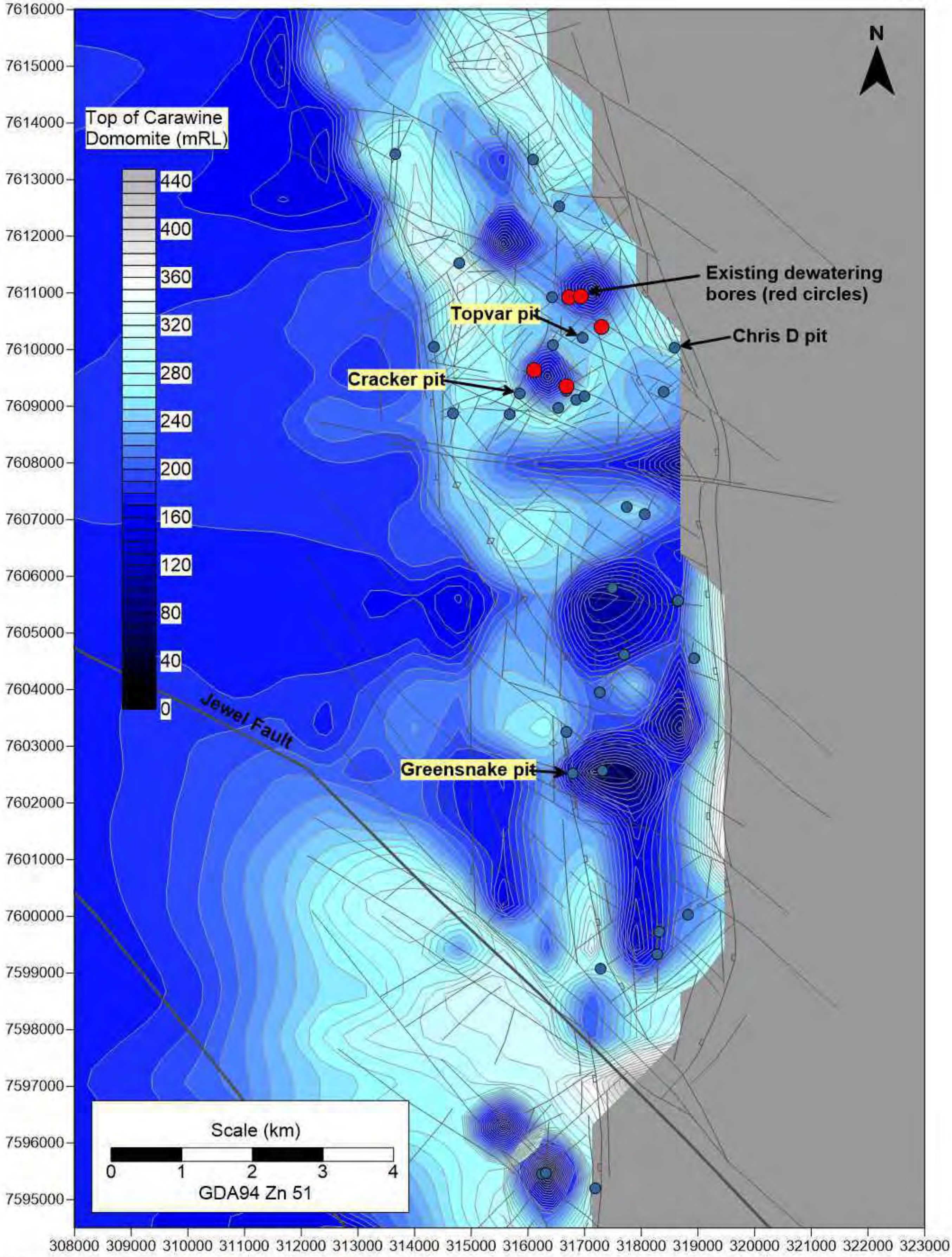
Figure 6



150-2/Surfer/18-03/Figure 06.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-6

Top of Carawine Dolomite

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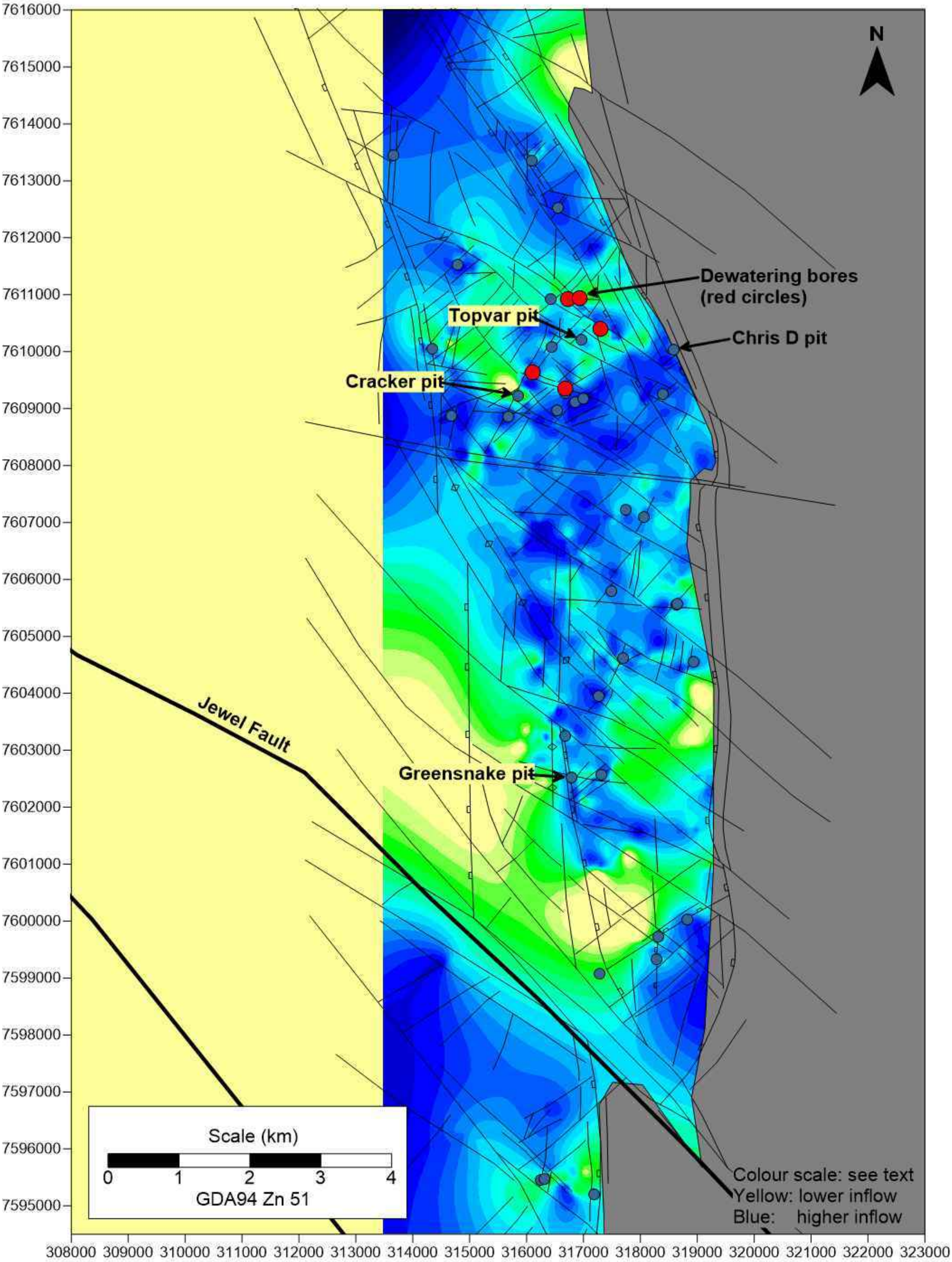
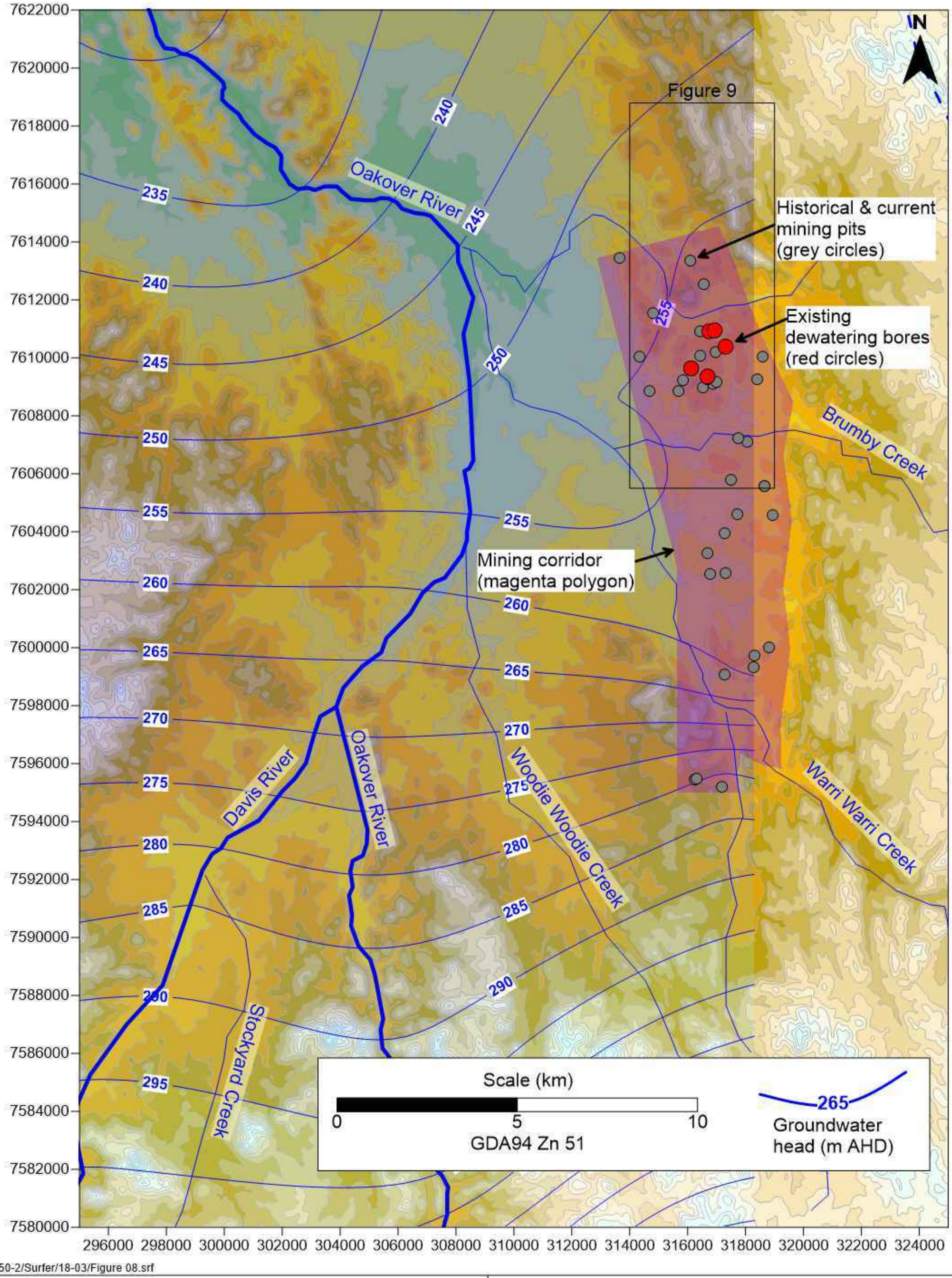
Figure 7



150-2/Surfer/18-03/Figure 07.srf

Client: Consolidated Minerals Project: Woodie Woodie modelling assessment Date: May 2018 Dwg. No: 150-2/18/03-7	Interpreted permeable regions Rockwater PROPRIETARY LIMITED

Figure 8



150-2/Surfer/18-03/Figure 08.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-8

Pre-mining groundwater heads

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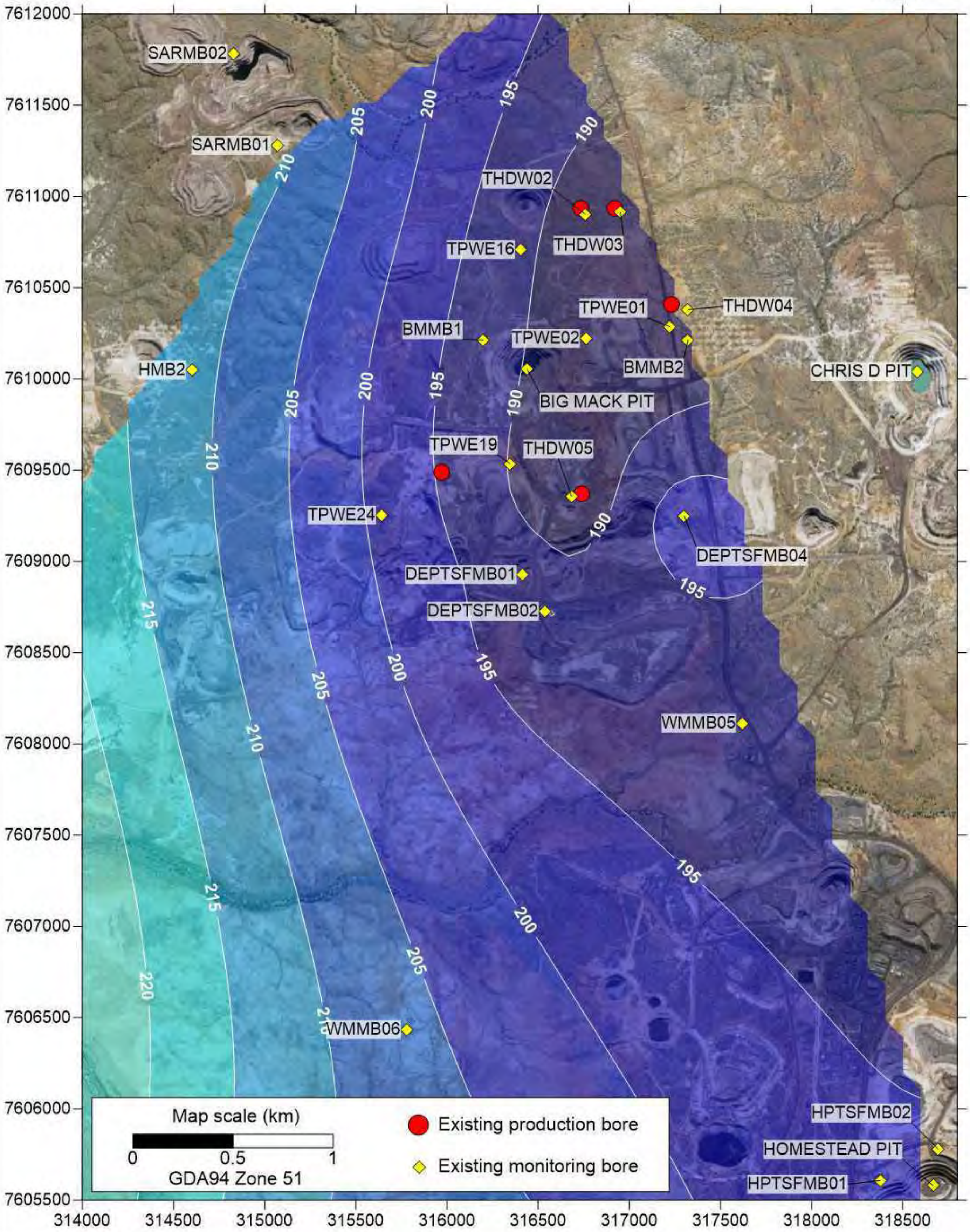
Figure 9



150-2/Surfer/Figure 09.srf

CLIENT: Consolidated Minerals

PROJECT: Woodie Woodie modelling assessment

DATE: May 2018

Dwg. No: 150-2/18/3-09

Groundwater heads, January 2018

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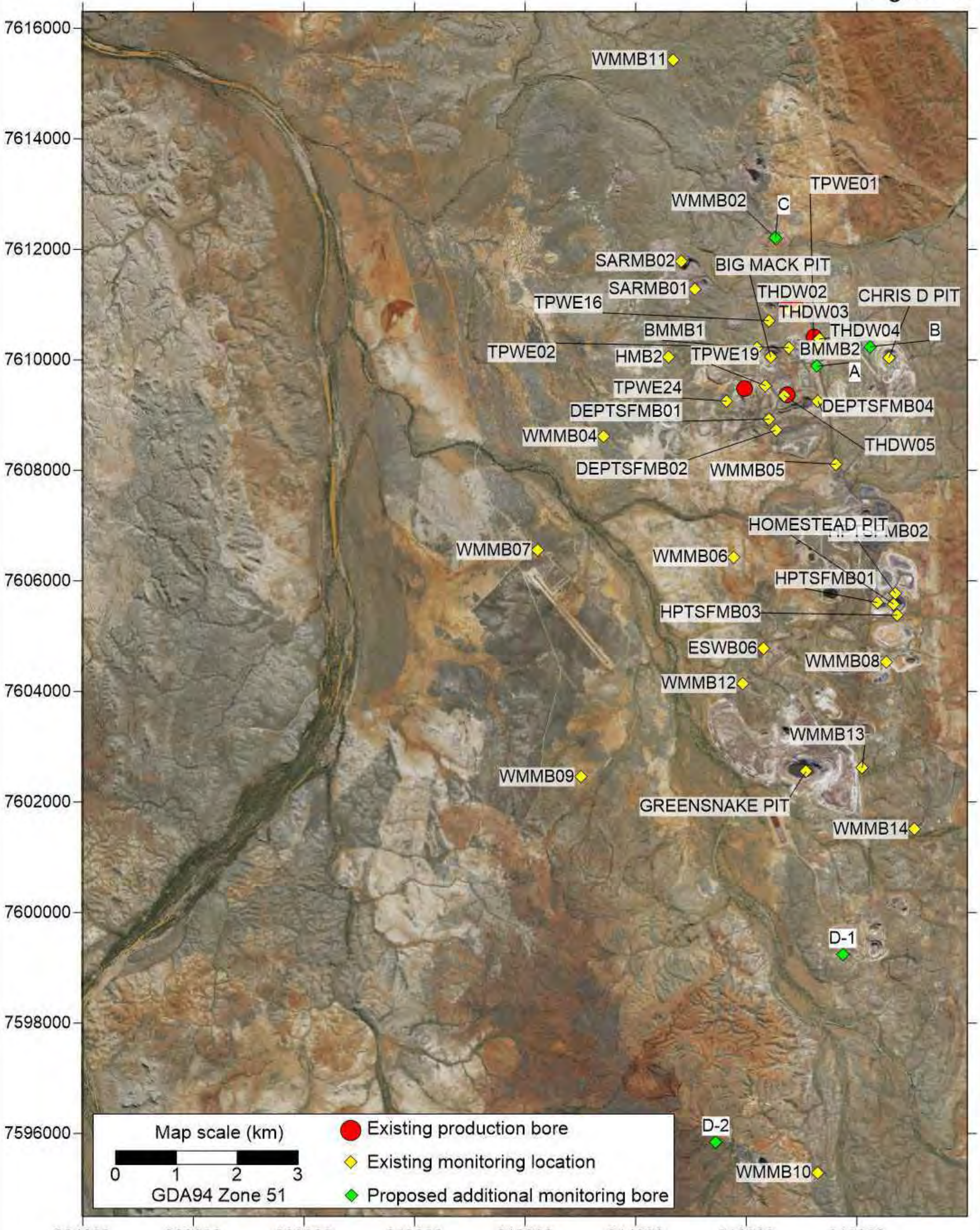
Figure 10



150-2/Surfer/Figure 10.srf

CLIENT: Consolidated Minerals

PROJECT: Woodie Woodie modelling assessment

DATE: May 2018

Dwg. No: 150-2/18/3-10

Monitoring locations

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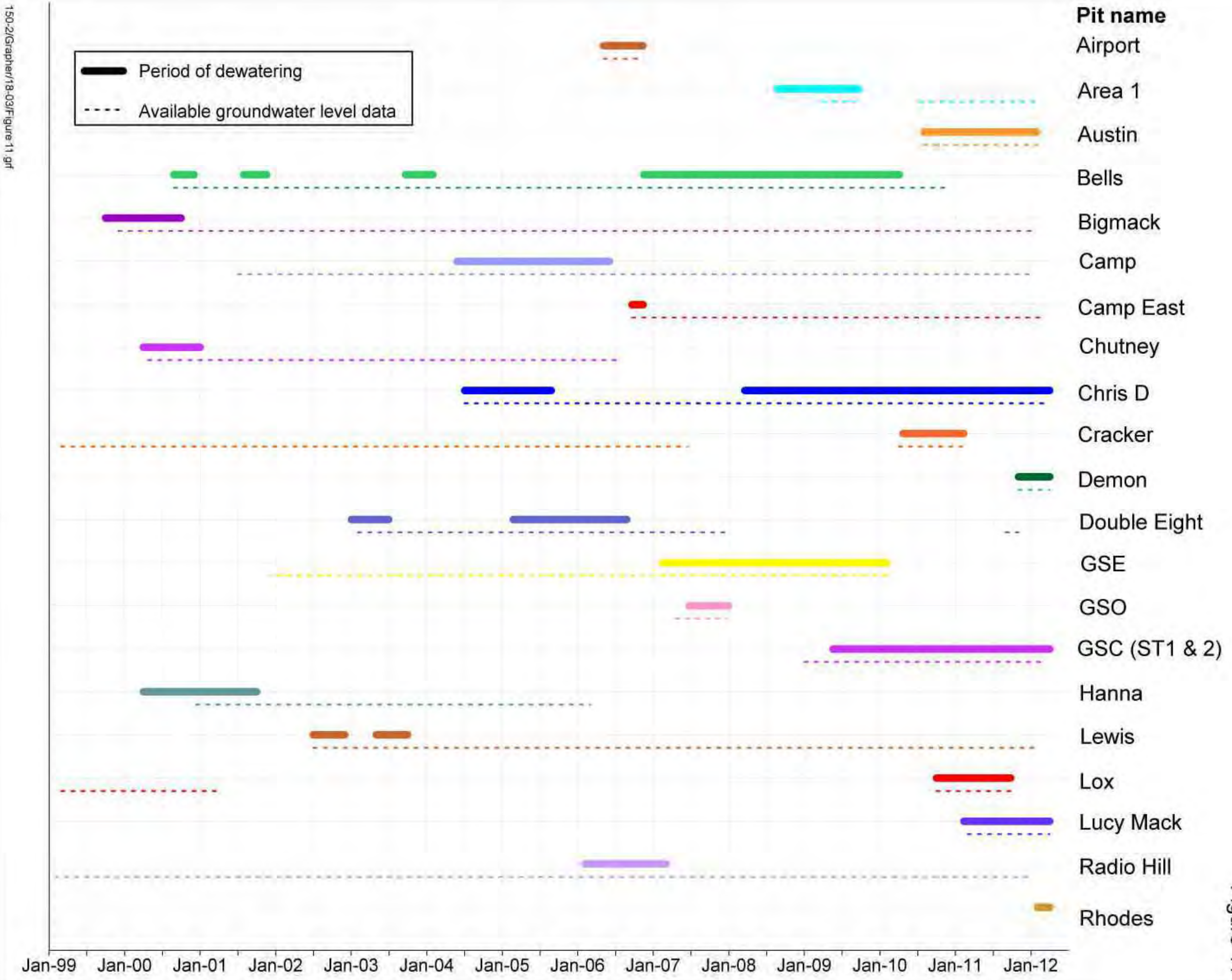
Project: Woodie Woodie modelling assessment
Date: May 2018
Dwg. No: 150-2/18/03-11

150-2/Grapher/18-03/Figure 11.grf



Historical dewatering summary, 1999–2012

Figure 11

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-12

Dewatering summary, 2012–2018

150-2/Grapher/18-03/Figure 12.grf

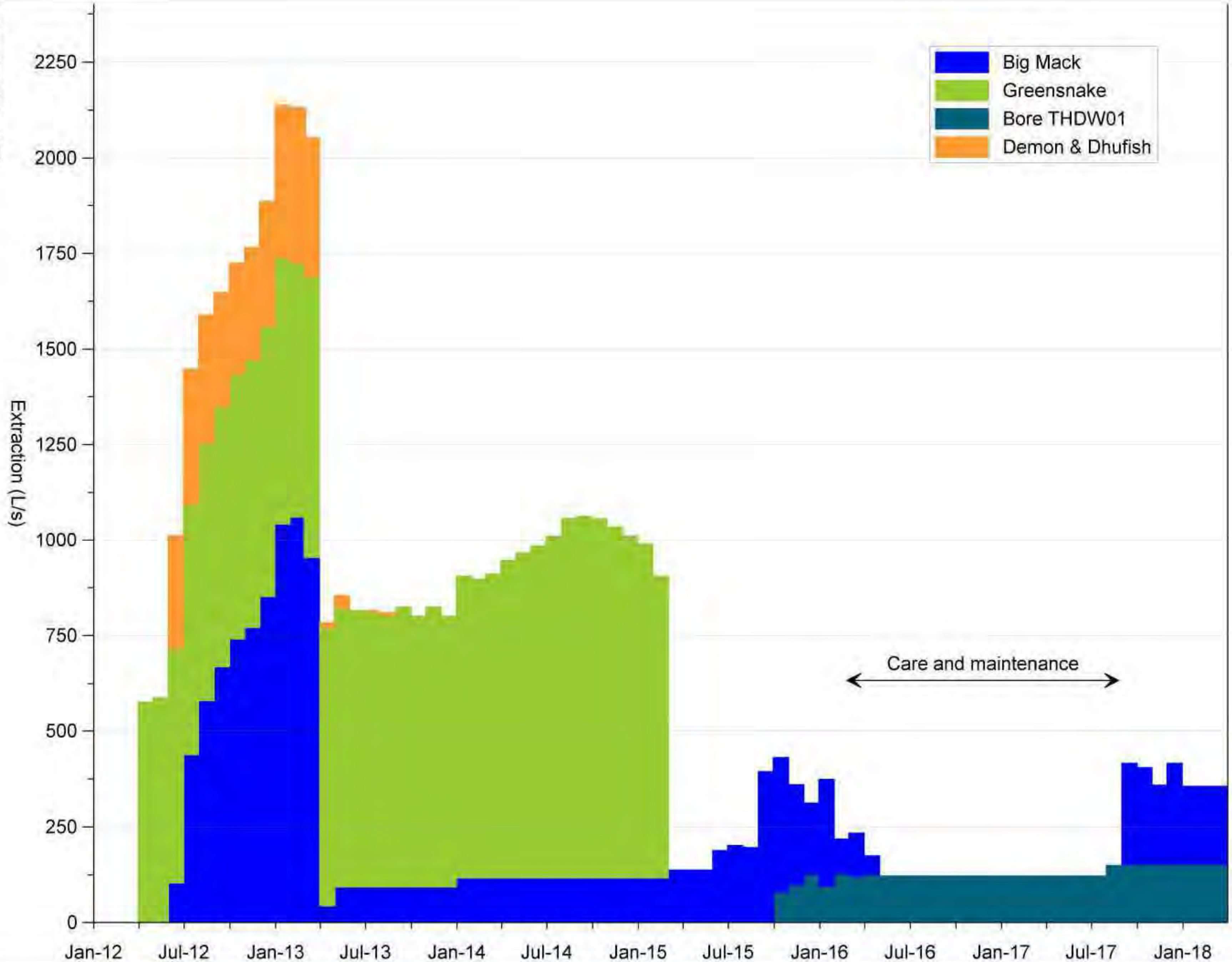
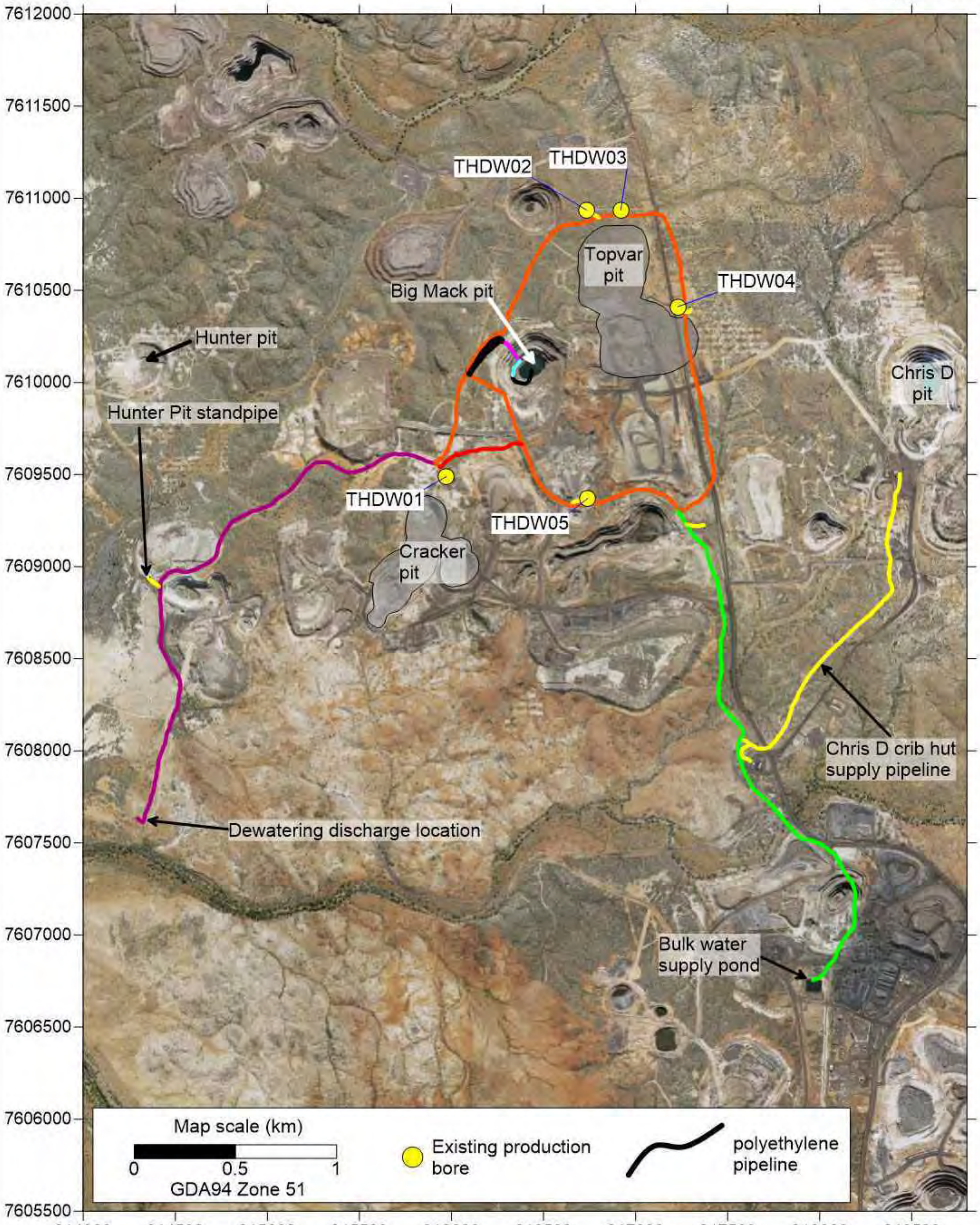


Figure 12

Figure 13



150-2/Surfer/Figure 13.srf

CLIENT:	Consolidated Minerals
PROJECT:	Woodie Woodie modelling assessment
DATE:	May 2018
Dwg. No:	150-2/18/3-13

Production bore locations and dewatering infrastructure

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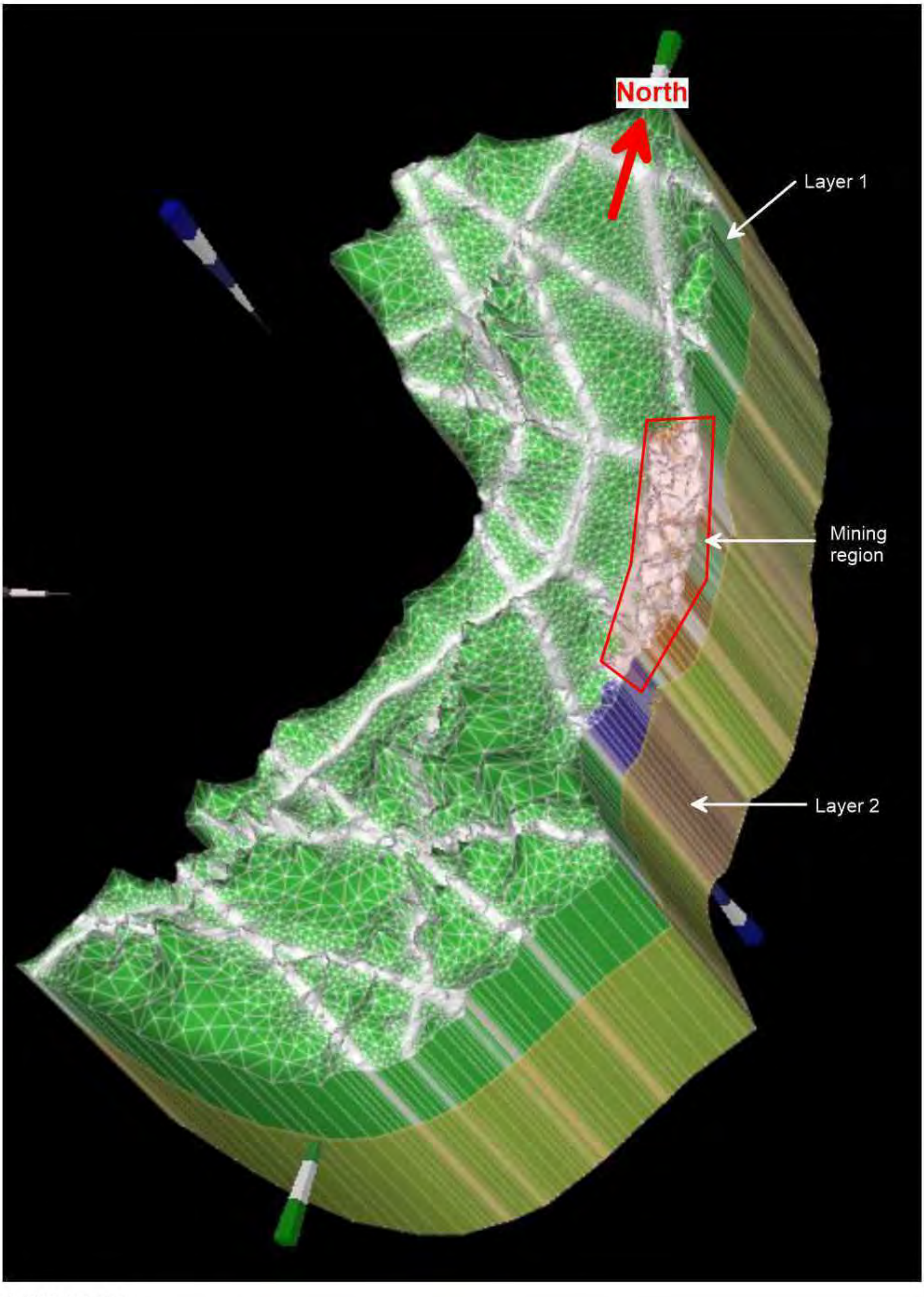
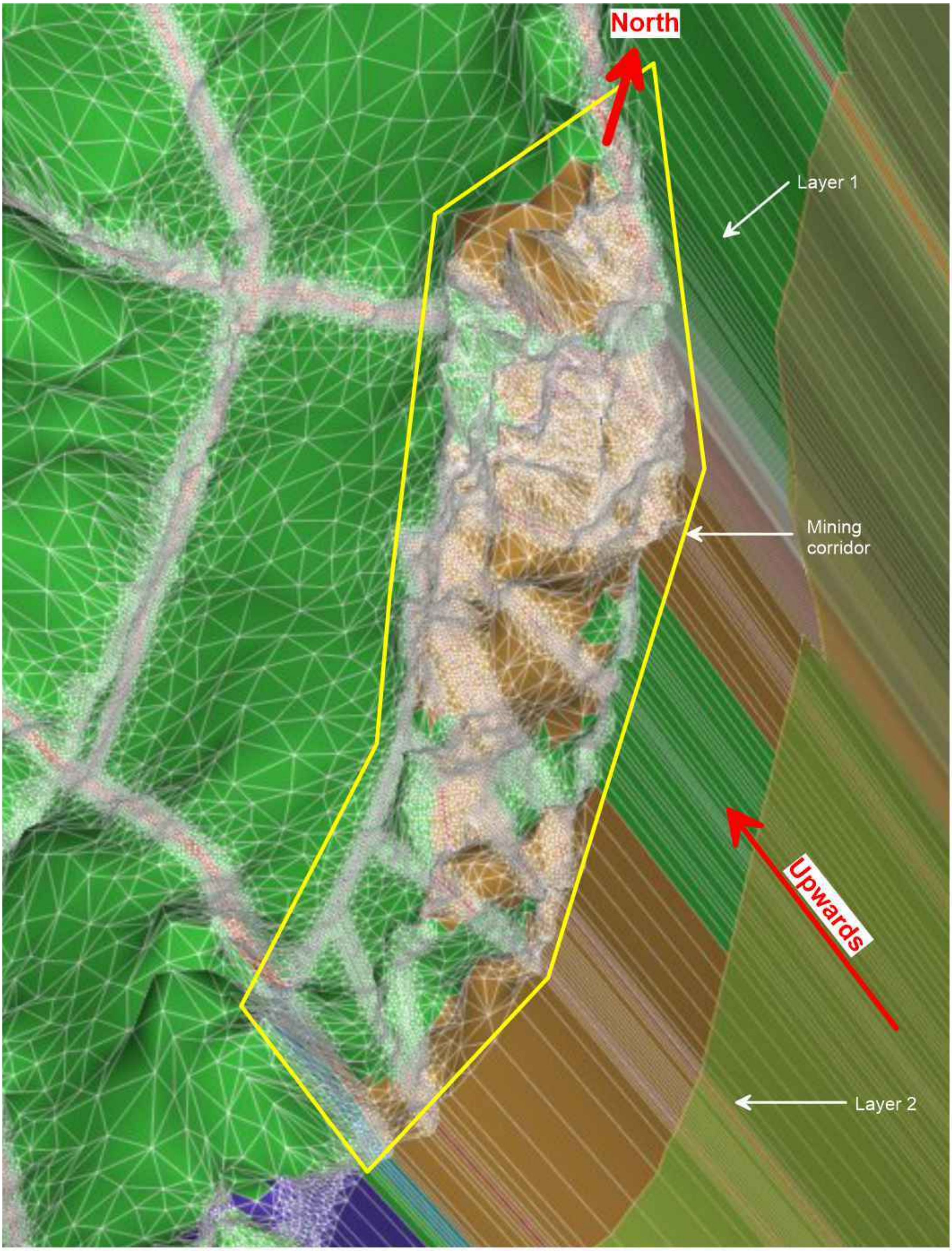
Figure 14



150-2/Surfer/18-03/Figure 14.srf

Client: Consolidated Minerals Project: Woodie Woodie modelling assessment Date: May 2018 Dwg. No: 150-2/18/03-14	Model grid, isometric view, regional scale Rockwater PROPRIETARY LIMITED

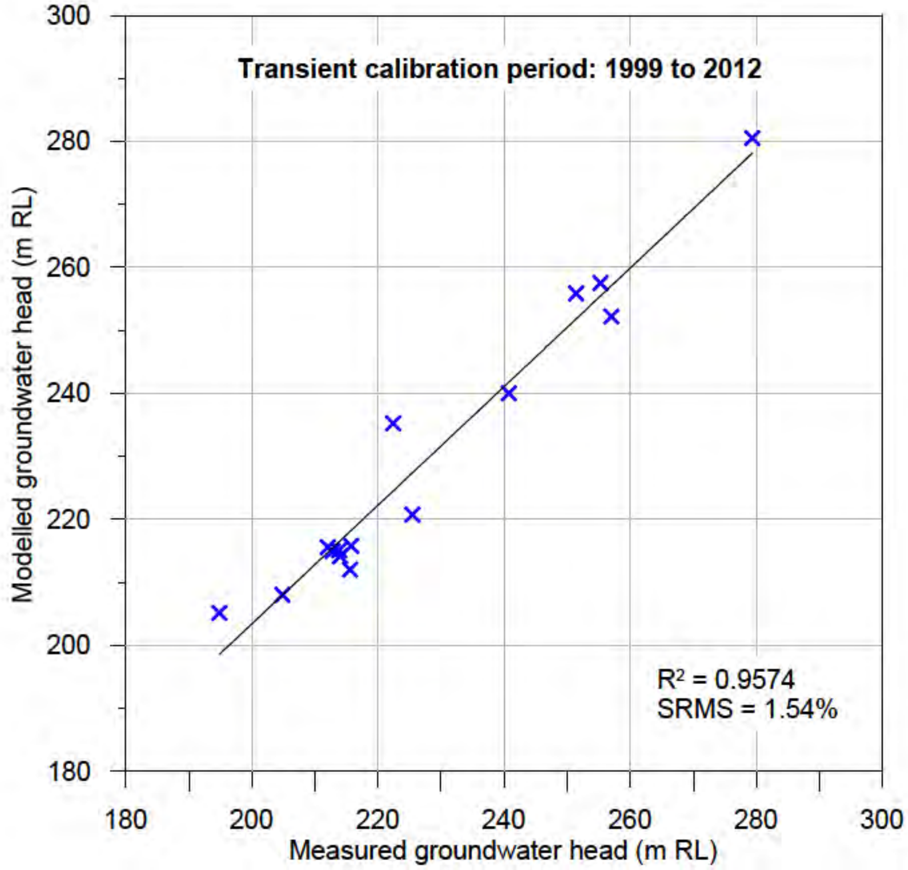
Figure 15

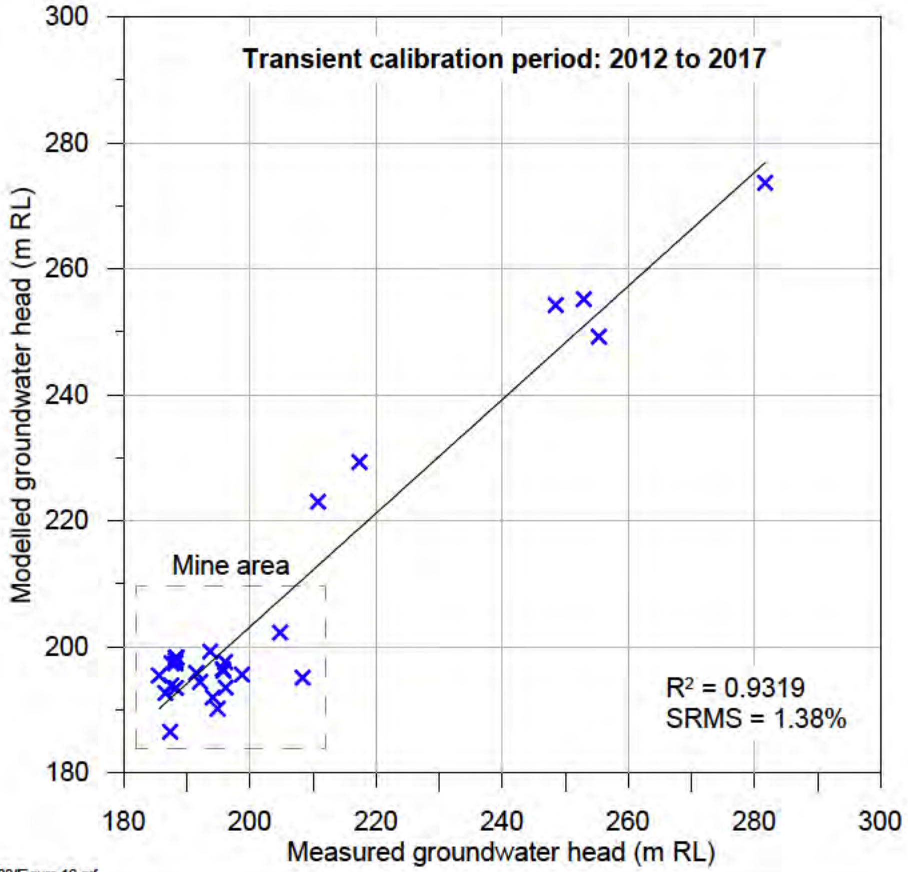


150-2/Surfer/18-03/Figure 15.srf

Client:	Consolidated Minerals	Model grid, isometric view, mining corridor
Project:	Woodie Woodie modelling assessment	
Date:	May 2018	
Dwg. No:	150-2/18/03-15	Rockwater PROPRIETARY LIMITED

Figure 16

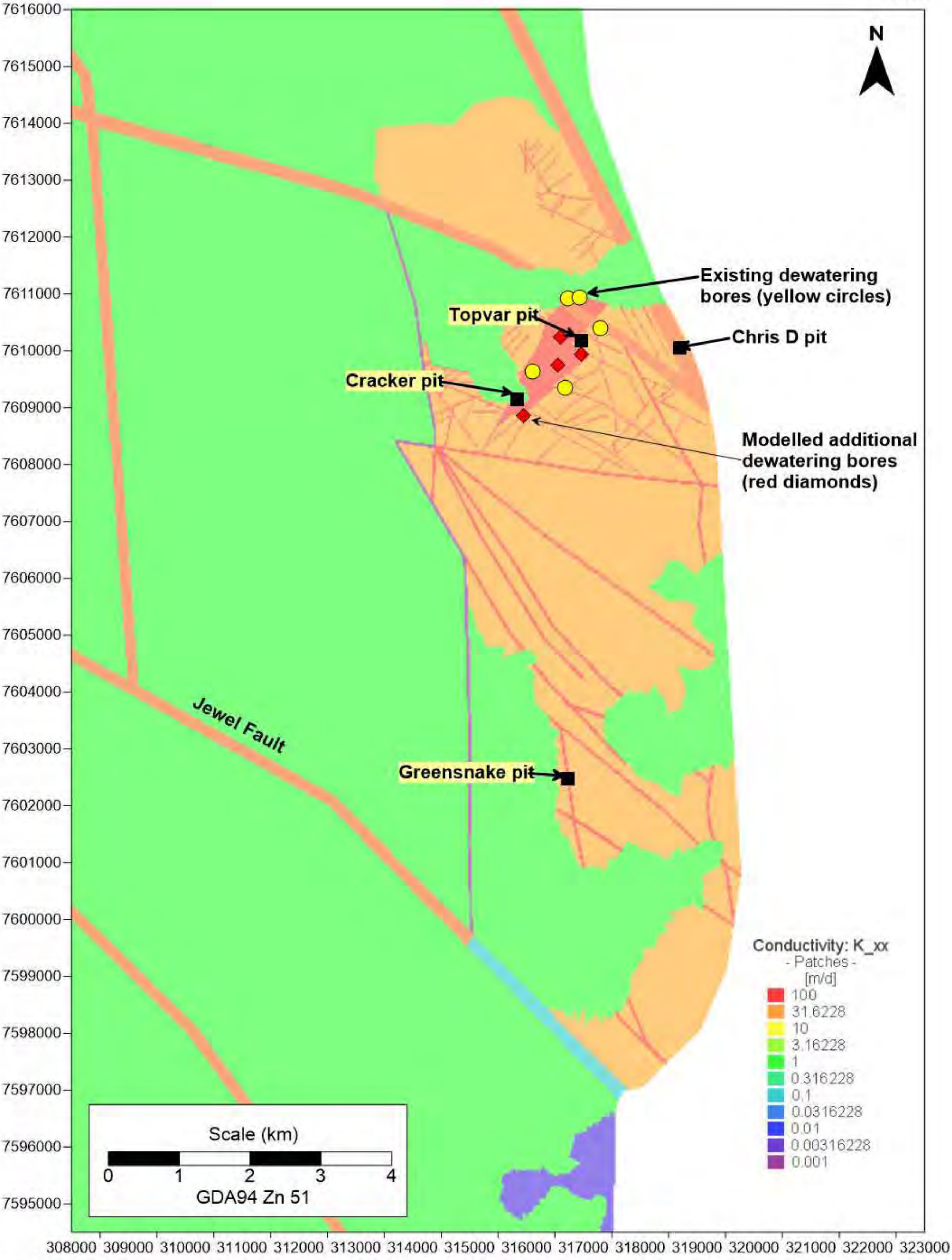




150-2/Grapher/18-03/Figure 16.grf

Client: Consolidated Minerals	Measured versus modelled heads
Project: Woodie Woodie modelling assessment	
Date: May 2018	
Dwg. No: 150-2/18/03-16	Rockwater

Figure 17



150-2/Surfer/18-03/Figure 17.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-17

Hydraulic conductivity distribution, layer 1, regional scale

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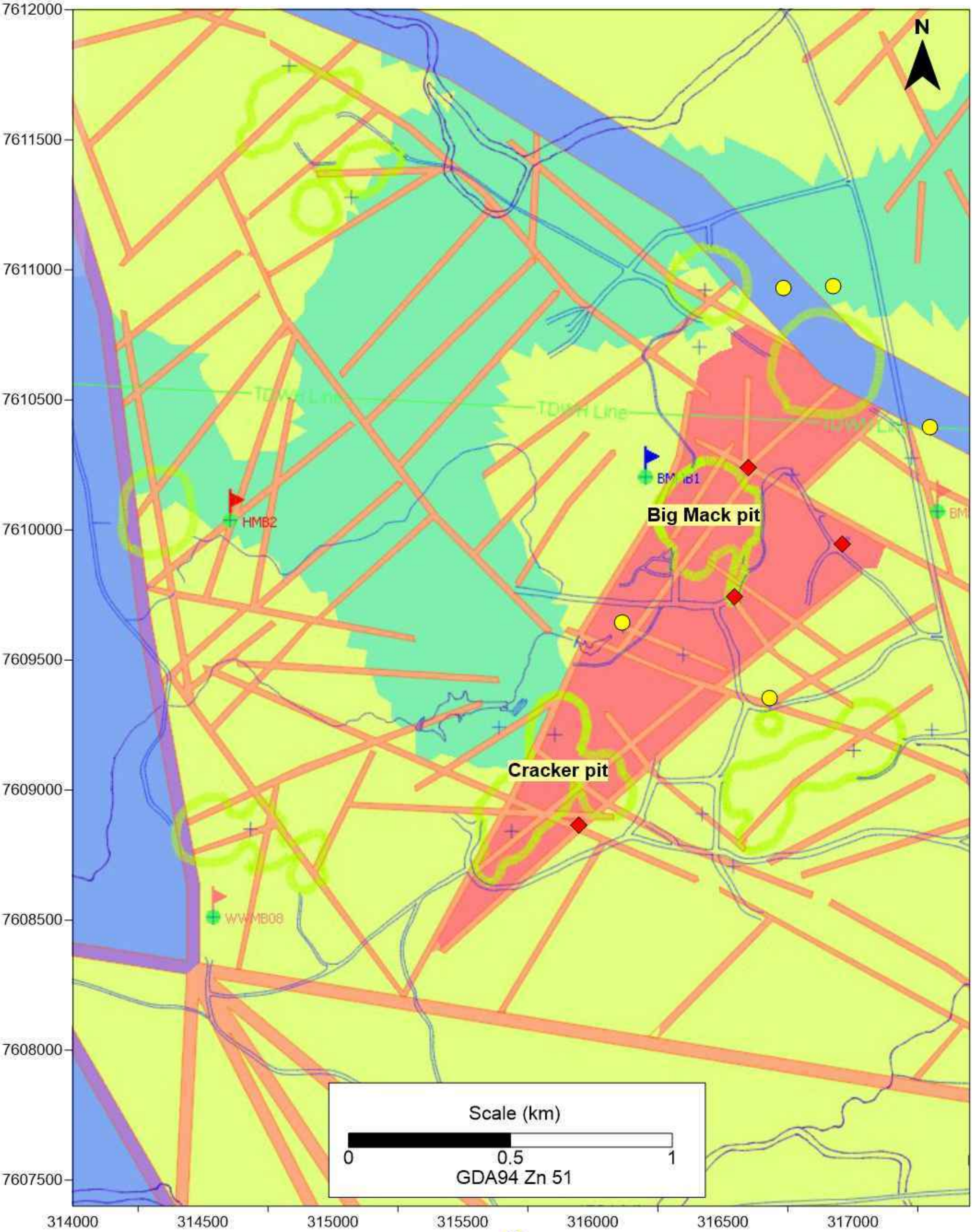
Figure 18



Existing dewatering bores (yellow circles)

Modelled dewatering bores (red diamonds)

150-2/Surfer/18-03/Figure 18.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-18

Hydraulic conductivity distribution, layer 1, local scale

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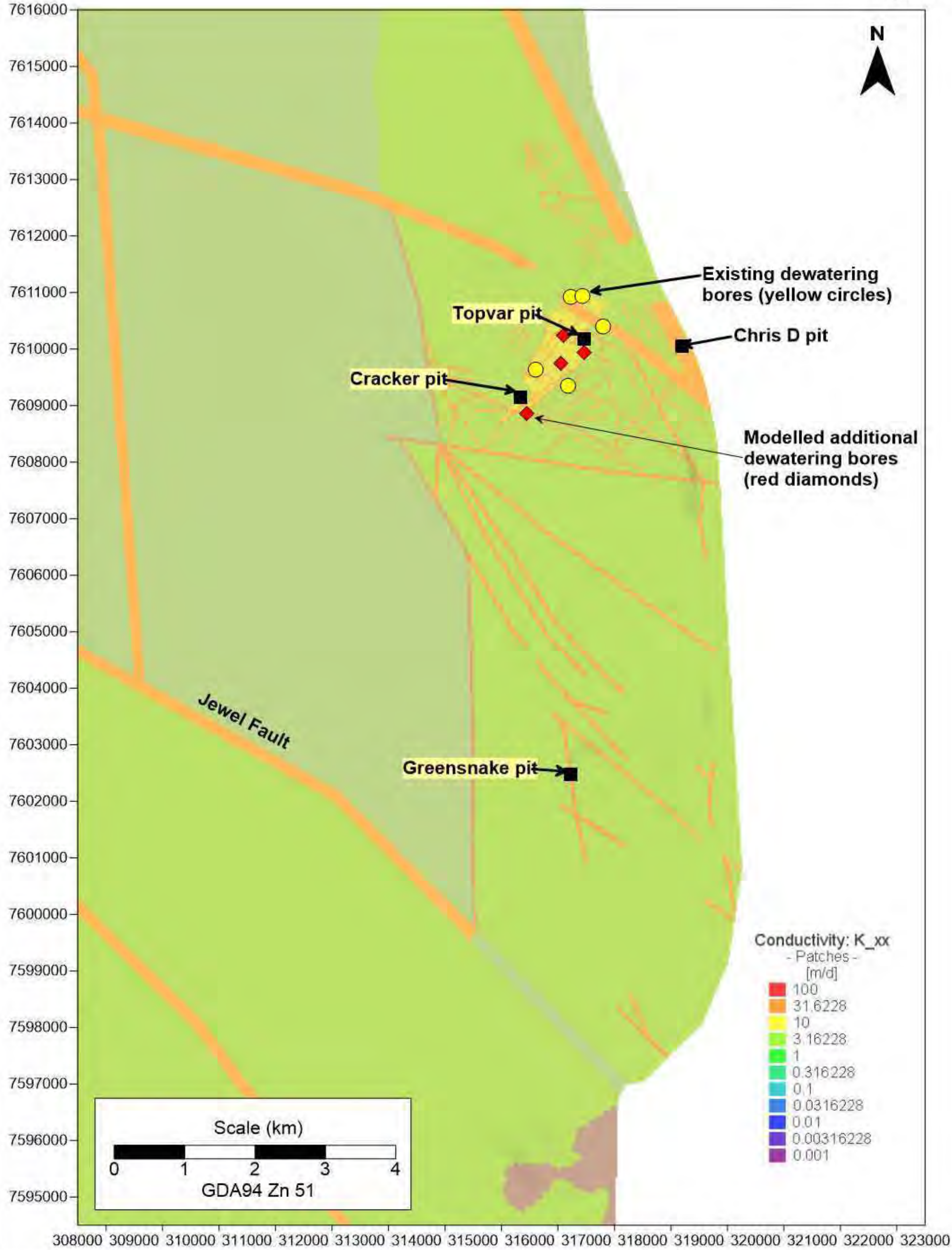
Figure 19



150-2/Surfer/18-03/Figure 19.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

Dwg. No: 150-2/18/03-19

Hydraulic conductivity distribution, layer 2, regional scale

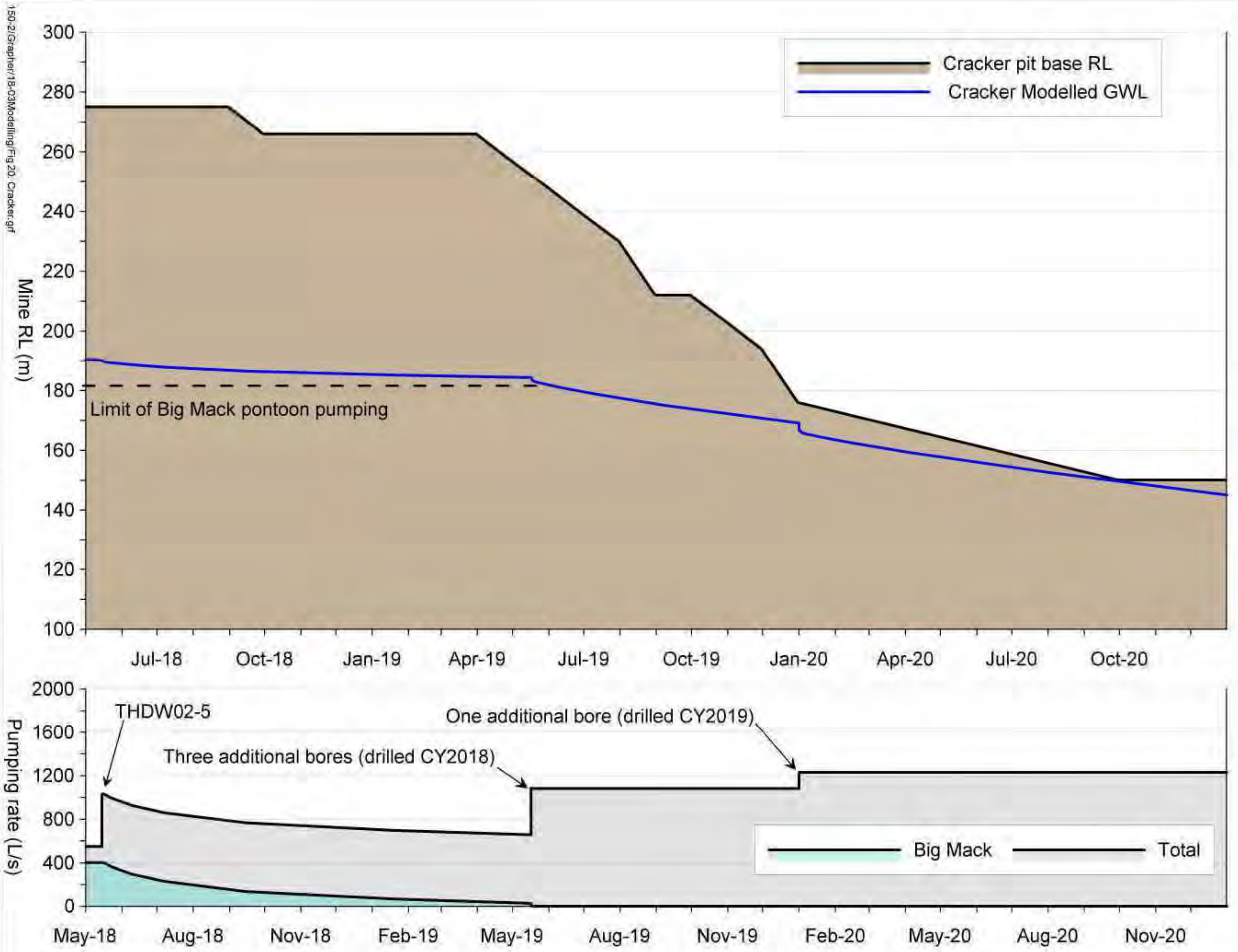
Rockwater PROPRIETARY LIMITED

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

Date: May 2018

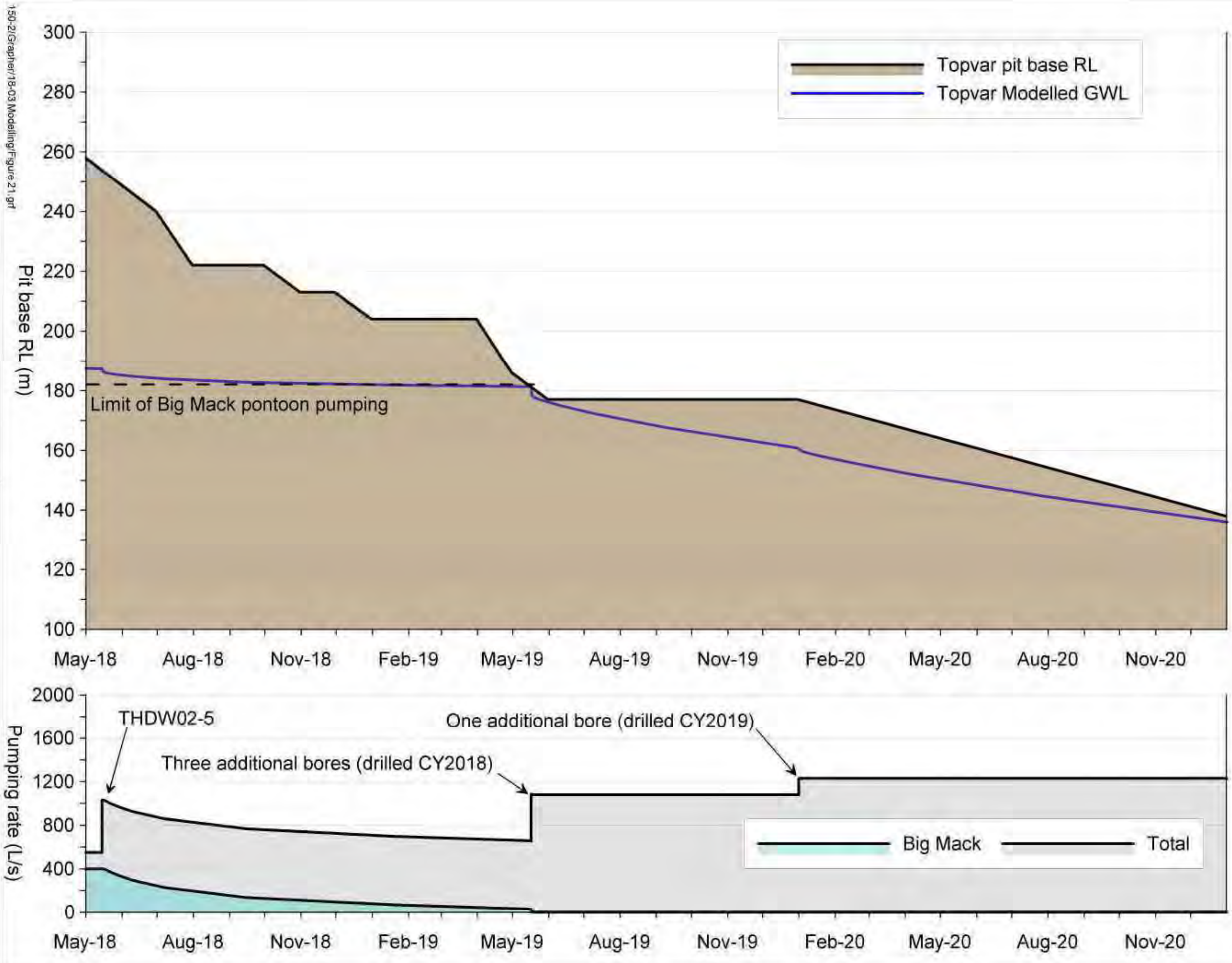
Dwg. No: 150-2/18/3-20



Modelled time-series groundwater heads, Cracker Pit

Figure 20

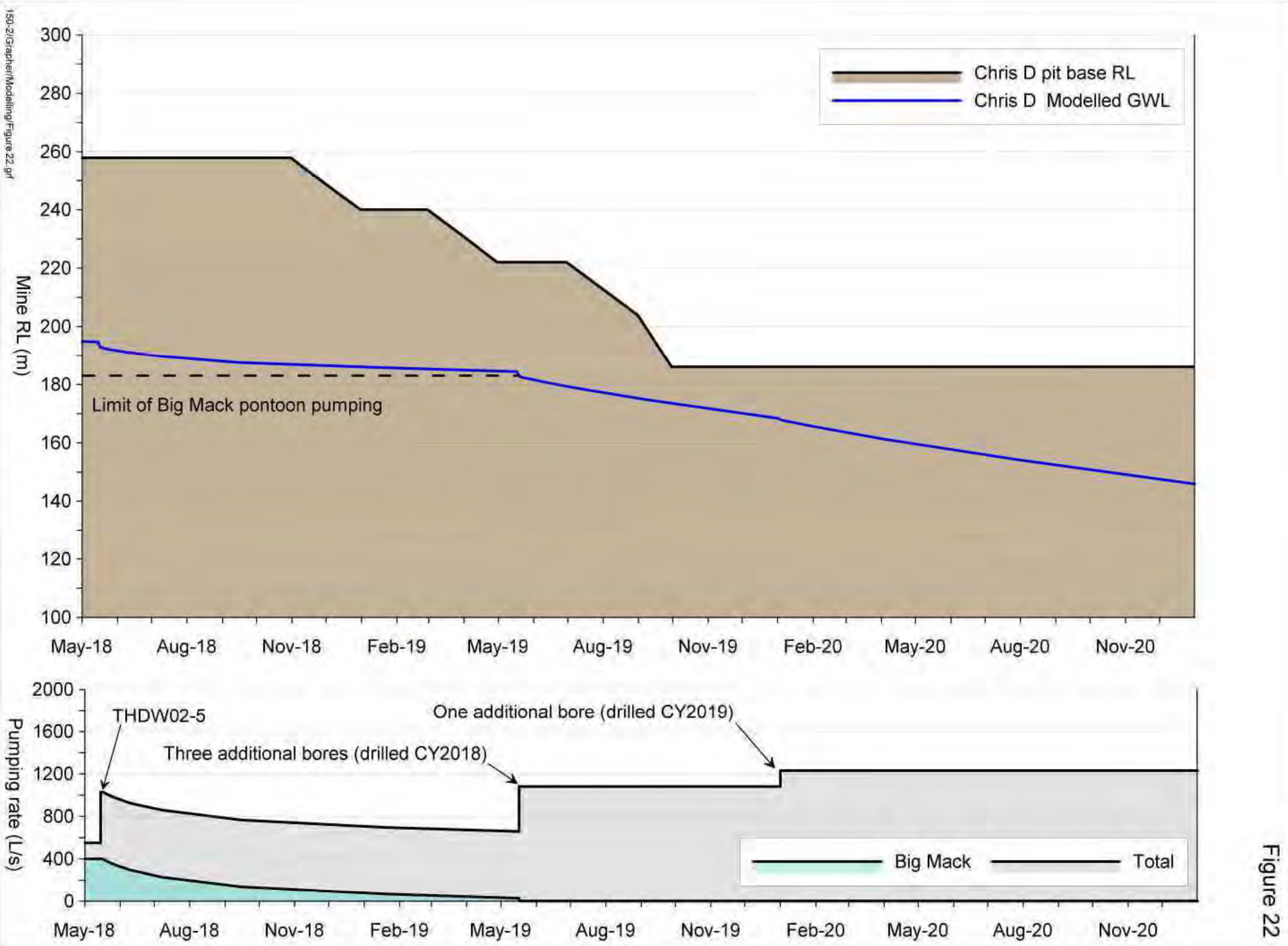
Client: Consolidated Minerals
Project: Woodie Woodie modelling assessment
Date: May 2018
Dwg. No: 150-2/18/3-21



Modelled time-series groundwater heads, Topvar Pit

Rockwater

Figure 21



Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

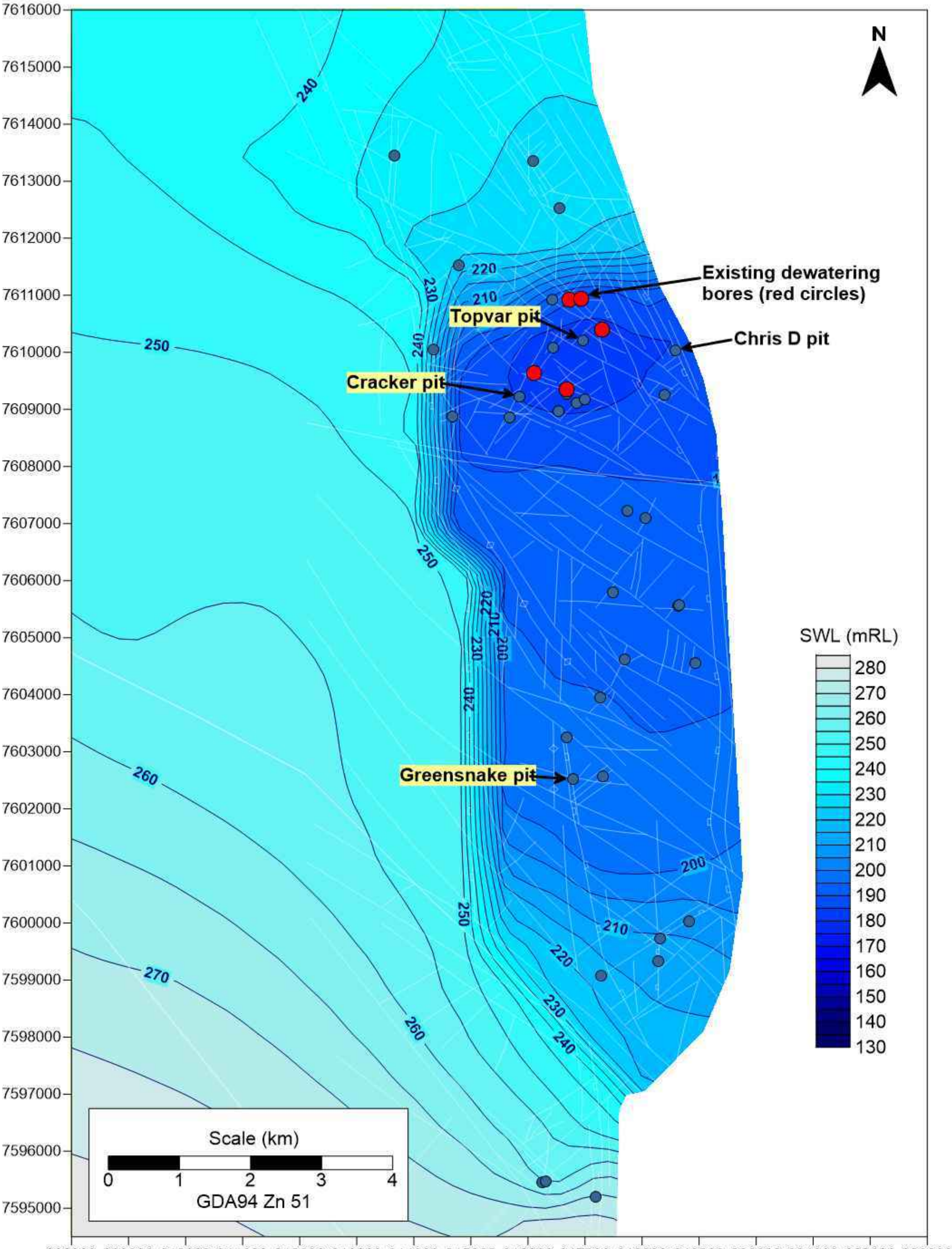
Date: May 2018

Dwg. No: 150-2/18/3-22

Modelled time-series groundwater heads, Chris D Pit

Figure 22

Figure 23



150-2/Surfer/18-03/Figure 23.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

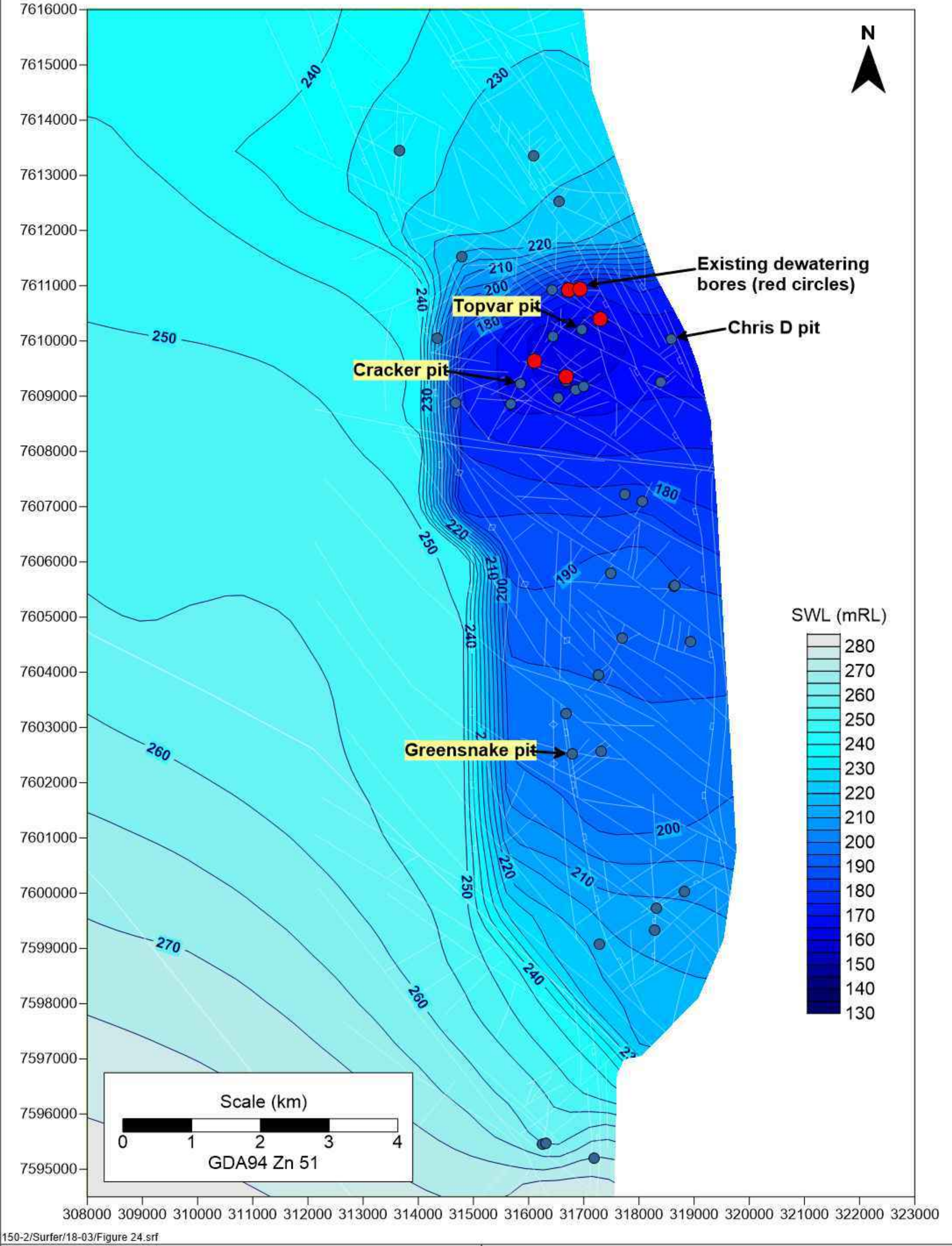
Date: May 2018

Dwg. No: 150-2/18/03-23

Modelled regional-scale groundwater heads, December 2018

Rockwater PROPRIETARY LIMITED

Figure 24



150-2/Surfer/18-03/Figure 24.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

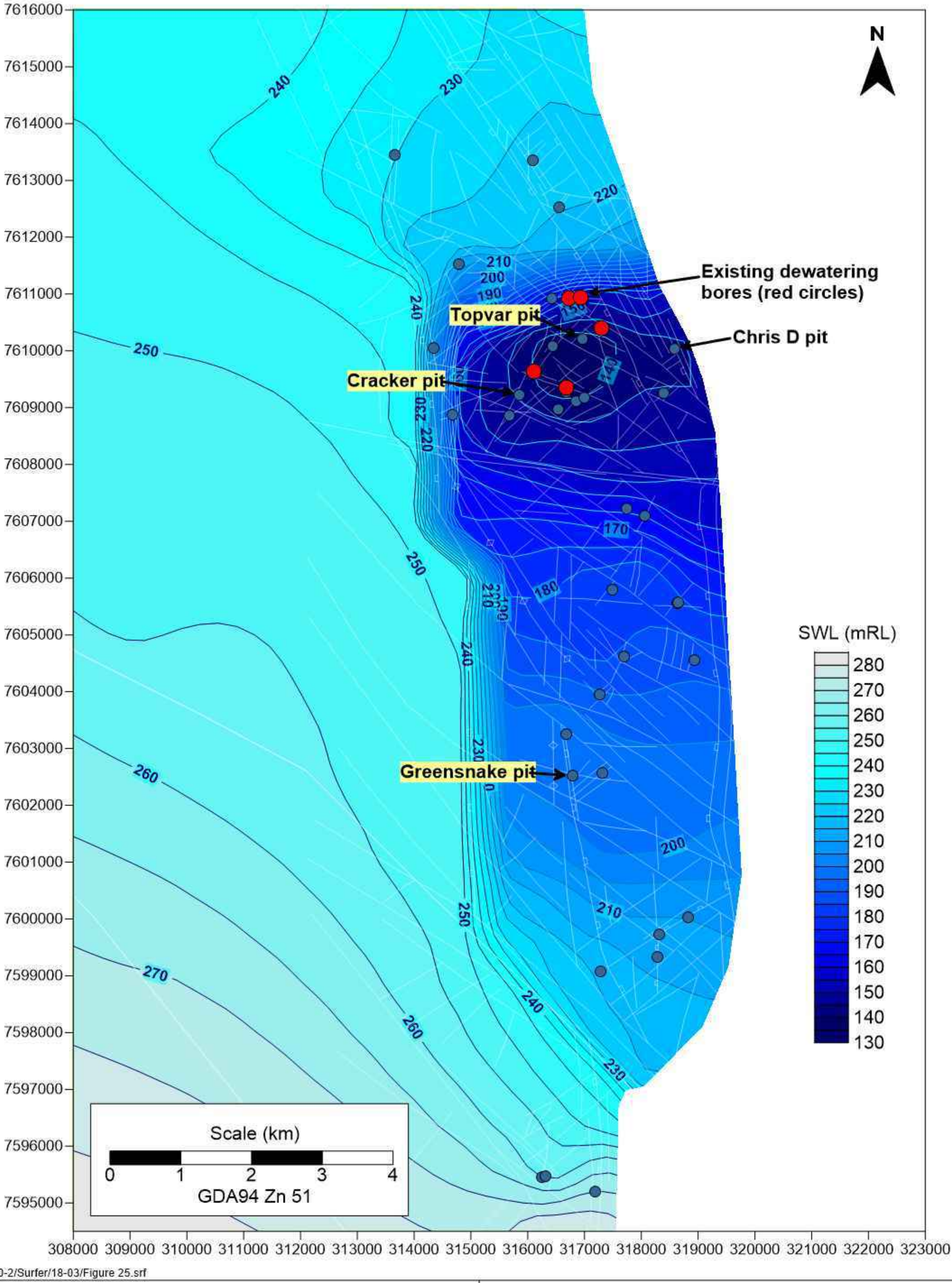
Date: May 2018

Dwg. No: 150-2/18/03-24

Modelled regional-scale groundwater heads, December 2019

Rockwater PROPRIETARY LIMITED

Figure 25



150-2/Surfer/18-03/Figure 25.srf

Client: Consolidated Minerals

Project: Woodie Woodie modelling assessment

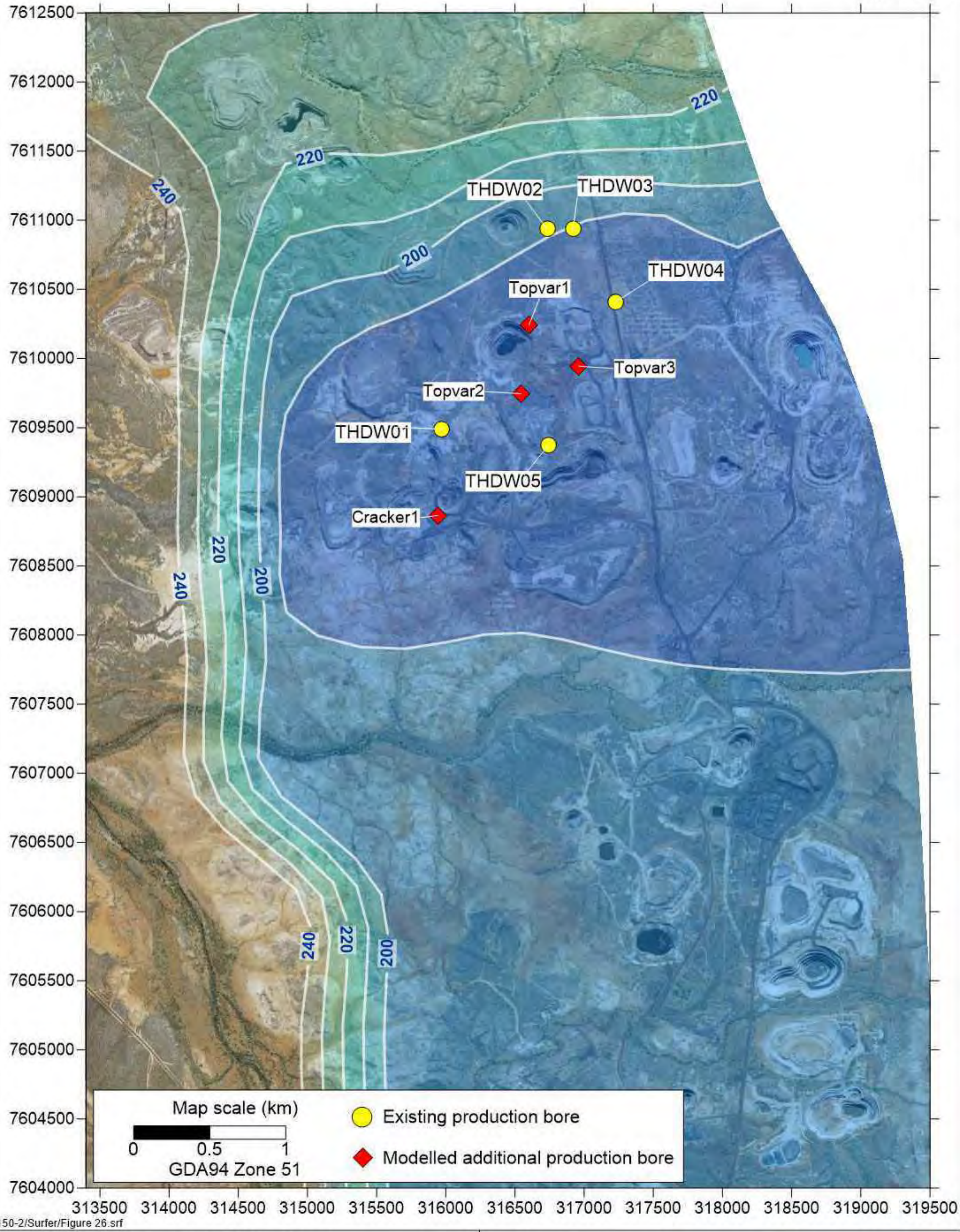
Date: May 2018

Dwg. No: 150-2/18/03-25

Modelled regional-scale groundwater heads, December 2020

Rockwater PROPRIETARY LIMITED

Figure 26



150-2/Surfer/Figure 26.srf

CLIENT: Consolidated Minerals

PROJECT: Woodie Woodie modelling assessment

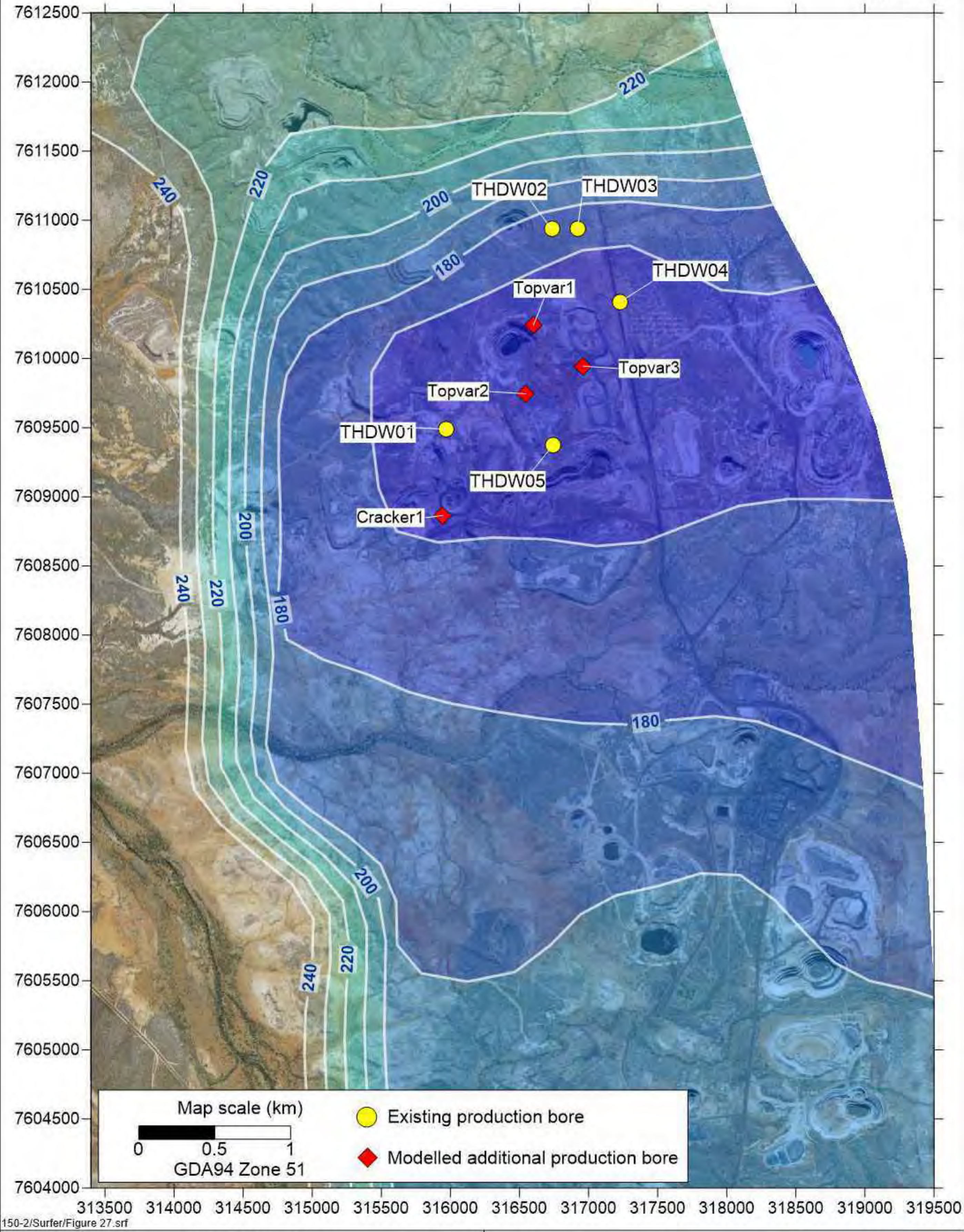
DATE: May 2018

Dwg. No: 150-2/18/3-26

Modelled Topvar-Hub scale groundwater heads, December 2018

Rockwater PROPRIETARY LIMITED

Figure 27



150-2/Surfer/Figure 27.srf

CLIENT: Consolidated Minerals

PROJECT: Woodie Woodie modelling assessment

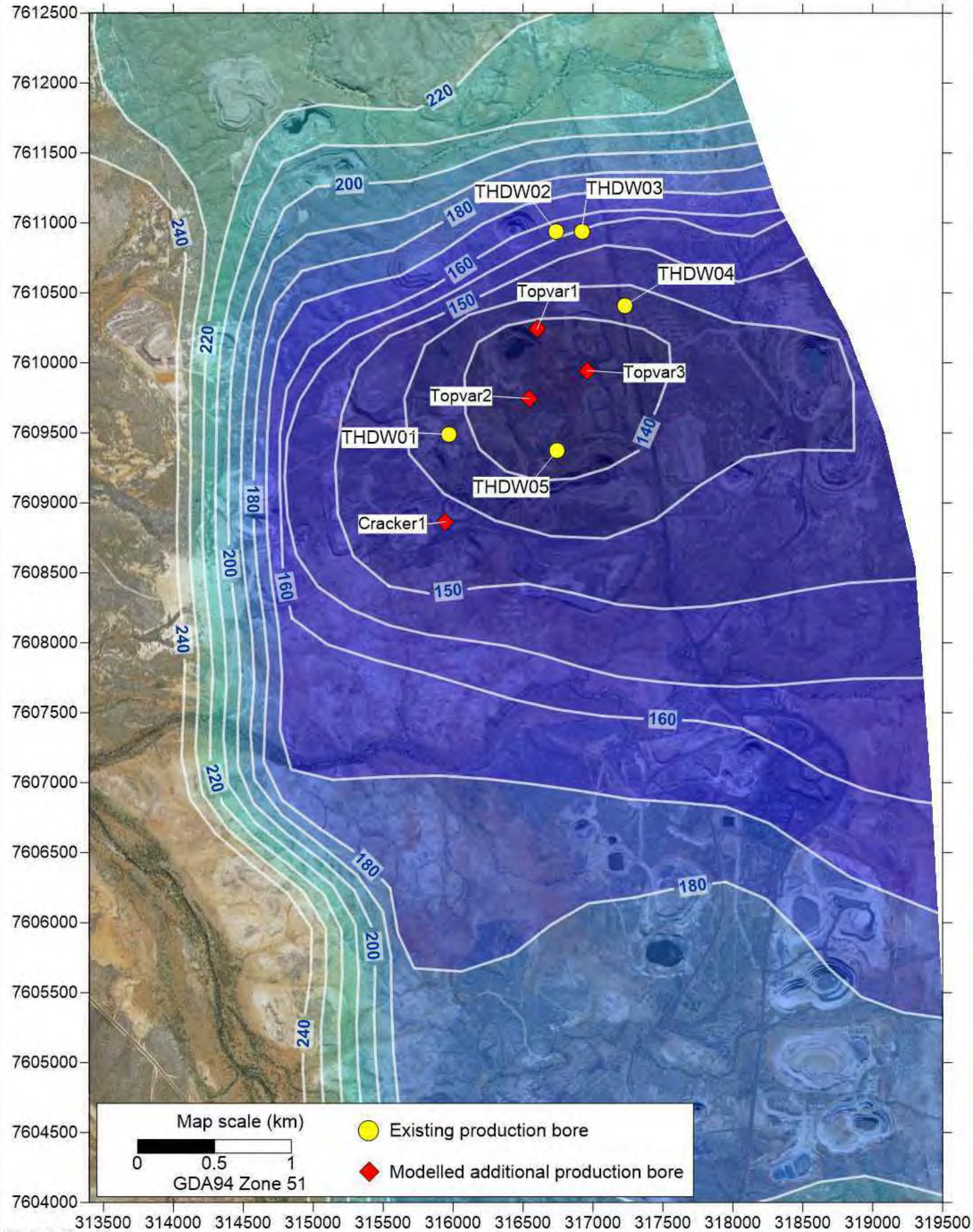
DATE: May 2018

Dwg. No: 150-2/18/3-27

Modelled Topvar-Hub scale groundwater heads, December 2019

Rockwater PROPRIETARY LIMITED

Figure 28



150-2/Surfer/Figure 28.srf

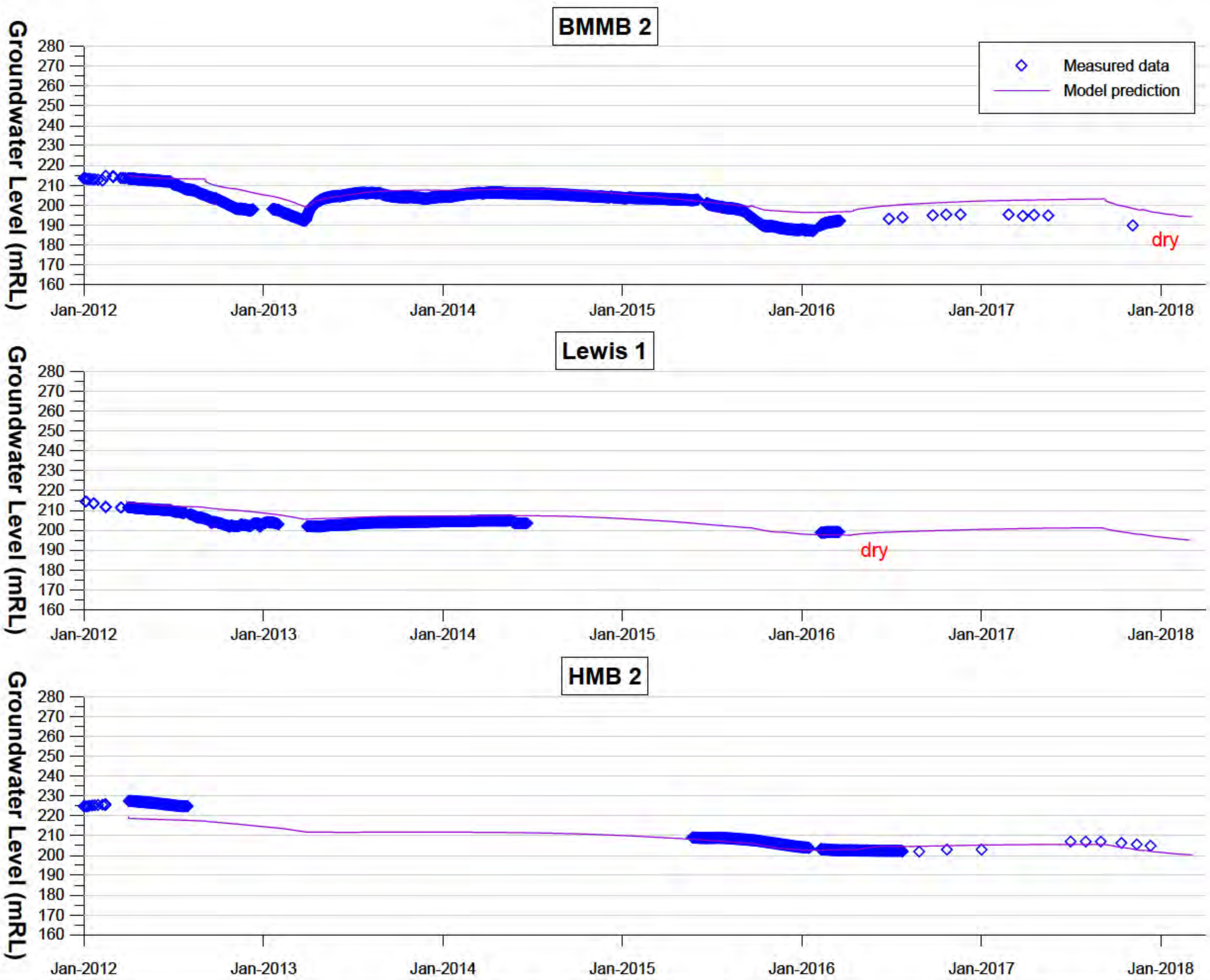
CLIENT:	Consolidated Minerals
PROJECT:	Woodie Woodie modelling assessment
DATE:	May 2018
Dwg. No:	150-2/18/3-28

Modelled Topvar-Hub scale groundwater heads, December 2020

Rockwater PROPRIETARY LIMITED

APPENDIX I

Model calibration data



Client: Consolidated Minerals Limited

Project : Numerical Dewatering Modelling Summary

Date : May 2018

Dwg. No: 150-2/18/03-AppI-1

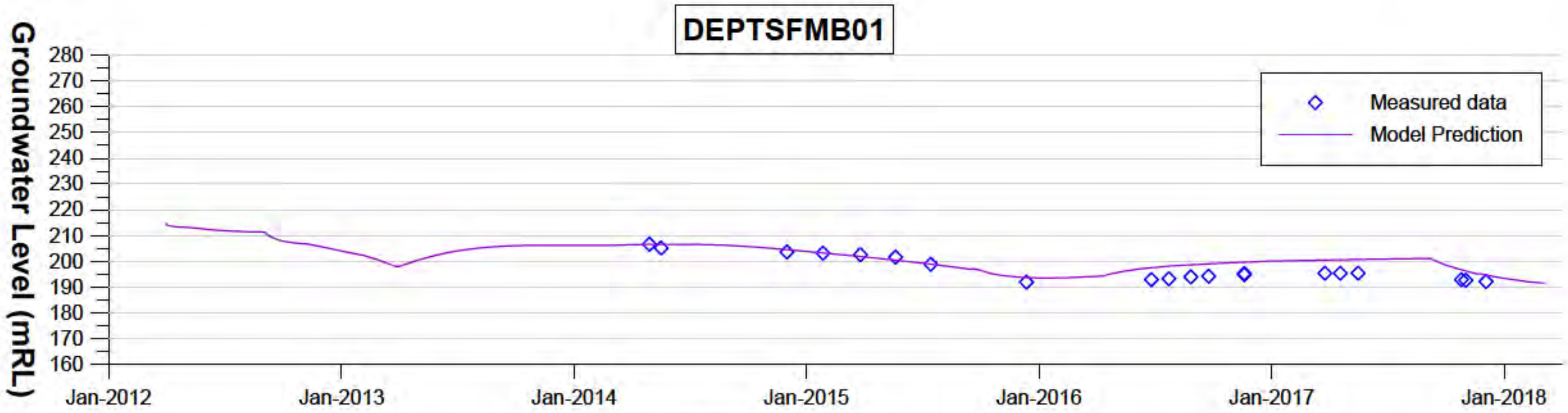
I:\150-2\Grapher\18-03\Hydrographs\BMMB2, Lewis 1, HMB2.grf

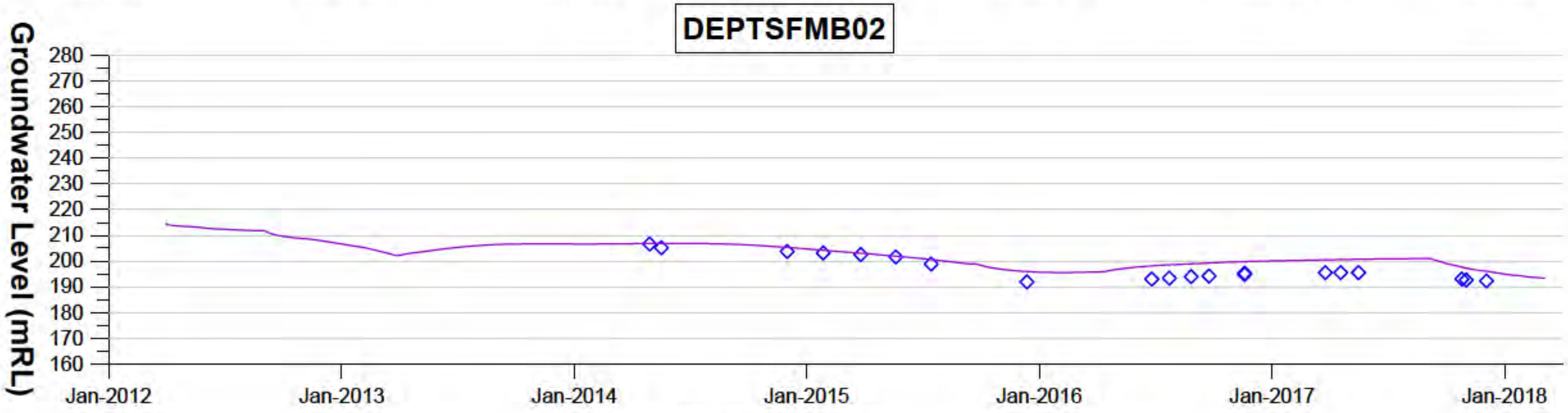
BMMB 2, Lewis 1 and HMB 2

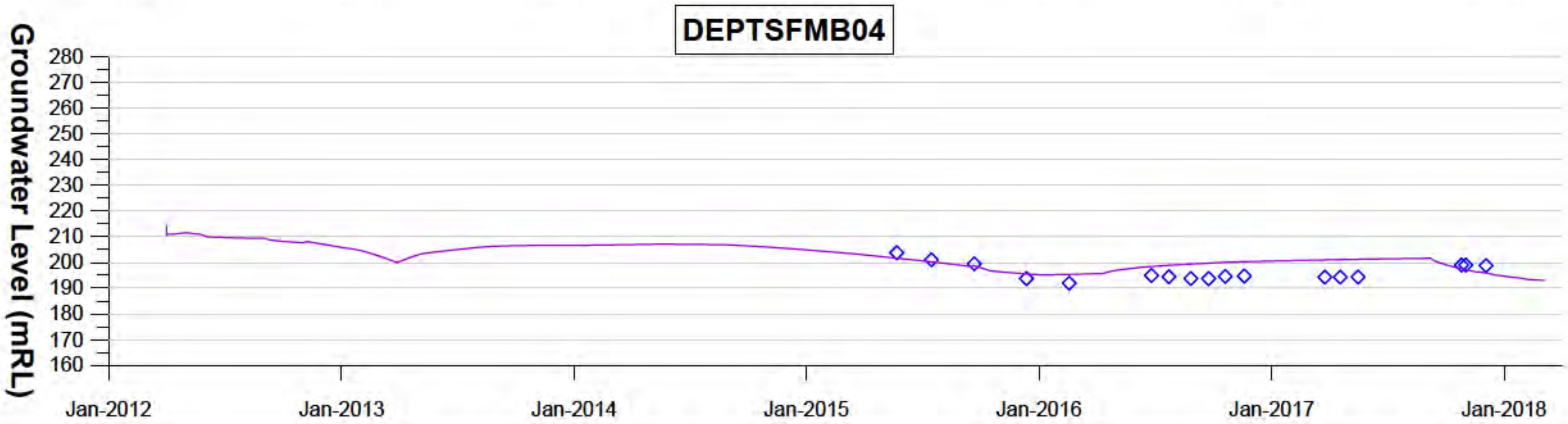
Appendix I-1

Client: Consolidated Minerals Limited
Project: Numerical Dewatering Modelling Summary
Date: May 2018
Dwg. No: 150-2/18/03-AppI-2

I:\150-2\Grapher\18-03\hydrographs\DEPTSFMB01, 2 and 4.grf







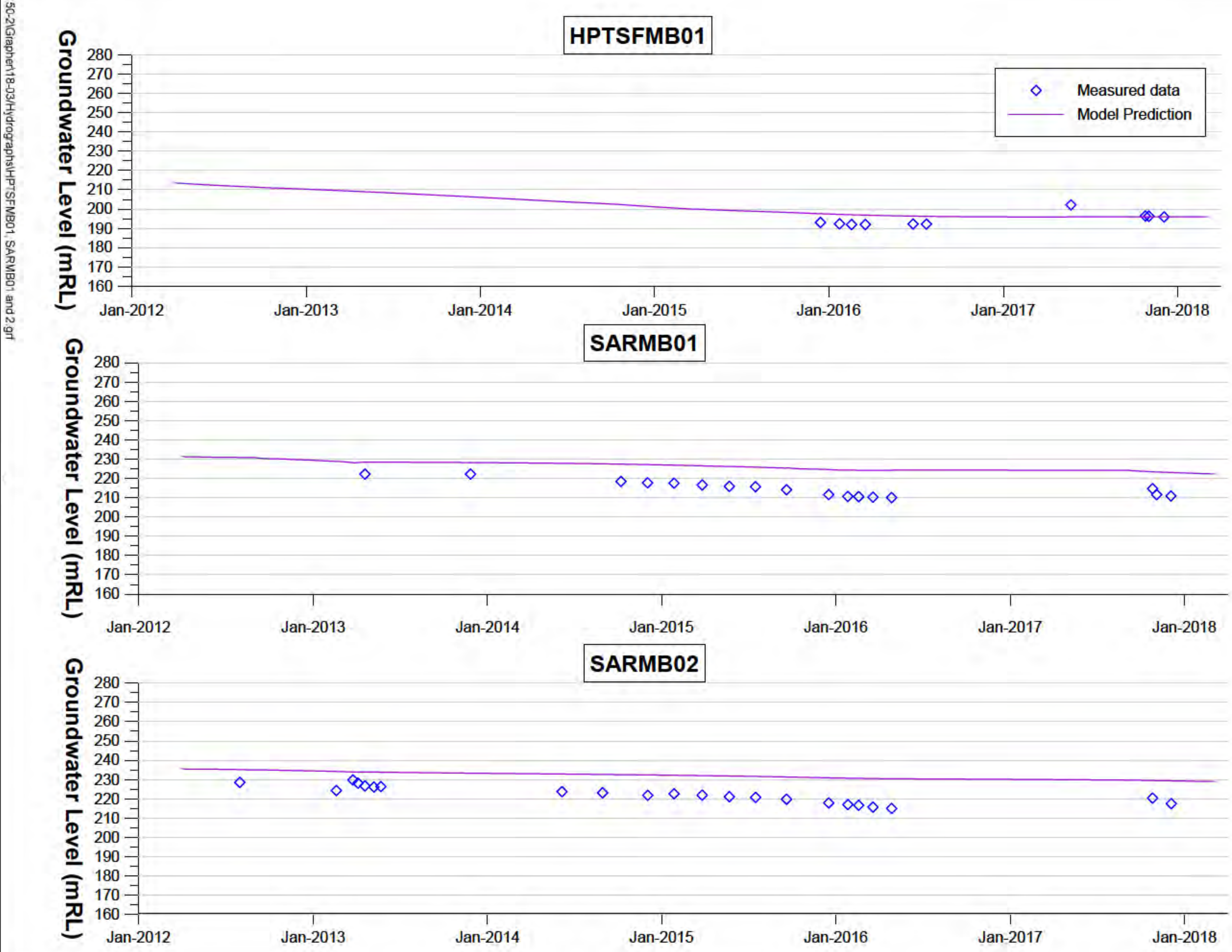
DEPTSFMB01, DEPTSFMB02 and DEPTSFMB04

Rockwater

Appendix I-2

Client: Consolidated Minerals Limited
Project: Numerical Dewatering Modelling Summary
Date: May 2018
Dwg. No: 150-2/18/03-Appl-3

:\150-2\Grapher18-03\Hydrographs\HPTSFMB01, SARMB01 and 2.grf



WWMB 2, SARMB01 and SARMB02

Appendix I-3

Client: Consolidated Minerals Limited

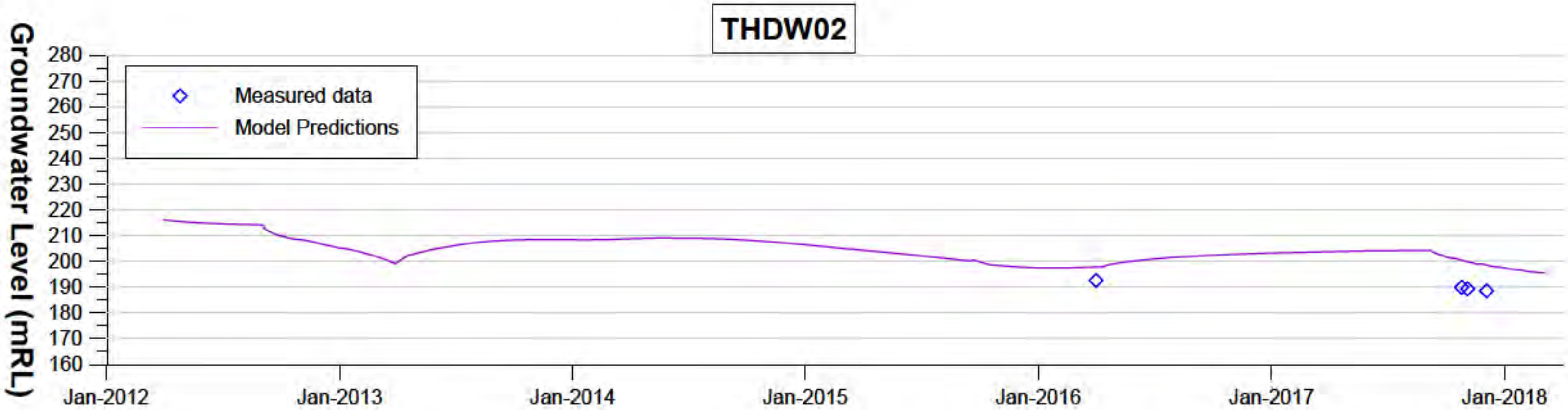
Project : Numerical Dewatering Modelling Summary

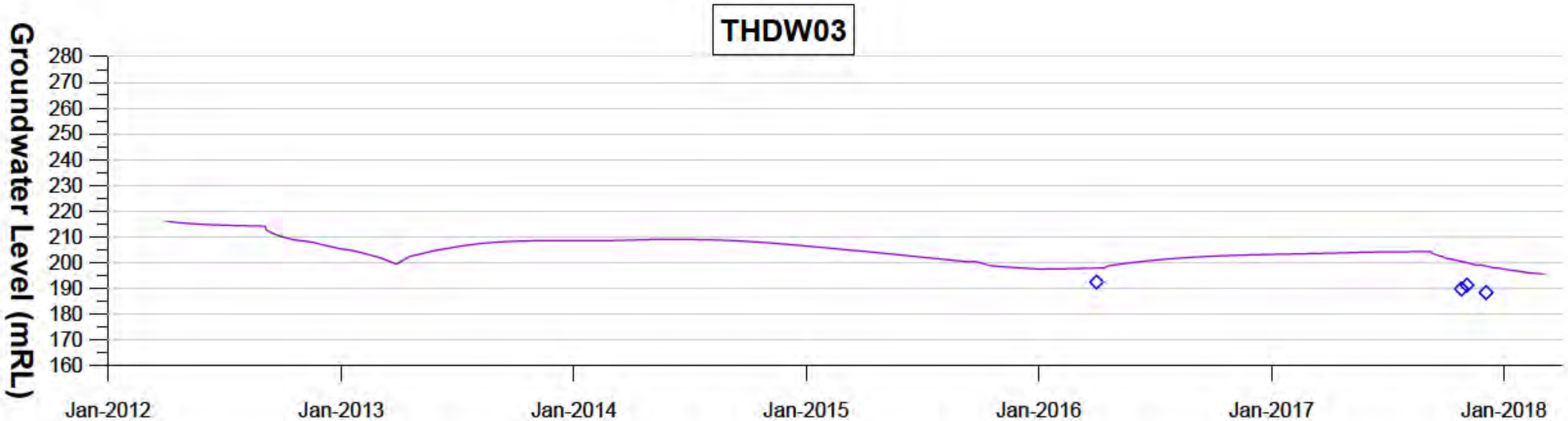
Date : May 2018

Dwg. No: 150-2/18/03-AppI-4

\150-2\Grapher\18-03\Hydrographs\THDW02_3.grf

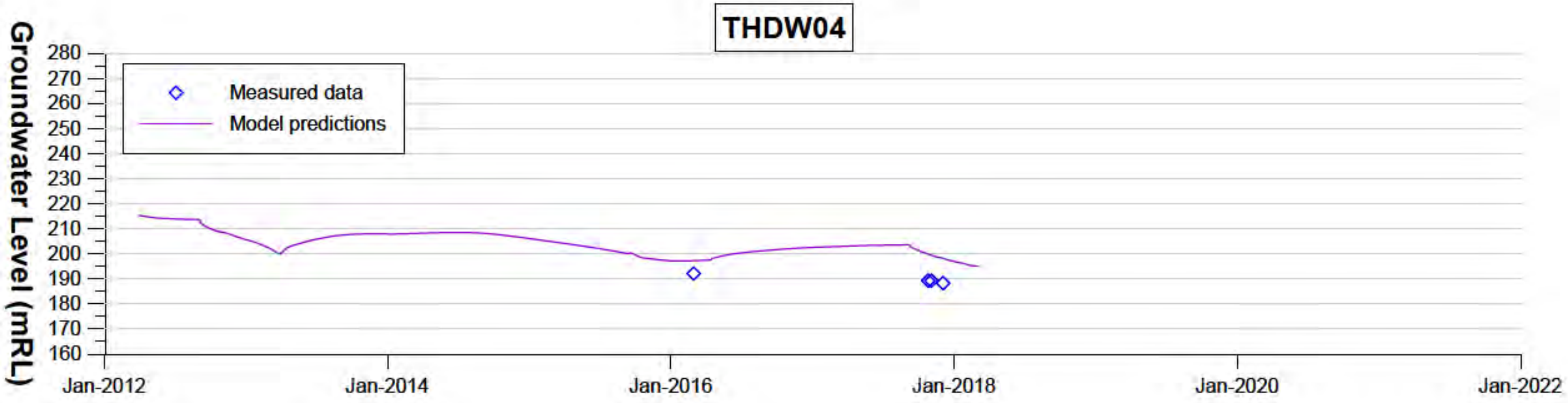
THDW02 and THDW03

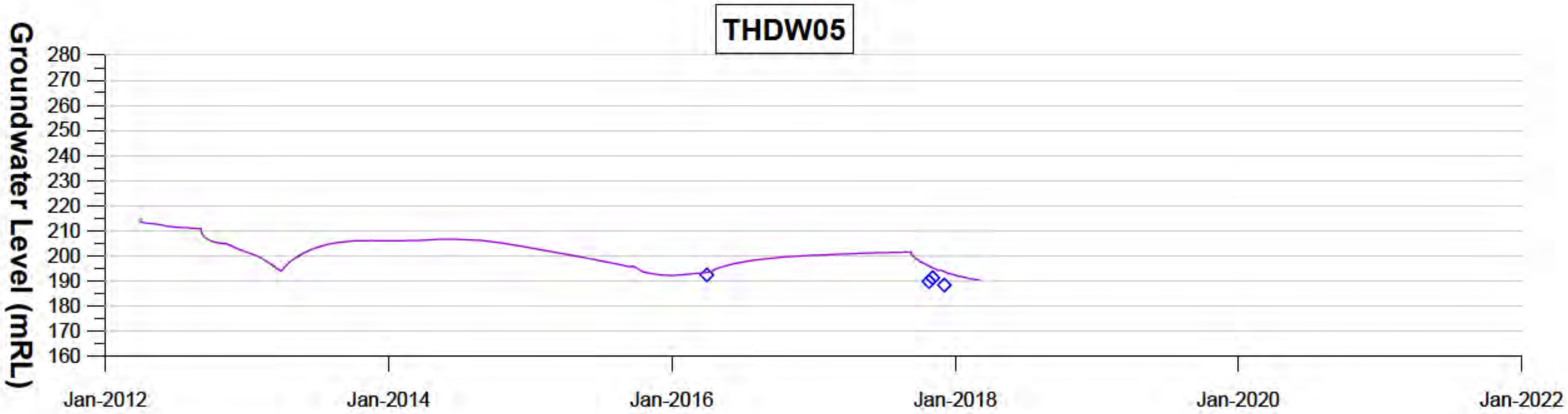




Appendix I-4

Rockwater





Client: Consolidated Minerals Limited

Project : Numerical Dewatering Modelling Summary

Date : May 2018

Dwg. No: 150-2/18/03-AppI-5

\150-2\Grapher\18-03\Hydrographs\THDW04_5.grf

THDW04 and THDW05

Rockwater

Appendix I-5

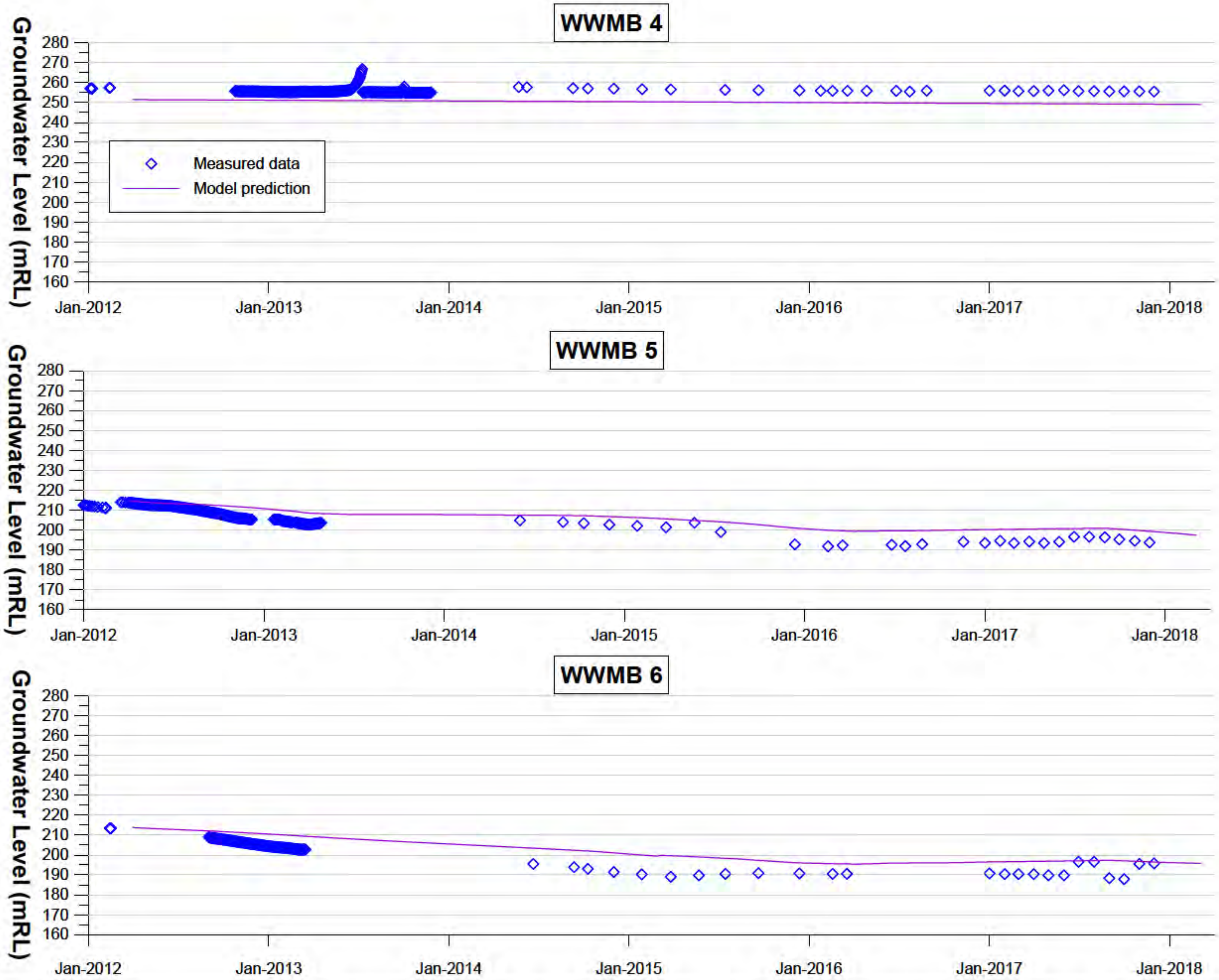
Client: Consolidated Minerals Limited

Project : Numerical Dewatering Modelling Summary

Date : May 2018

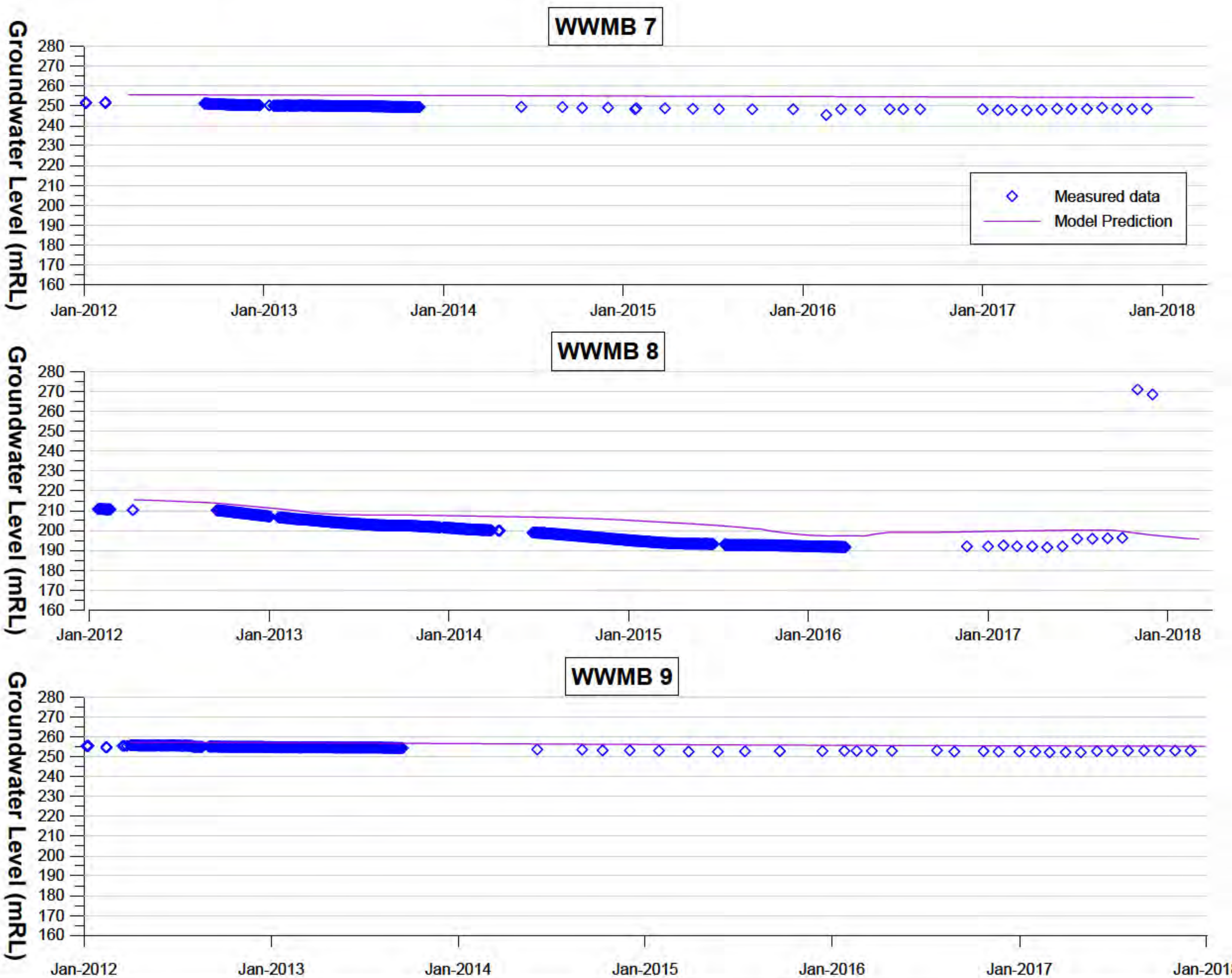
Dwg. No: 150-2/18/03-AppI-6

\\150-2\Grapher18-01\Hydrographs\WWMB4, WWMB 5 and WWMB6.grf



WWMB 4, WWMB 5 and WWMB 6

Appendix I-6



I:\150-2\Grapher18-03\Hydrographs\WWMB 7, 8, 9.grf

Client: Consolidated Minerals Limited

Project : Numerical Dewatering Modelling Summary

Date : May 2018

Dwg. No: 150-2/18/03-AppI-7

WWMB 7, WWMB 8 and WWMB 9

Appendix I-7

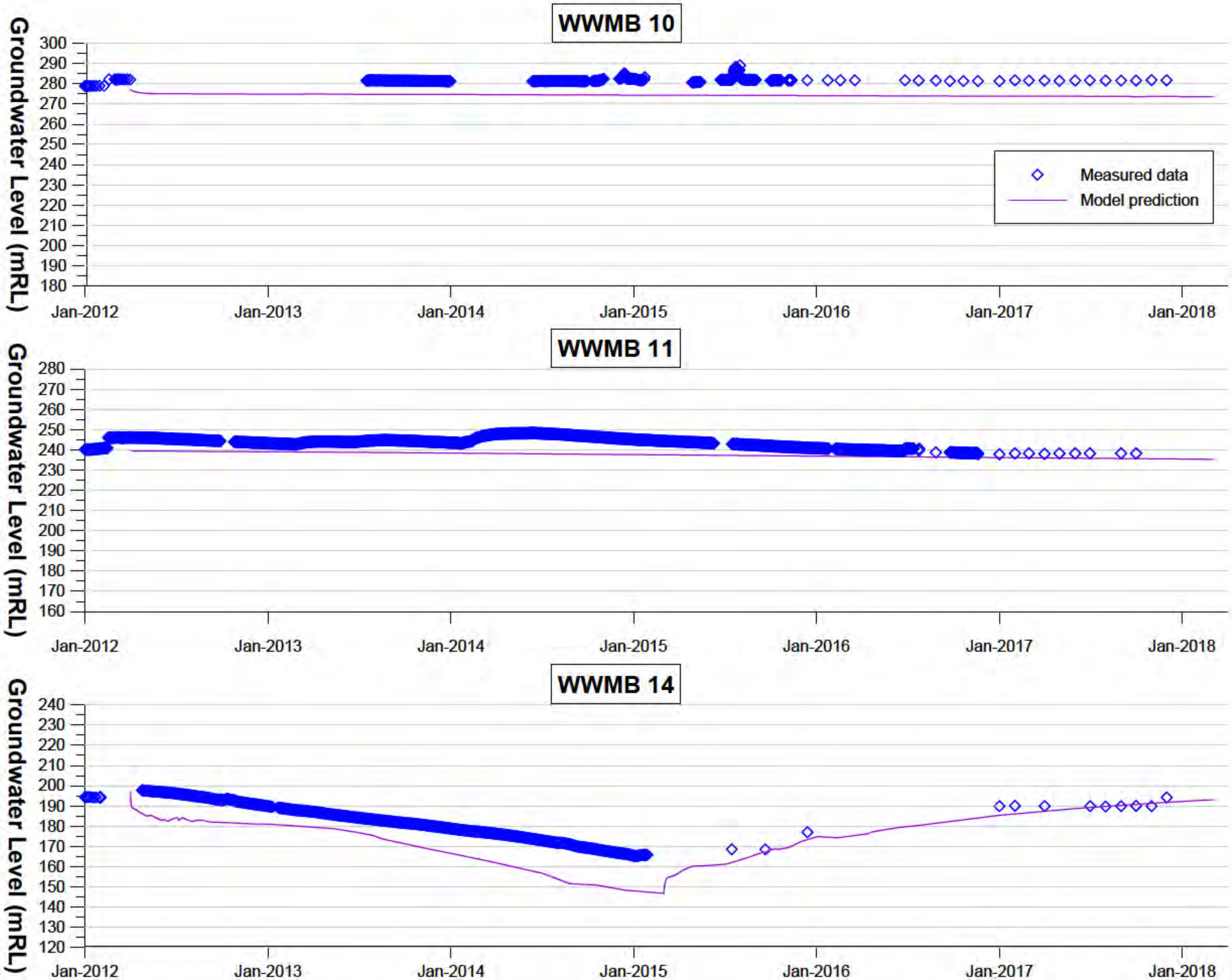
Client: Consolidated Minerals Limited

Project : Numerical Dewatering Modelling Summary

Date : May 2018

Dwg. No: 150-2/18/03-AppI-8

I:\150-2\Grapher\Hydrographs\WWMB 10, 11, 14.grf



WWMB 10, WWMB 13 and WWMB 14

Appendix I-8

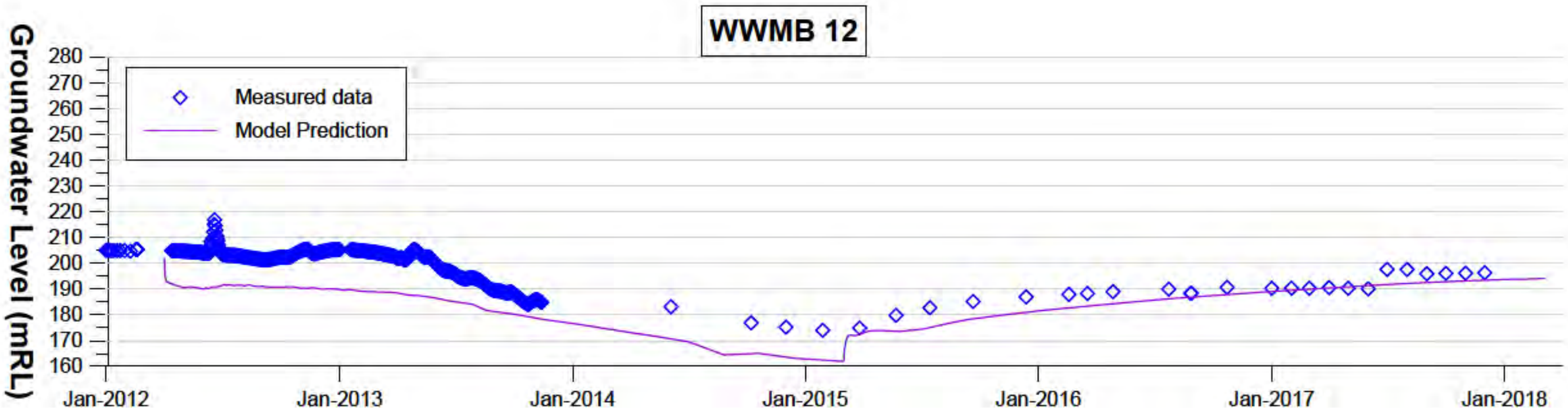
Client: Consolidated Minerals Limited

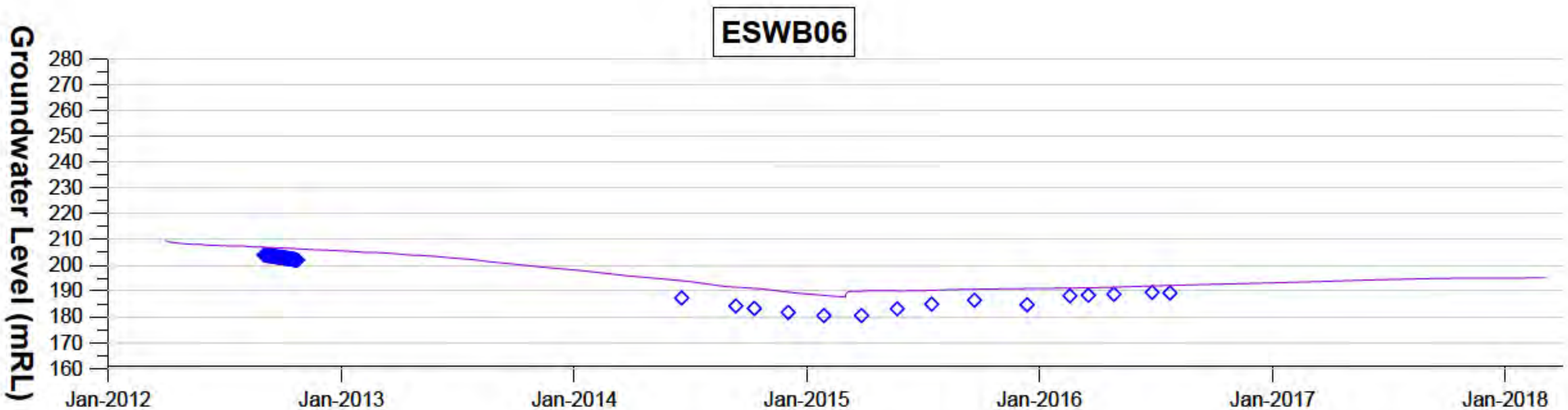
Project : Numerical Dewatering Modelling Summary

Date : May 2018

Dwg. No: 150-2/18/03-AppI-9

\150-2\Grapher\18-03\Hydrographs\WWMB 12 and ESWB06.grf





WWMB 12 and ESWB06

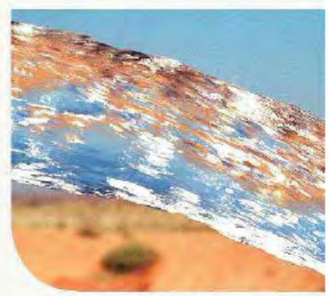
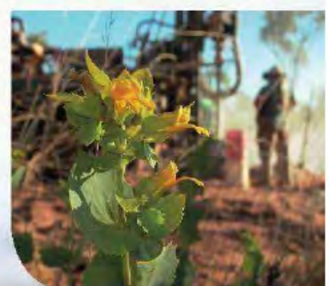
Rockwater

Appendix I-9

APPENDIX IV

2018 Monitoring Bore Completion Report



CML

WOODIE WOODIE MINE

GROUNDWATER MONITORING BORE COMPLETION (WWMB15-18)

REPORT FOR

CONSOLIDATED MINERALS LTD

JULY 2018

Report No. 150-2/18-04

Rockwater
HYDROGEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

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Table 2: Drilling and monitoring bore details – July 2018 2

Figures

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2 Groundwater Contours (m AHD) - July 2018

Appendix

I Bore Completion Logs

REVISION	AUTHOR	REVIEW	AUTHORISED	ISSUED
0	CK	IB	9/7/18	9/7/18

1. INTRODUCTION

Consolidated Minerals (CML) operates the Woodie Woodie manganese mine, situated in the East Pilbara region of Western Australia. Mining is undertaken using open-cut methods and requires a substantial dewatering program. The latest phase of dewatering commenced in September 2017 and involves pumping from a network of five high-capacity ex-pit dewatering bores. The combined pumping capacity is approximately 680 L/s (58,800 kL/day), with pumping currently averaging about 455 L/s. In-pit pumping is also carried out at Big Mack at rates that range from about 100 up to 400 L/s. Dewater is discharged via a pipeline system that connects the dewatering sites to a point of discharge along Brumby Creek.

Predictive groundwater modelling is undertaken to assist in the on-going planning and refining of the dewatering operations at Woodie Woodie. There is a network of monitoring bores across the site that can be used to track the drawdown of groundwater-levels in response to dewatering. The construction of additional monitoring sites was recommended in January 2018, it included replacing some of the existing bores that have become dry or damaged. The increased monitoring bore network will assist dewatering tracking and assessment (and the monitoring of certain bores is a regulatory requirement) as well as improve the hydrogeological understanding of key aquifer regions.

1.1. SCOPE OF WORK

Five sites were selected for initial construction (Fig.1, Table 1). Site A (a replacement bore site) was not completed as it was located within a road/waste dump access reserve. Site B (a replacement bore site) was relocated further north, outside of the mine footprint of Chris D pit.

Table 1: Planned monitoring sites

Site ID	Purpose	Drilled as	Completed as
A	To replace dry bore BMMB2 (this bore is included in GWL operating strategy as a regulatory monitoring point)	Not drilled	Not completed
B	To replace dry bore CD Nth; and provide a north-west monitoring point	WB18004	WWMB18
C	To replace damaged bore WWMB02; and provide a northern monitoring point	WB18001	WWMB15
D-1	West of Jewel Fault; to provide information on fault hydrogeological properties	WB18002	WWMB16
D-2	East of Jewel Fault; to provide information on fault hydrogeological properties	WB18003	WWMB17

2. DRILLING AND BORE CONSTRUCTION RESULTS

Drilling and bore construction was completed by Ausdrill under the supervision of a Rockwater Hydrogeologist from 2 to 8 July 2018. A total of 517 metres was drilled using RC drilling methods at planned sites B, C and D. Four monitoring bores were constructed by lining the 140 mm diameter hole with 50 mm (nominal diameter) Class 12 PVC with a 6 or 12 m slotted section set at the base of the bore. Gravel was installed in the annulus alongside the slotted section and the annulus plugged 0.3 below ground surface and a cement block installed. CML advises that a large diameter pipe will be installed at ground surface to protect the 50 mm PVC casing at a later date. Depth to water was measured post bore construction. Bore WWMB16 is set in an apparent low permeability zone where the depth to water is below the cased depth of 210 m AHD (i.e. the bore is dry) and possibly below the drilled depth of 181 m AHD.

Drilling and bore construction details are summarised in Table 2, bore locations are shown in Figure 1 and bore logs are included in Appendix I.

Table 2: Drilling and monitoring bore details – July 2018

Hole ID	Bore name	Coordinates*		RL*[1]	Drilled depth	Hole diam.	Yield[2]	Cased depth[3]	Slotted interval[4]	EC	WATER LEVEL	
											Est. [5]	Act. [6]
		mE	mN	m AHD	m	mm	L/s	m	m	µS/cm	m AHD	m AHD
WB18001	WW MB15	316,530	7,612,204	283.96	142	140	~ 1	140	128 – 140	775	193	194
WB18002	WW MB16	317,736	7,599,234	283.86	103	140	Nil	74	68 – 74	NA	234	<210[7]
WB18003	WW MB17	315,440	7,595,848	301.50	100	140	~ 1-2	96	84 – 96	1,110	276	279
WB18004	WW MB18	318,084	7,611,121	291.68	172	140	Nil	160	148 – 160	NA	176	191

[1] = ground surface elevation
[2] = open hole
[3] = 50 mm diameter class 12 PVC
[4] = 50 mm diameter class 12 PVC, 0.5 mm slots, gravel installed in annulus to 2 m above slots
[5] = from groundwater contours based on depth to water in monitoring bore network in June-18
[6] = water level measured 8-7-18, based on planned RL elevation
[7] = cased hole dry to 210 m AHD; drilled hole dry to 181 m AHD
*planned (coordinates are GDA, Zn51) – bores to be surveyed
bgl = below ground level; Est. = estimated; Act. = actual

3. SITE WATER LEVELS

Depth to water is measured in the network of monitoring bores on a monthly basis. Groundwater contours are presented in Figure 2. They are based on levels collected in late-June 2018 as well as the water levels obtained from monitoring bores WWMB15-18 on July 8 2018.

The depth to water around the Topvar mining hub approximates 180 m AHD. To the north of Chris D pit the depth to water (based on the water level at WWMB18) is slightly higher than anticipated at around 190 m AHD.

The water level at monitoring bore WWMB16, south of Lox pit, has been estimated based on the results of drilling at that site. Here the depth to water appears to be much lower than expected. This could be the result of the hydraulic properties of the Jewel Fault or low permeability strata at that location. This could be confirmed with further hydrogeological assessment of drilling data from this area.

Based on the depth to water in monitoring bore WWMB17 (George deposit) water is close to the ground surface. Although only a minor water yield was observed from drilling this site, other exploration drilling currently being carried out in this area is noted to be producing large quantities of water.

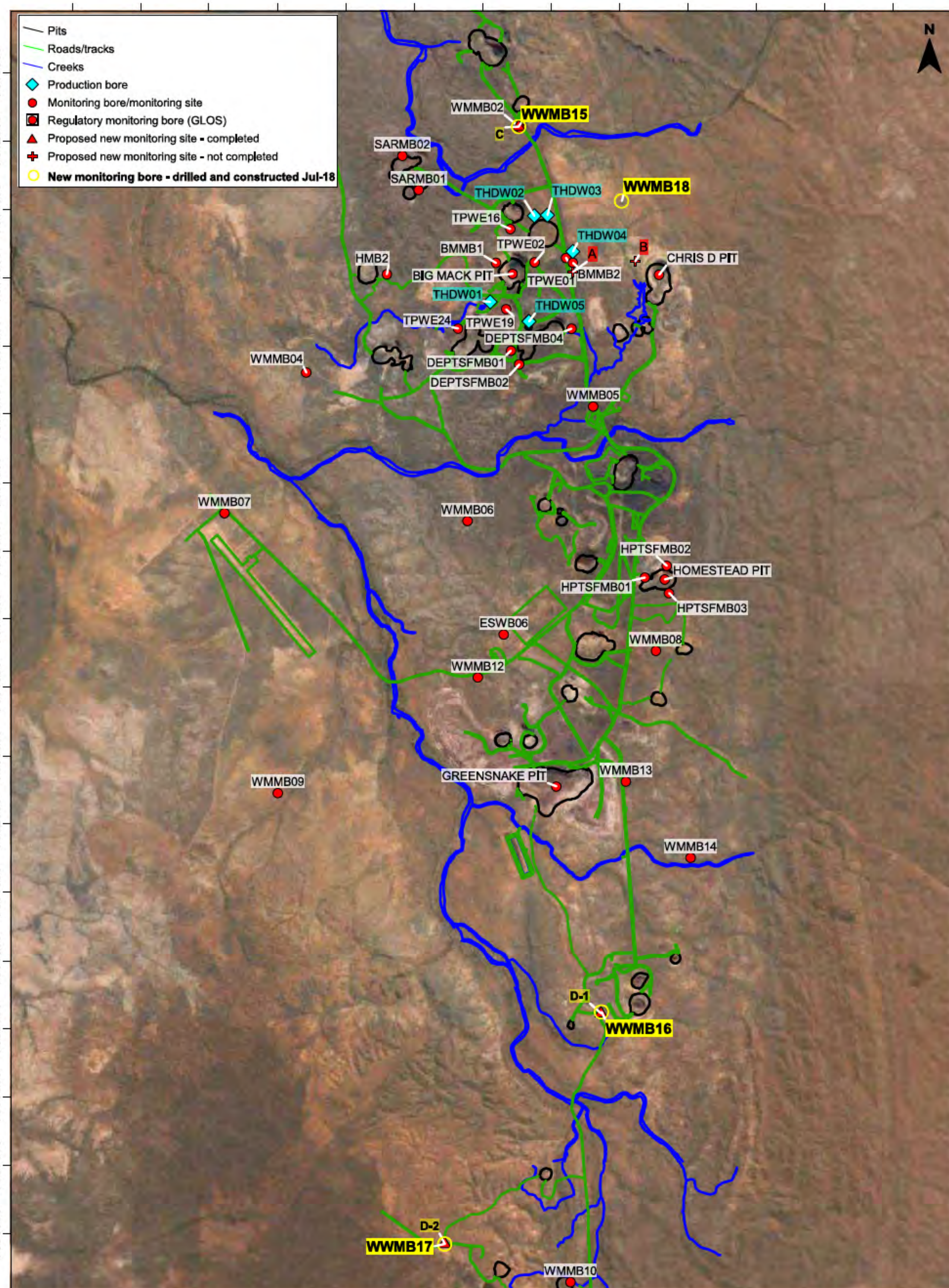
4. SUMMARY

Four monitoring bores (WWMB15 to WWMB18) were constructed from 2 to 8 July 2018. The bores were installed to add to the groundwater monitoring network at Woodie Woodie and should be included in the monthly groundwater monitoring, noting that if bore WWMB16 remains dry over the next few monitoring rounds it could be excluded from the monitoring round.

[redacted]

FIGURES

Figure 1



150-2/Surfer/18-4/F1 - sites.srf

Client: Consolidated Minerals Limited

Project: Groundwater Monitoring

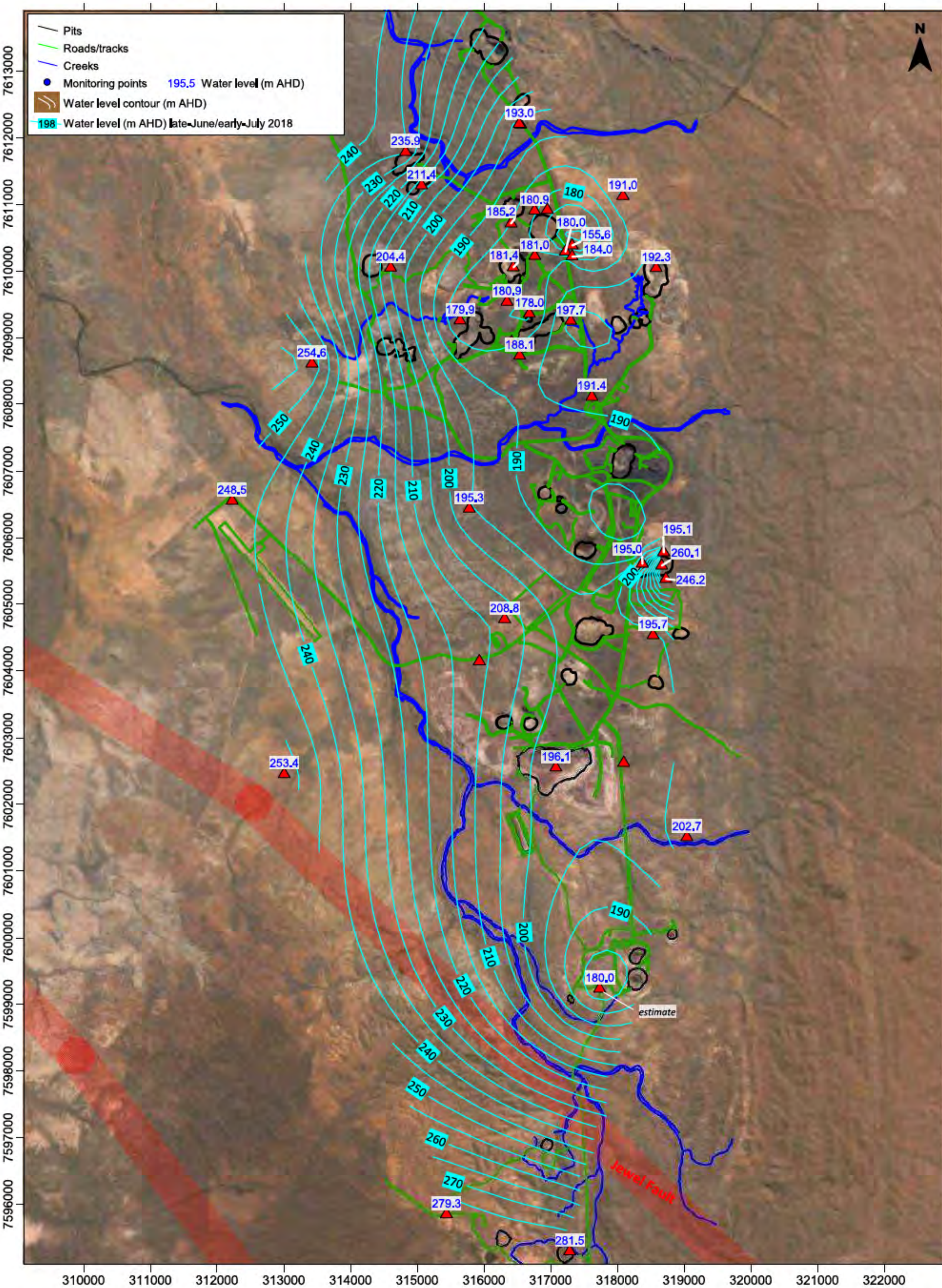
Date: July 2018

Dwg: 150-2/18/04-1

Existing and New Monitoring Sites - July 2018

Rockwater

Figure 2



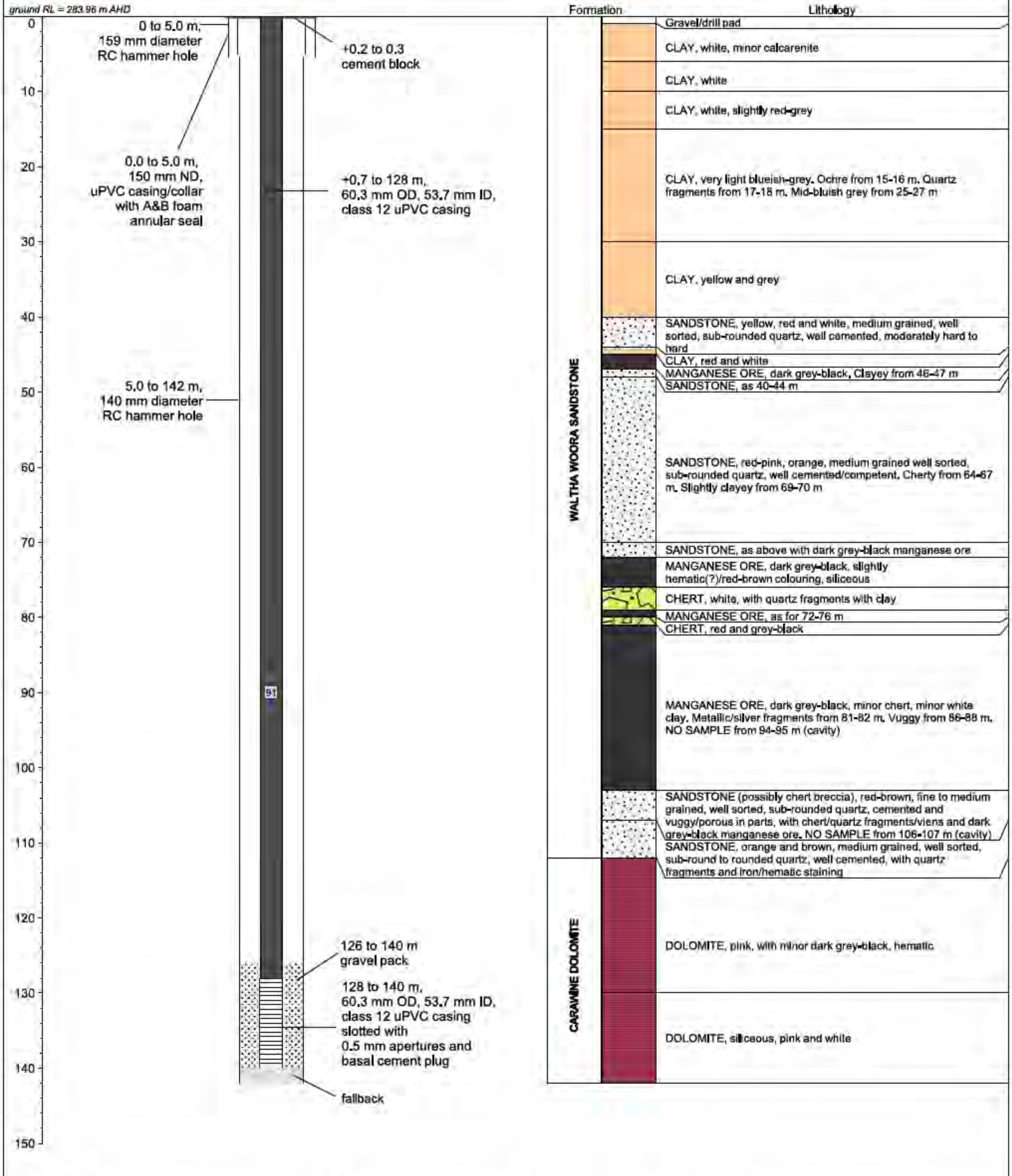
150-2/Surfer/18-4/F2 – wl contours Jul-18.srf

Client:	Consolidated Minerals Limited	Groundwater Contours - July 2018 (m AHD)
Project:	Groundwater Monitoring	
Date:	July 2018	
Dwg:	150-2/18/04-2	Rockwater

APPENDIX I

Bore Completion Logs

Rockwater
CONSULTANT HYDROGEOLOGISTS



Construction Date:	3 July 2018	Depth Drilled (m bgl):	142	SWL (7 July 2018):	90.97 m bgl / 198 m AHD
Easting (m MGA):	316530.4	Top of Casing (m agl):	0.7	Water Chemistry (2 July 2018):	EC 775 uS/cm; pH 7.9
Northing (m MGA):	7612204	Cased Depth (m bgl):	140	Airlift (L/s):	~1
Drill Hole ID	WB18001 (Site C)	Screened Interval (m bgl):	128 to 140		

150-2/Strain/MB-July 2018.str

Client: Consolidated Minerals Limited

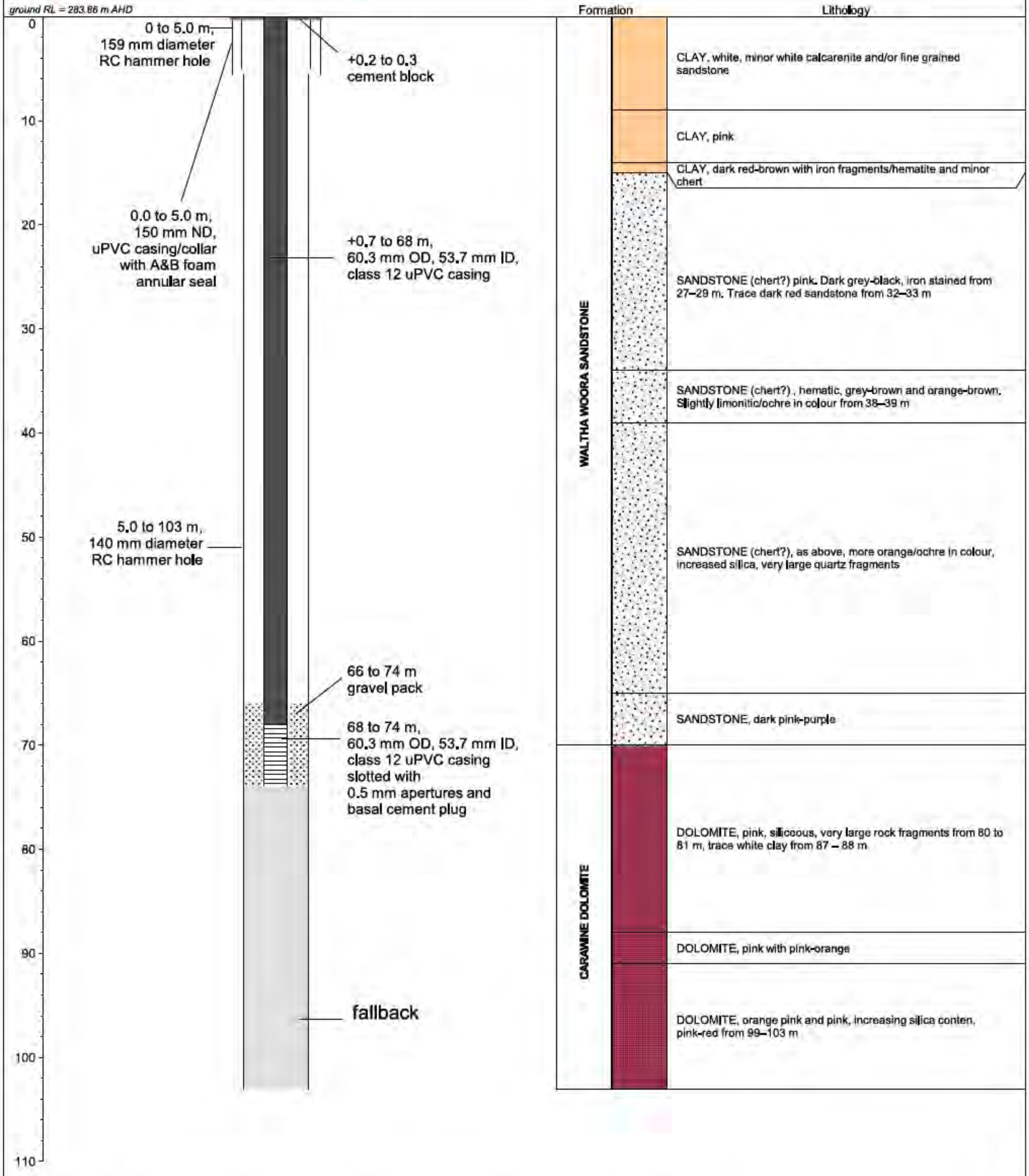
Project: Woodie Woodie Groundwater Monitoring

Date: July 2018

Dwg. No.: 150-2/18/4-App I-1

Monitoring Bore WWMB15
Composite Log

Rockwater
CONSULTANT HYDROGEOLOGISTS



Construction Date:	5 July 2018	Depth Drilled (m bgl):	103	SWL (7 July 2018):	DRY; <215 m AHD
Easting (m MGA):	317736.5	Top of Casing (m agl):	0.7	Water Chemistry (5 July 2018):	No sample
Northing (m MGA):	7599234	Cased Depth (m bgl):	74	Airlift (L/s):	Nil
Drill Hole ID	WB18002 (Site D-1)	Screened Interval (m bgl):	68 to 74		

150-2/Strater/MBs July 2018.ster

Client: Consolidated Minerals Limited

Project: Woodie Woodie Groundwater Monitoring

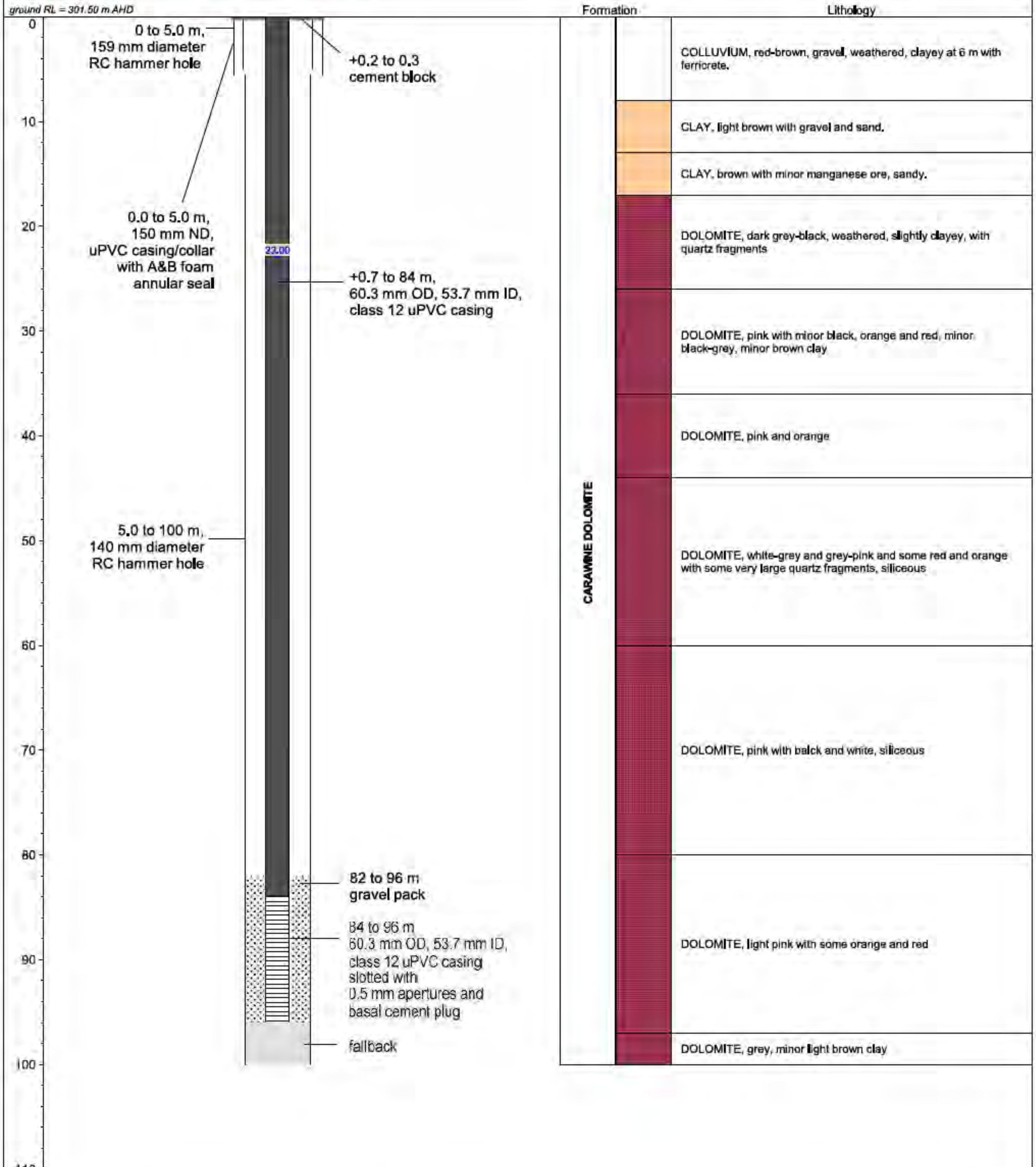
Date: July 2018

Dwg. No.: 150-2/18/4-App I-2

Monitoring Bore WWMB16 Composite Log

App I-3

Rockwater
CONSULTANT HYDROGEOLOGISTS



Construction Date:	6 July 2018	Depth Drilled (m bgl):	100	SWL (8 July 2018):	22.77 m bgl / 297.2 m AHD
Easting (m MGA):	315439.3	Top of Casing (m agl):	0.6	Water Chemistry (5 July 2018):	EC 1,100 uS/cm; pH 7.9
Northing (m MGA):	7595848	Cased Depth (m bgl):	96	Airlift (L/s):	~1 to 2
Drill Hole ID	WB18003 (Site D-2)	Screened Interval (m bgl):	84 to 96		

150-2/Strater/MBs July 2018.sr

Client: Consolidated Minerals Limited

Project: Woodie Woodie Groundwater Monitoring

Date: July 2018

Dwg. No.: 150-2/18/4-App I-3

Monitoring Bore WWMB17 Composite Log

APPENDIX V

Recent Groundwater Exploration Programme Summary

SUMMARY DATA FROM 2018 TO 2020 GROUNDWATER EXPLORATION PROGRAMMES

1.1 2018 RC DRILLING PROGRAM

From 12 September to 20 October 2018 RC holes were drilled to assess lithological and hydrogeological features. This program did not generally highlight obvious fracture-hosted aquifer features (such as large cavities and highly-contrasting airlift yields).

The Table 1 represents initial order-of-magnitude assessments of hydraulic conductivity within a highly heterogeneous aquifer system (airlift recovery results).

Table 1 – 2018 airlift results

Site / ID	Aquifer thickness (m)	Max. airlift rate (L/s)	Hydraulic Conductivity (m/d)
Chutney			
WB18005	7.4	10	6.3 – 12.1
WB18006	40.0	1.7	1.0E-06 – 2.3
WB18007	27.8	1.2	1.0E-06 – 3.1
WB18008	41.6	94	2.2
Radio Hill			
WB18009	33.5	0.2	1.4E-06 – 2.3
WB18010	51.6	1.8	1.0E-02 – 1.8
WB18011	61.1	1.7	7.8 – 1.1
WB18012	72.4	1	1.3
Canyon			
WB18013	38.0	0.02	1.0E-06 – 0.9
WB18014	39.3	5	0.2 – 0.9
WB18015	42.1	1.1	0 – 0.8
WB18016	35.9	0.003	1.0E-06 – 0.9

1.2 2019-2020 RC DRILLING PROGRAM

In 2019–2020 Consolidated Minerals undertook RC drilling programs for various sites at Eat and Cracker Pit. Rockwater supervised site operations during these RC drilling programs and recorded field lithological and hydrogeological data (Rockwater, 2020).

[redacted] CRACKER PIT DRILLING RESULTS

The Cracker Pit RC drilling program was completed from 7 to 14 February 2019. Bore collars and orientations (Table 2) were planned based on resource-drilling and resource-modelling data.

Table 2 : Cracker Pit RC collar locations, orientations and depths

Hole ID	mE	mN	mRL	Depth drilled (m bgl[1])	Dip	Azimuth
CRHY002	315,818.00	7,609,194.00	237.0	201	-87.1	280.9
CRHY003	315,693.37	7,608,785.84	243.3	201	-80[A]	296[A]
CRHY006	315,849.14	7,609,114.22	237.0	237	-74.8	292.3
CRHY007	315,833.70	7,609,060.76	237.3	261	-79.5	283.7

1. Metres below ground level
A. Planned dip and azimuth (survey data unavailable)

This program suggests the main ore zone is not particularly transmissive (Table 3). Meanwhile at two drilling locations to the west of the pit (at 315655mE, 7609332mN and also at 315636mE, 7609259mN) the hydraulic conductivity was quite high (in the order of 10–50 m/day).

Table 3: Cracker Pit drilling results

Hole ID	Groundwater level (m RL)		Saturated thickness (m)		Transmissivity (m2/d)[5]	Lithology summary		Airlift rate (L/s)	
	SWL[1]	Intercept[2]	All[3]	Aquifer[4]		Cavities[6] (mRL)	Manganese (mRL)	Max.	Avg.
CRHY002	166.9	105	131	94	4.8	171–169, 158	219–217, 213–209, 165–161, 143–137	11.32	1.46
CRHY003	176.5	150	131	15	2.2	-	-	0.12	-
CRHY006	168.0	83	160	145	1.6	157–155, 148–144, 140, 26 & 23	63–55	4.24	0.79
CRHY007	169.2	86	189	172	9.3	-	37.3–19.3	7.26	4.64

1. Based on regional monitoring bore data the time of drilling
2. RL of first fracture/aquifer feature
3. SWL minus depth of hole (angle holes' depth measured as true vertical depth)
4. SWL minus last significant fracture/aquifer feature
5. Based on a simplified numerical assessment of airlift data, whereby transmissivity is inversely estimated based on yield-drawdown data. Drawdown is estimated based on the initial groundwater level, the aquifer thickness and the timing of the drop off in airlift yield. This initial assessment is provided for the purpose relative comparison only.
6. Only above-watertable and near-watertable cavities are listed

[redacted] EAT PIT DRILLING RESULTS

A summary of Eat Pit RC drilling results is provided (Table 4). This program was completed from 1 to 4 October 2019. Hole EARC08 yielded the greatest airlift rate and depth to water out of the two holes while the deeper hole, EARC07v2 only achieved a maximum airlift rate of 2 L/s.

Table 4: Eat Pit drilling results

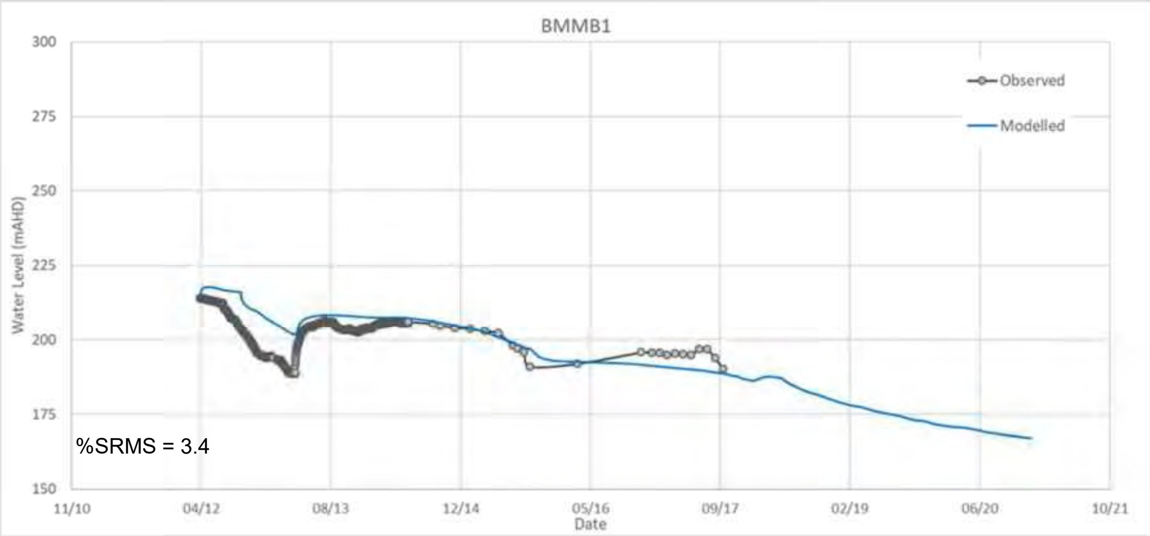
Hole ID	mE	mN	Date drilled	Depth drilled (m bgl[1])	Groundwater level (m bgl[1])	Max. airlift rate (L/s)
EARC07v2	315859	7608960	4 Oct 2019	285	114.0	2.0
EARC08	316005	7608960	2 Oct 2019	225	153.0	20.0

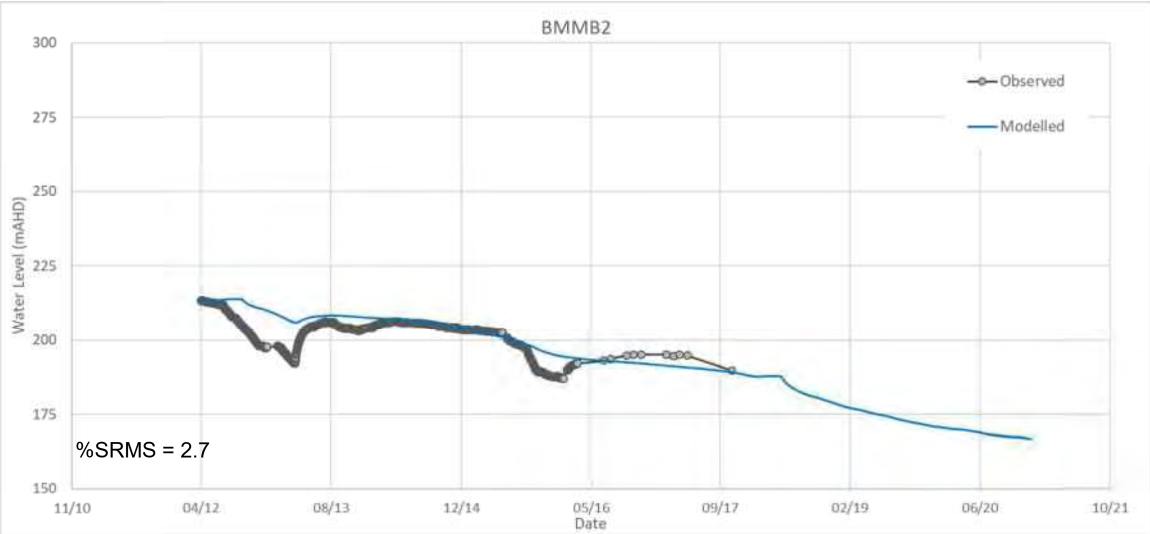
1. Metres below ground level

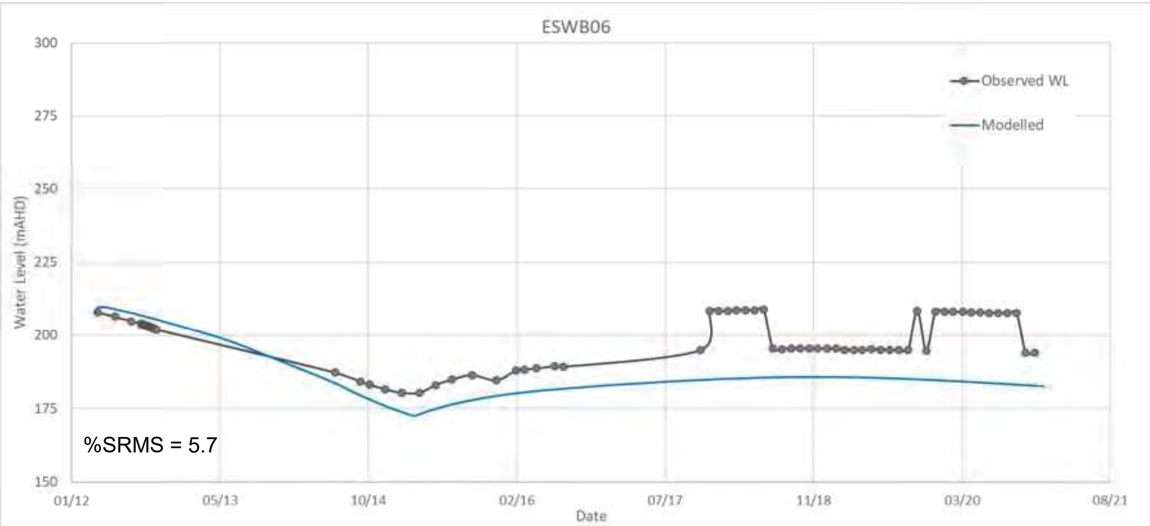
APPENDIX VI

Monitoring Bore Schedule and Model Calibration Hydrographs

Bore	mE	mN	m TOC (m AHD)	Ground (m AHD)	Casing Height (m)	Hole Depth (m bgl)	Hole Depth (m AHD)	Slotted interval (m bgl)	Slot Top (m AHD)	Slot bottom (m AHD)	Modelled Slot (m AHD)	Model Slice	Slice approx elevation (m AHD)
BMMB1	316199	7610213	285.8	285.0	0.8	100	185.0				197.0	6	180
BMMB2	317298	7610105	285.8	285.5	0.3	102	183.5	36-102	249.8	183.8	216.8	4	227
ESWB06	316312	7604776	282.3	268.9	13.4	150	118.9		94.0	202.0	148.0	7	141
HMB2	314601	7610048	280.1	279.3	0.8	102	177.3	36-102	244.1	178.1	211.1	4	222
SARMB01	315068	7611280	292.6	292.1	0.5	100	120.1				132.1	7	148
TPWE01	317223	7610286	286.4	285.9	0.5	174	111.9				123.9	8	112
TPWE02	316763	7610222	288.1	287.6	0.5	180	107.6				119.6	8	114
TPWE16	316406	7610709	292.0	291.4	0.6	190	101.4		100.0	178.0	139.0	7	154
TPWE19	316345	7609535	279.5	279.0	0.5	249	30.0		237.0	249.0	243.0	3	242
TPWE24	315643	7609253	279.8	279.0	0.8	144	135.0		126.0	144.0	135.0	7	149
WMMB02	316549	7612191	285.7	284.9	0.8	120	164.9	36-120	249.7	165.7	207.7	5	205
WMMB04	313423	7608609	261.2	260.5	0.7	120	140.5	36-120	225.2	141.2	183.2	5	188
WMMB05	317619	7608113	276.0	275.5	0.5	120	155.5	112-148	164.0	128.0	146.0	7	146
WMMB06	315780	7606435	277.8	277.4	0.4	150	127.4	26-110	251.8	167.8	209.8	5	201
WMMB07	312227	7606552	264.0	263.6	0.4	127	136.6	26-127	238.0	137.0	187.5	5	198
WMMB08	318535	7604536	281.9	281.4	0.5	120	161.4	36-120	245.9	161.9	203.9	5	203
WMMB09	313007	7602453	274.2	273.6	0.6	122	151.6	26-122	248.2	152.2	200.2	5	198
WMMB10	317287	7595294	294.0	293.5	0.5	120	173.5	36-120	258.0	174.0	216.0	5	221
WMMB11	314679	7615431	280.7	280.0	0.7	124	156.0	36-124	244.7	156.7	200.7	5	204
WMMB12	315932	7604144	269.8	269.2	0.6	120	149.2	36-120	233.8	149.8	191.8	5	195
WMMB14	319042	7601505	285.2	284.7	0.5	120	164.7	36-120	249.2	165.2	207.2	5	203
WMMB15	316532	7612204	284.9	284.3	0.6	142	142.3	128-140	156.9	144.9	150.9	7	148
WMMB17	315439	7595848	302.6	302.0	0.5	100	202.0	84-96	218.6	206.6	212.6	5	220
WMMB18	318084	7611121	292.6	292.1	0.5	172	120.1	148-160	144.6	132.6	138.6	8	116

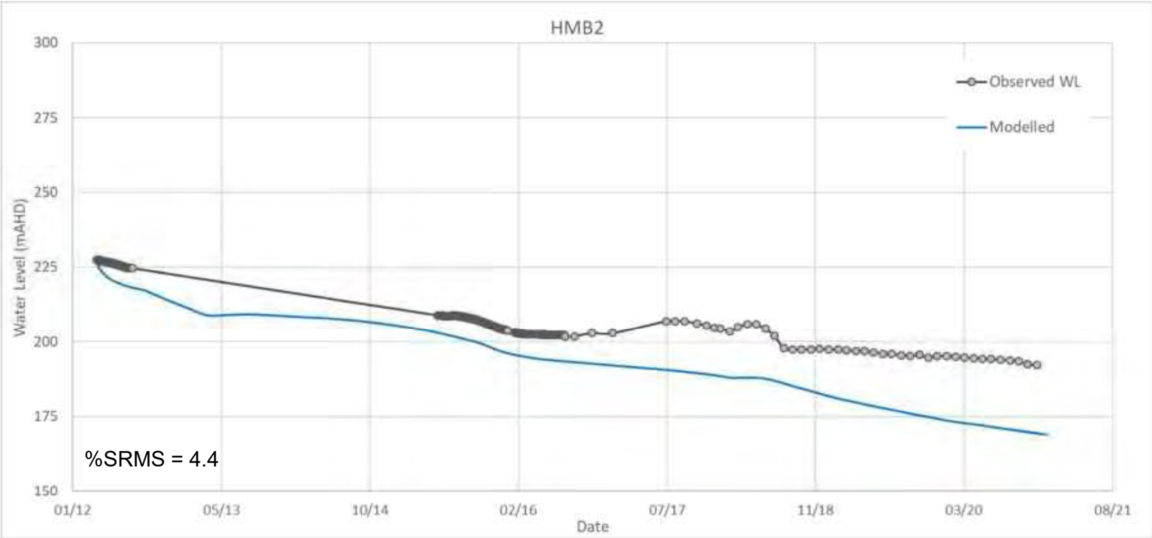


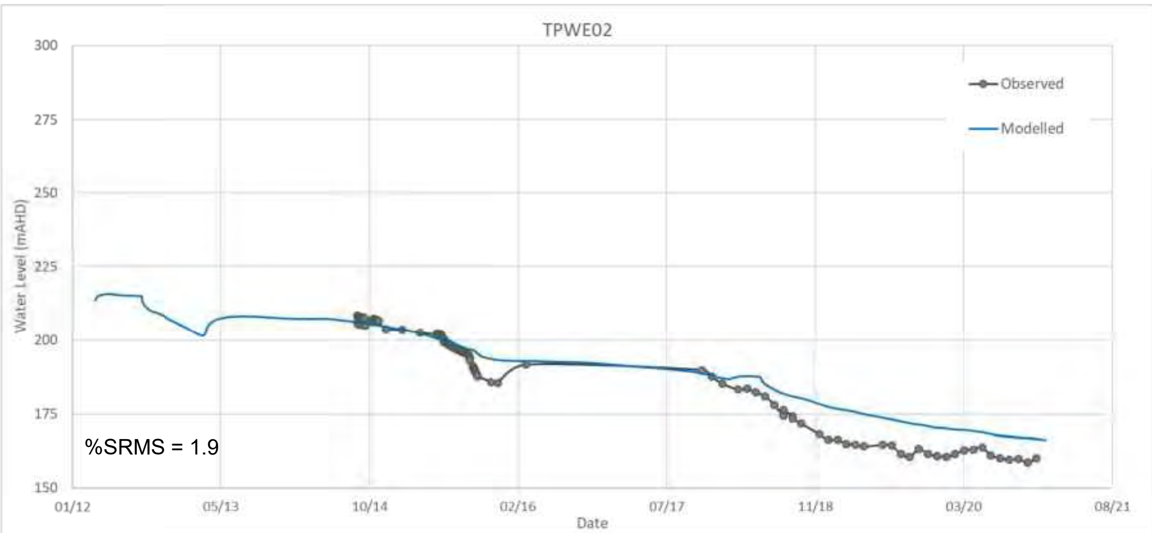




150-2/Grapher/Calibration Phase Hydrographs/VI-1

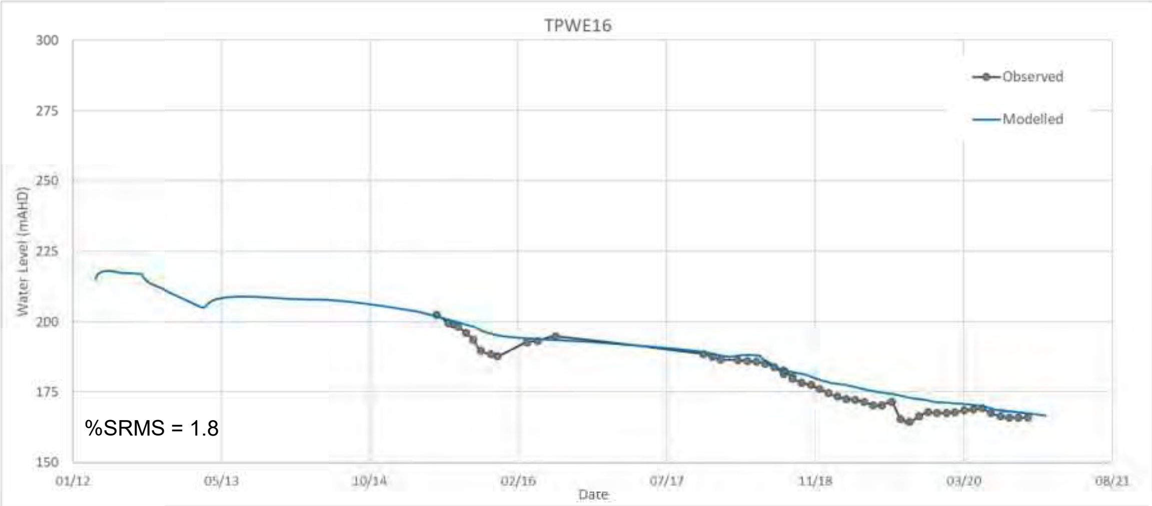
Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVI-1	Calibration Phase Hydrographs (BMMB1, BMMB2, ESWB06)

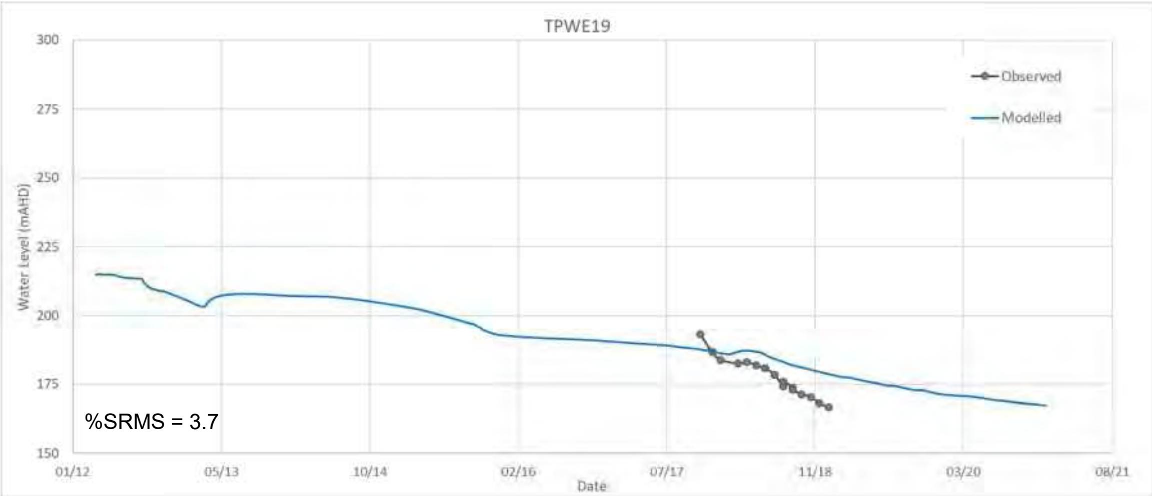


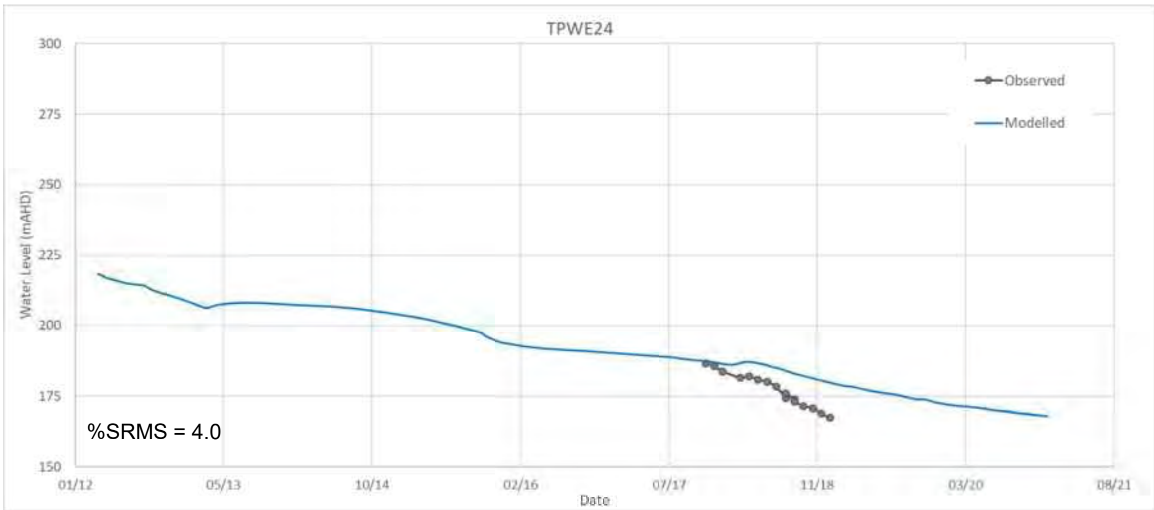


150-2/Grapher/Calibration Phase Hydrographs/VI-2

Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVI-2	Calibration Phase Hydrographs (HMB2, SARMB01, TPWE02)







150-2/Grapher/Calibration Phase Hydrographs/VI-3

Client: Consolidated Minerals

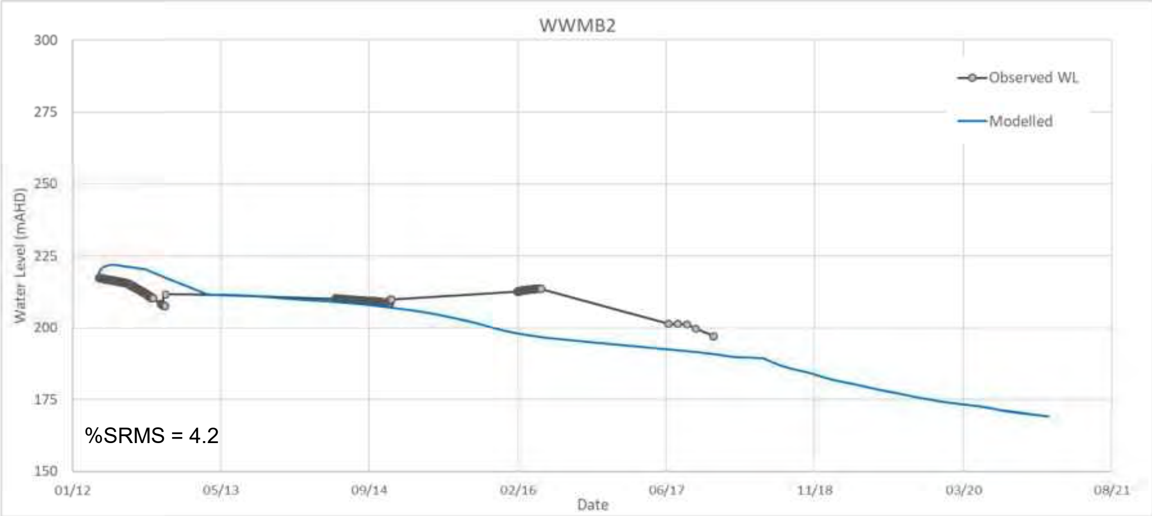
Project : Detailed Hydrogeological Assesment and Modeling Report

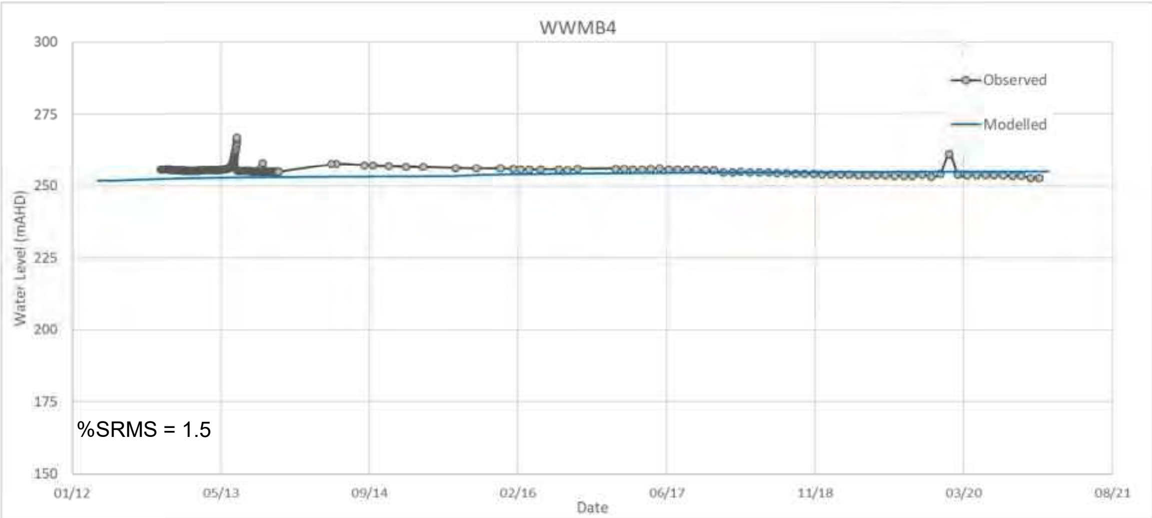
Date : November 2021

Dwg. No: 150-2/21/1-AppVI-3

Calibration Phase Hydrographs
(TPWE016, TPWE019, TPWE024)

Rockwater





150-2/Grapher/Calibration Phase Hydrographs/VI-4

Client: Consolidated Minerals

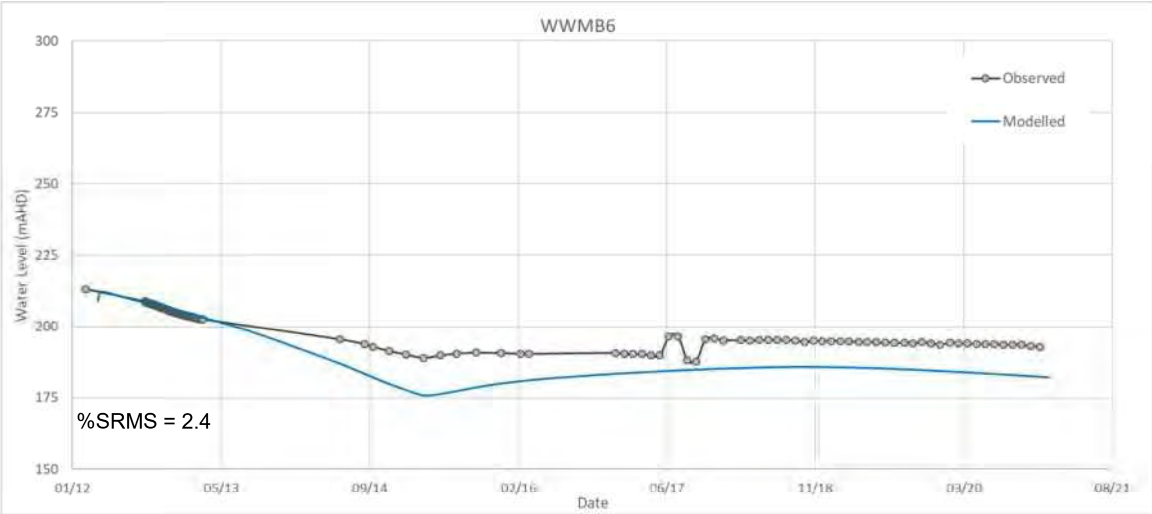
Project : Detailed Hydrogeological Assesment and Modeling Report

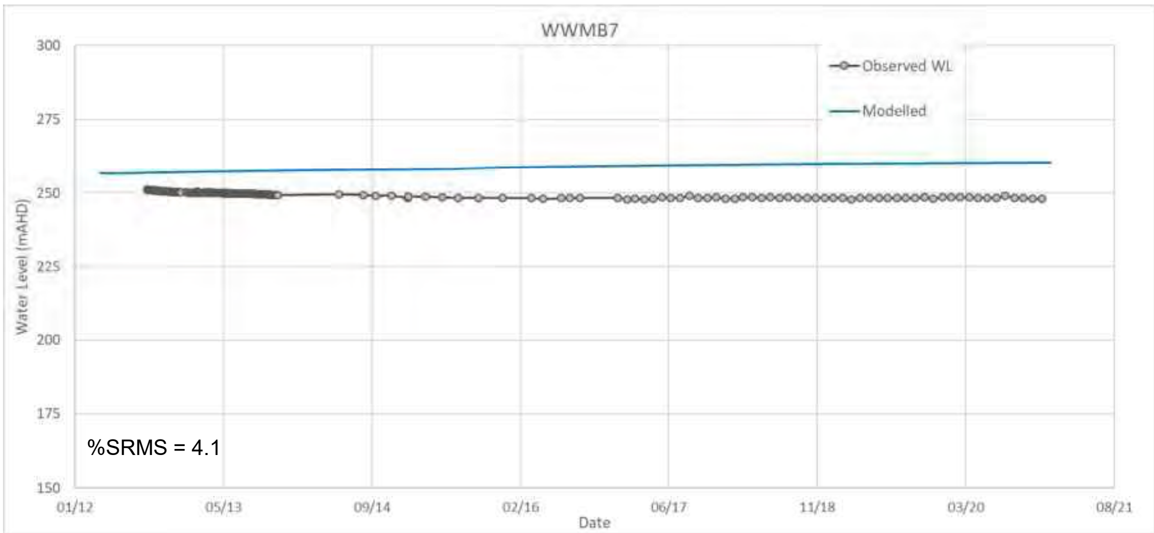
Date : November 2021

Dwg. No: 150-2/21/1-AppVI-4

Calibration Phase Hydrographs
(WWMB2, WWMB4, WWMB5)

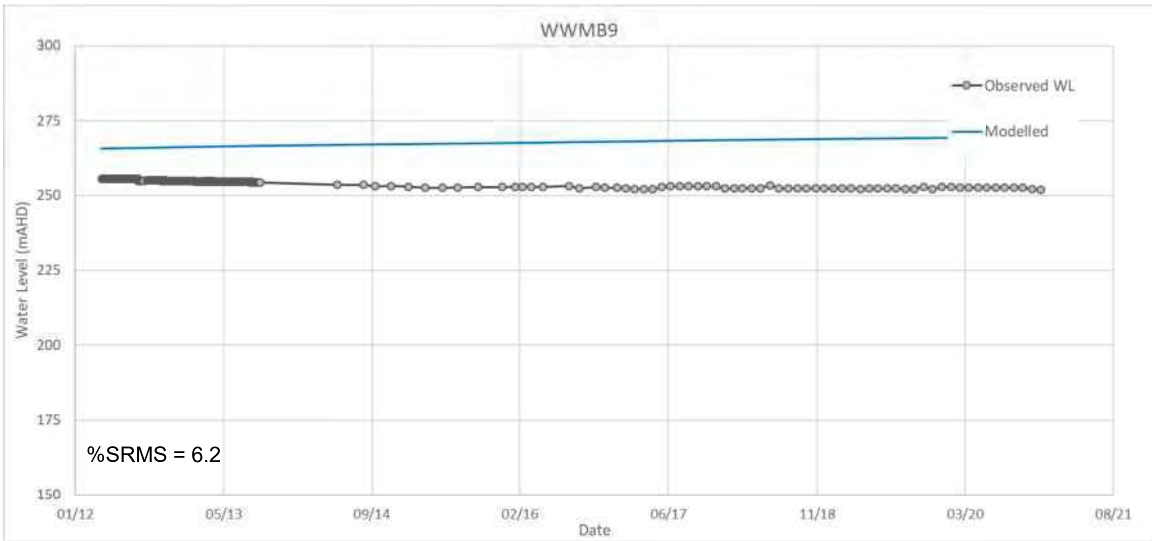
Rockwater PROPRIETARY LIMITED

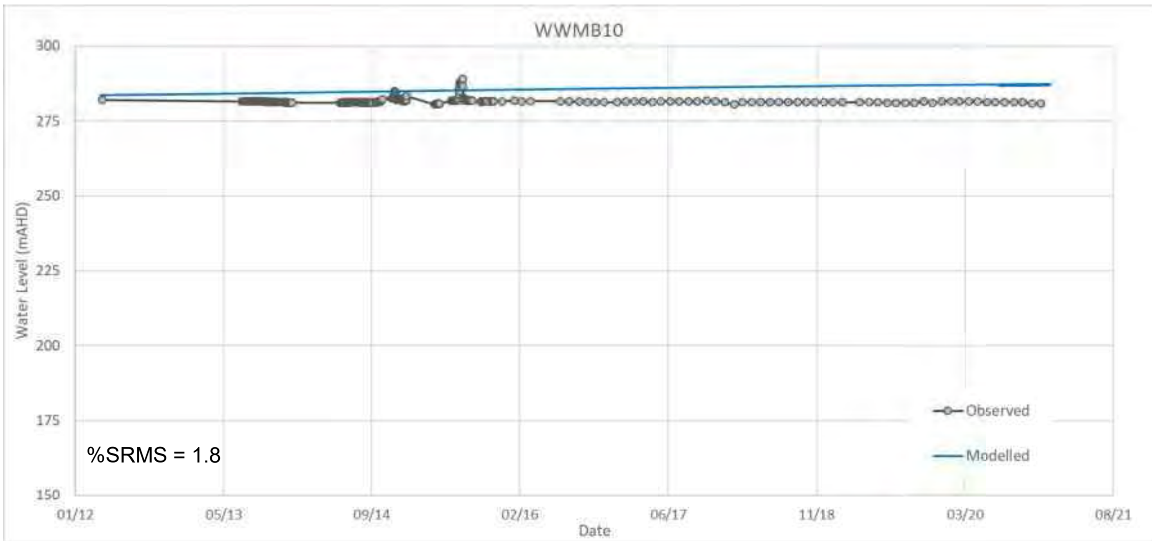




150-2/Grapher/Calibration Phase Hydrographs/VI-5

Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVI-5	Calibration Phase Hydrographs (WWMB6, WWMB7, WWMB8)





150-2/Grapher/Calibration Phase Hydrographs/VI-6

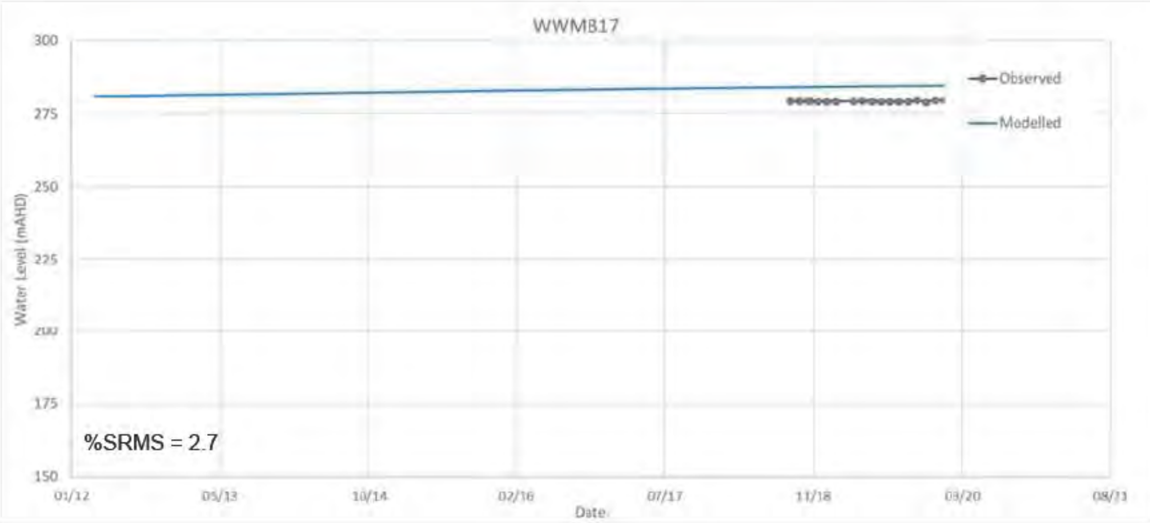
Client:	Consolidated Minerals
Project :	Detailed Hydrogeological Assesment and Modeling Report
Date :	November 2021
Dwg. No:	150-2/21/1-AppVI-6

Calibration Phase Hydrographs
(WWMB9, WWMB10, WWMB11)

Rockwater

150-2/Grapher/Calibration Phase Hydrographs/VI-7

Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVI-7	Calibration Phase Hydrographs (WWMB12, WWMB14, WWMB15) Rockwater



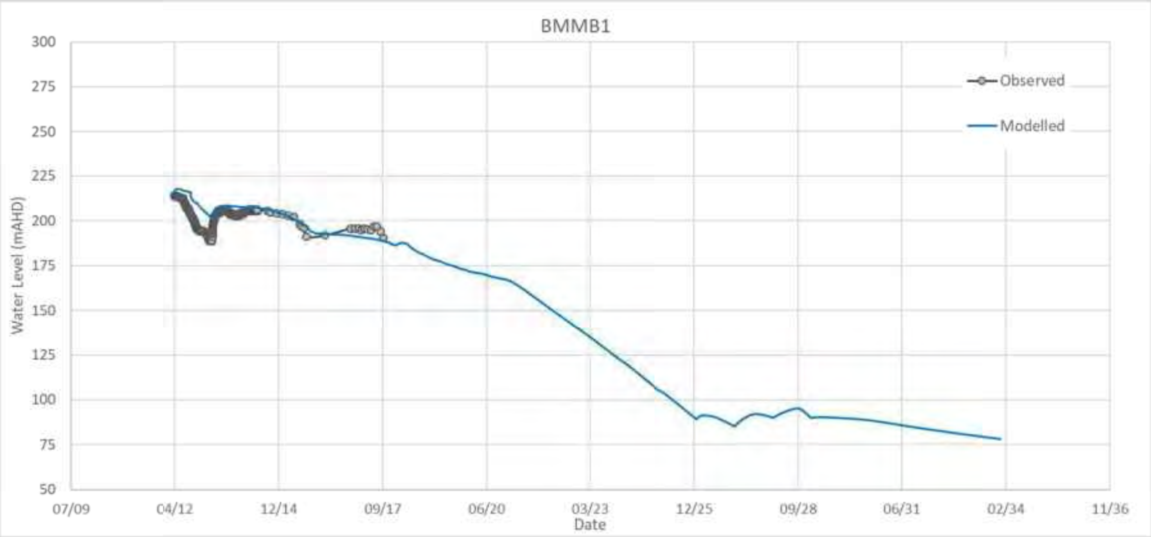
150-2/Grapher/Calibration Phase Hydrographs/VI-8

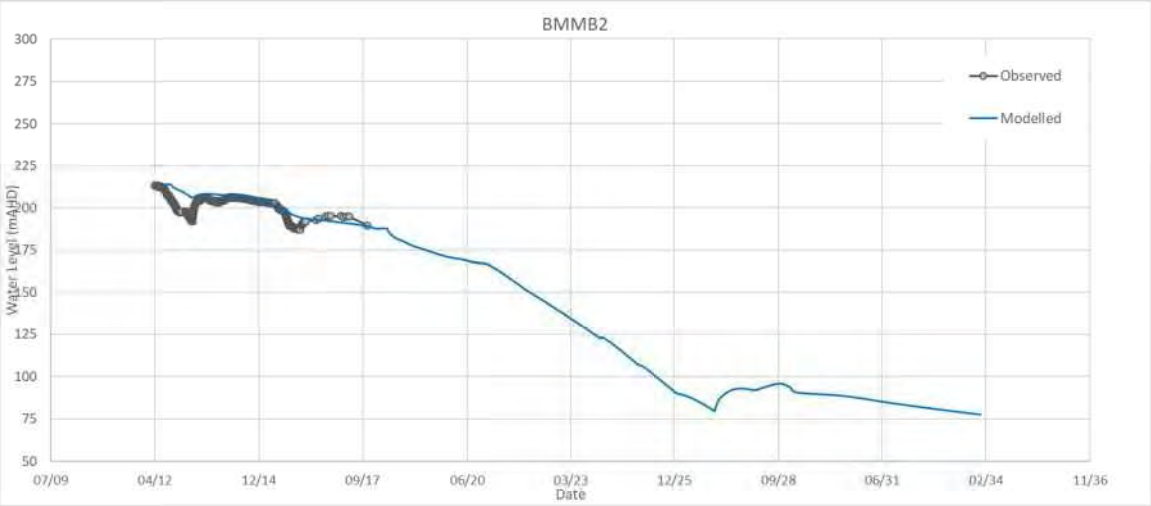
Client: Consolidated Minerals Project: Detailed Hydrogeological Assesment and Modeling Report Date: November 2021 Dwg. No: 150-2/21/1-AppVI-8	Calibration Phase Hydrographs (WWMB17, WWMB18, TPWE01)

Rockwater

APPENDIX VII

Model Prediction Hydrographs





150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-1

Client: Consolidated Minerals

Project : Detailed Hydrogeological Assesment and Modeling Report

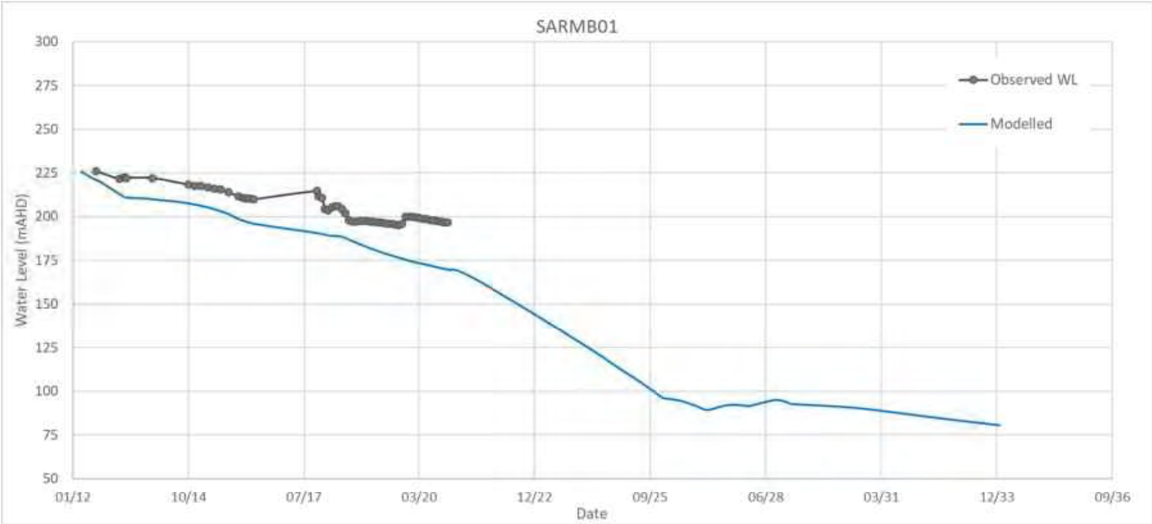
Date : November 2021

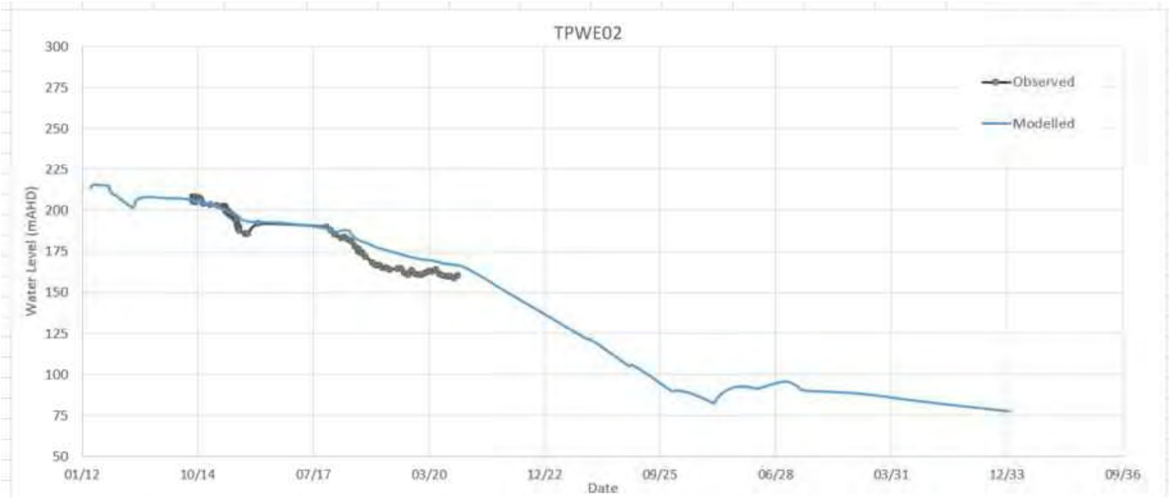
Dwg. No: 150-2/21/1-AppVII-1

Prediction Phase Hydrographs
(BMMB1, BMMB2, ESWB06)

Rockwater

Appendix VII - 2





150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-2

Client: Consolidated Minerals

Project : Detailed Hydrogeological Assesment and Modeling Report

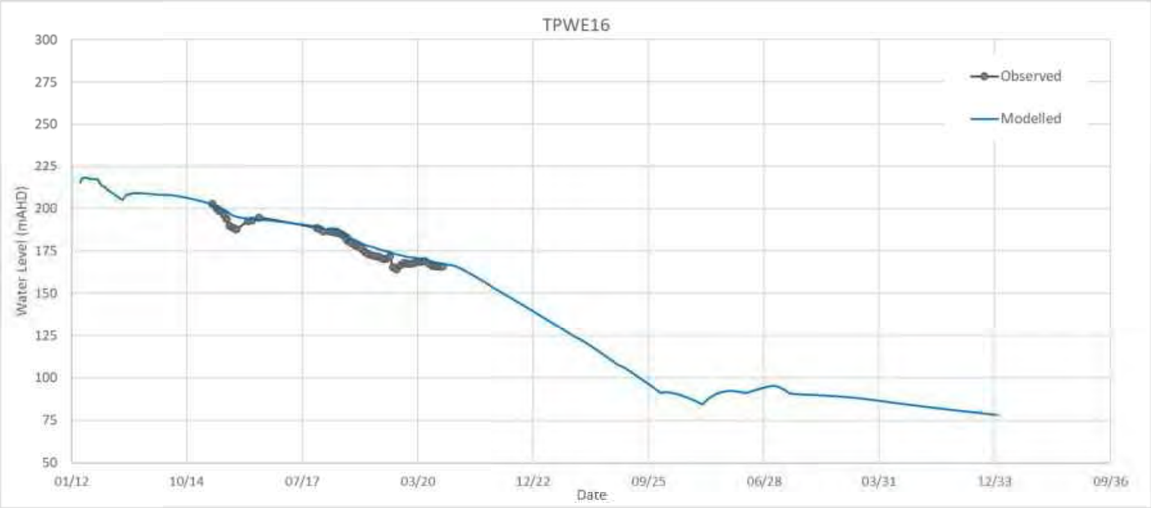
Date : November 2021

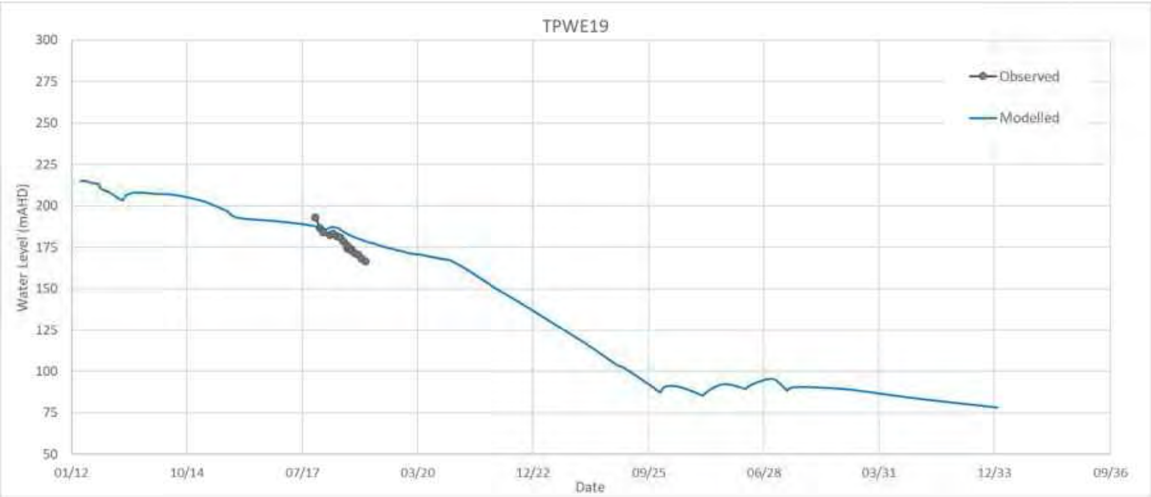
Dwg. No: 150-2/21/1-AppVII-2

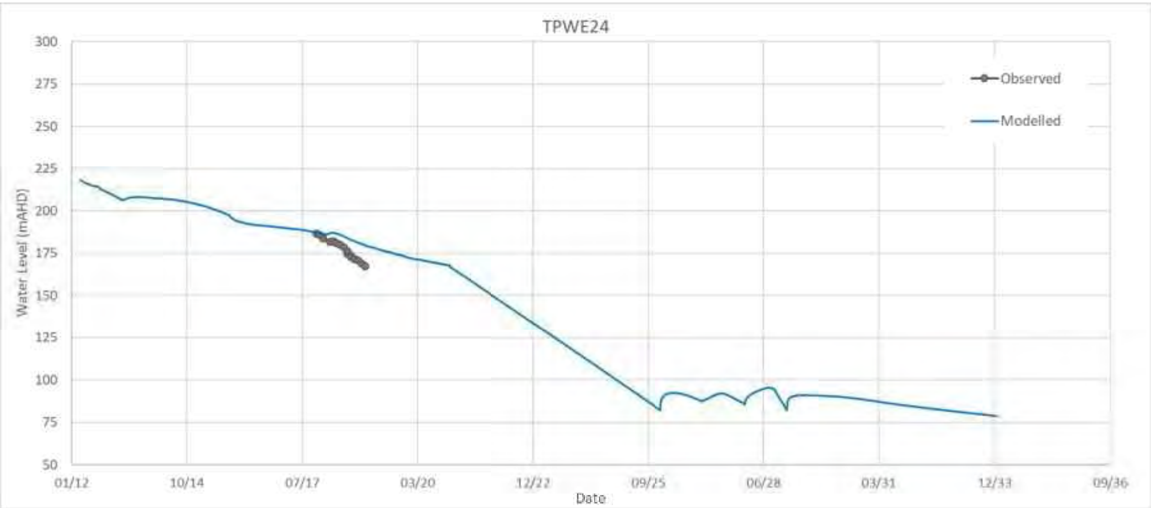
Prediction Phase Hydrographs
(HMB2, SARMB01, TPWE02)

Rockwater

Appendix VII - 3







150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-3

Client: Consolidated Minerals

Project : Detailed Hydrogeological Assesment and Modeling Report

Date : November 2021

Dwg. No: 150-2/21/1-AppVII-3

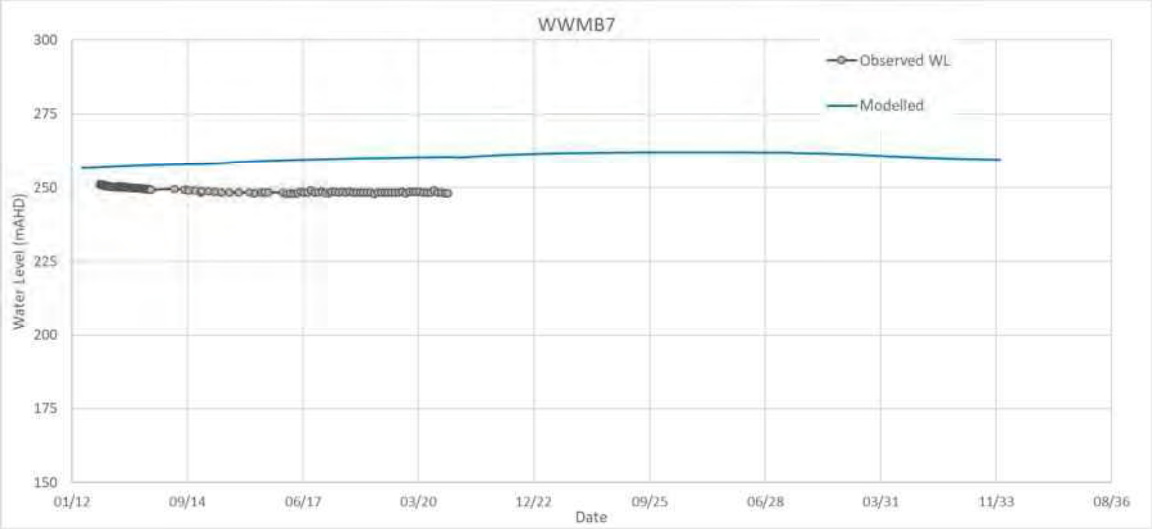
Prediction Phase Hydrographs
(TPWE016, TPWE019, TPWE024)

Rockwater

Appendix VII - 4

150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-4

Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVII-4	Prediction Phase Hydrographs (WWMB2, WWMB4, WWMB5)

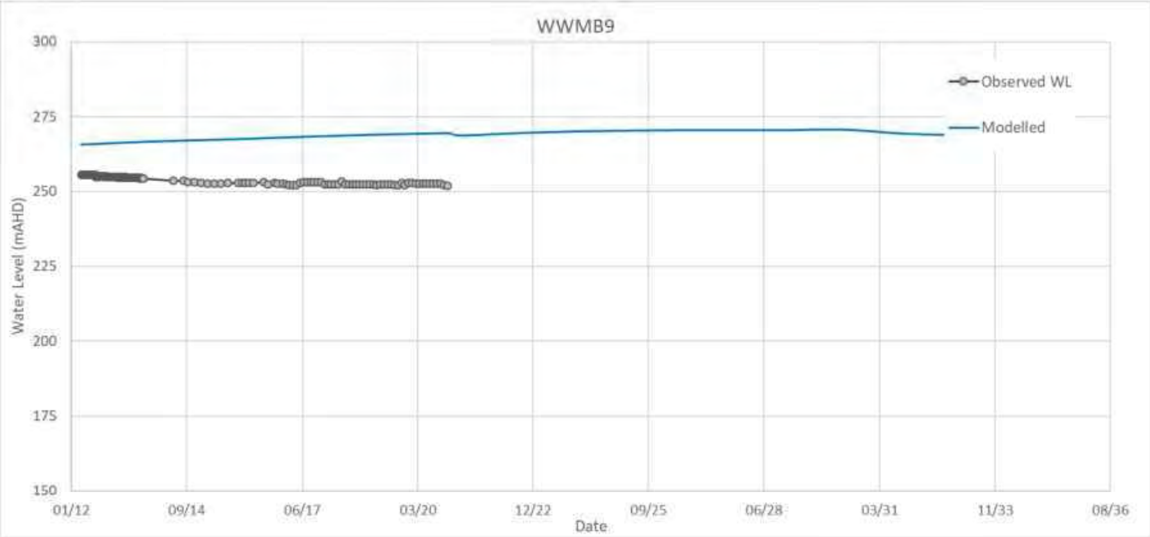


150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-5

Client: Consolidated Minerals	Prediction Phase Hydrographs (WWMB6, WWMB7, WWMB8)
Project : Detailed Hydrogeological Assesment and Modeling Report	
Date : November 2021	
Dwg. No: 150-2/21/1-AppVII-5	

Rockwater

Appendix VII - 6



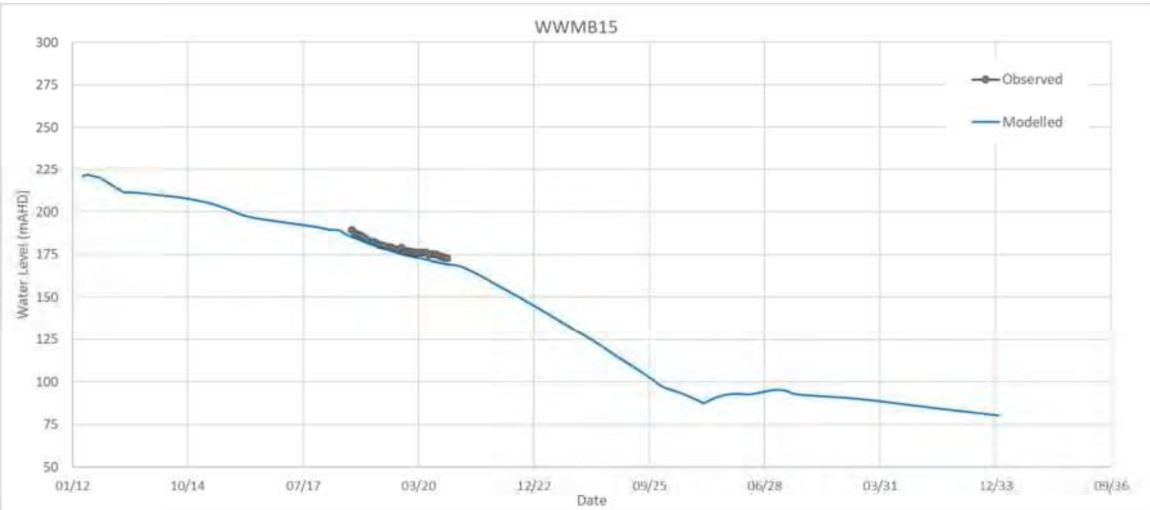
150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-6

Client:	Consolidated Minerals
Project :	Detailed Hydrogeological Assesment and Modeling Report
Date :	November 2021
Dwg. No:	150-2/21/1-AppVII-6

Prediction Phase Hydrographs
(WWMB9, WWMB10, WWMB11)

Rockwater

Appendix VII - 7



150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-7

Client: Consolidated Minerals

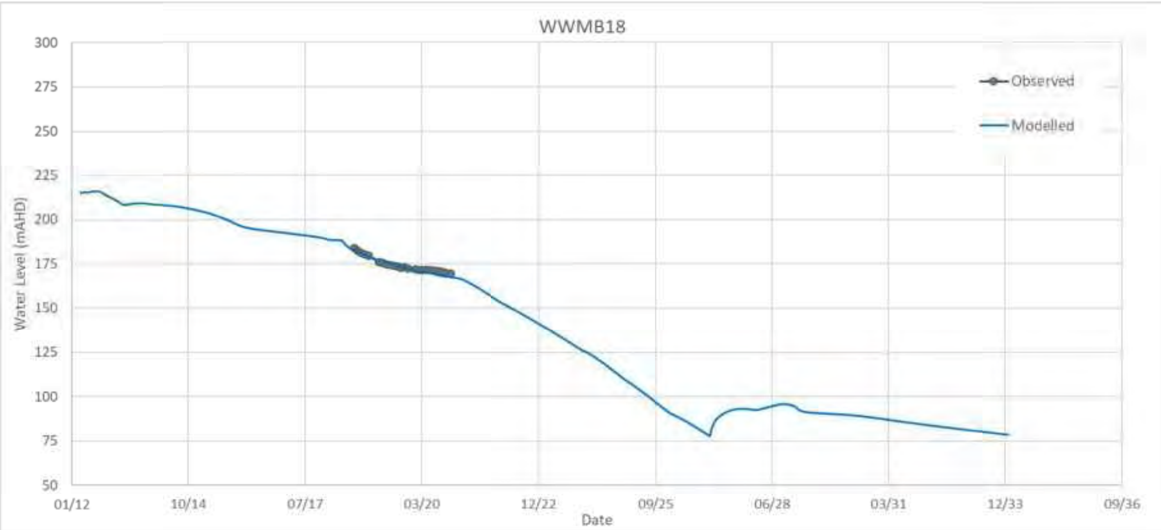
Project : Detailed Hydrogeological Assesment and Modeling Report

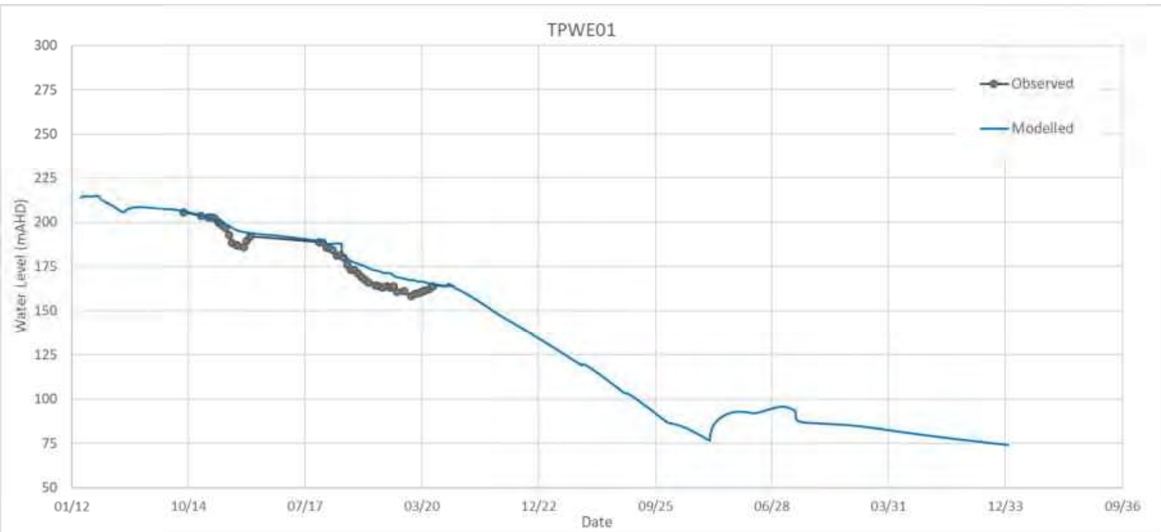
Date : November 2021

Dwg. No: 150-2/21/1-AppVII-7

Prediction Phase Hydrographs (WWMB12, WWMB14, WWMB15)

Rockwater





150-2/Grapher/21-01/Prediction Phase Hydrographs/VII-8

Client: Consolidated Minerals Project : Detailed Hydrogeological Assesment and Modeling Report Date : November 2021 Dwg. No: 150-2/21/1-AppVII-8	Prediction Phase Hydrographs (WWMB17, WWMB18, TPWE01) Rockwater

Appendix F Annual Audit Compliance Report

Government of **Western Australia**
Department of **Water and Environmental Regulation**

Annual Audit Compliance Report Form

Environmental Protection Act 1986, Part V Division 3

Once completed, please submit this form either via email to info@dwer.wa.gov.au, or to the below postal address:

Department of Water and Environmental Regulation
Locked Bag 10
Joondalup DC WA 6919

Section A – Licence details			
Licence number:	L6131/1990/13	Licence file number:	DER2013/001337-
Licence holder name:	Pilbara Manganese Pty Ltd		
Trading as:	ConsMin		
ACN:	074 106 577		
Registered business address:	L2/24 Outram Street, West Perth, WA 6005		
Reporting period:	01 /10/2024 **to** 30/09/2025		

Section B – Statement of compliance with licence conditions
Did you comply with all of your licence conditions during the reporting period? (please tick the appropriate box)
☐ Yes – please complete: • section C; • section D (if required); and • sign the declaration in Section F.
☒ No – please complete: • section C; • section D (if required); • section E; and • sign the declaration in Section F.

Section C – Statement of actual production	
Provide the actual production quantity for this reporting period. Supporting documentation is to be attached.	
Prescribed premises category	**Actual production quantity**
5 - Processing or beneficiation of metallic or non-metallic ore	1,343,782 tonnes (t) (primary and secondary ore). Approved premise production or design capacity of 5,000,000 t per annum (tpa)
6 - Mine dewatering	11,547,768 tonnes (t) of mine dewatering. Approved premise production or design capacity of 55,188,000 t per annum (tpa)
54 - Sewage Facility	153.58m^3 average per day. Approved premise production or design capacity of 300 m^3 per day.
73 - Bulk Storage of Chemicals	1773.66 m^3 capacity. Approved premise production or design capacity of 2144 m^3 in aggregate.
89 - Putrescible landfill site	525.17 tonnes (t). Approved premise production or

Section C – Statement of actual production	
Provide the actual production quantity for this reporting period. Supporting documentation is to be attached.	
Prescribed premises category	**Actual production quantity**
	design capacity of 1,950 tpa

Section D – Statement of actual Part 2 waste discharge quantity	
Provide the actual Part 2 waste discharge quantity for this reporting period. Supporting documentation is to be attached.	
Prescribed premises category	**Actual Part 2 waste discharge quantity**
5 - Processing or beneficiation of metallic or non-metallic ore	602,342 dry tonnes (dT) of tailings discharge to Homestead in-pit TSF. Approved premise production or design capacity of 5,000,000 tpa.
6 – Mine Dewatering	10,114,098 (kL) of mine dewatering discharged to the environment.

Section E – Details of non-compliance with licence condition			
Please use a separate page for each condition with which the licence holder was non-compliant at a time during the reporting period.			
Condition no:	25	Date(s) of non-compliance:	Jul 25, Aug 25, Sep 25
Details of non-compliance:			
Monthly qualitative analysis was not conducted for Emission Point W9 for three consecutive months. However, abstraction volumes have been captured via flow meter readings.			
What was the actual (or suspected) environmental impact of the non-compliance? **NOTE** – please attach maps or diagrams to provide insight into the precise location of where the non-compliance took place.			
Failure to conduct the analysis did not result in any identified environmental harm.			
Cause (or suspected cause) of non-compliance:			
Administrative oversight was identified as the cause of non-compliance. The dewatering team failed to communicate with the environmental team that the W9 discharge was active on 28 July 2025. Once identified on 25 Oct 2025, the discharge point was sampled immediately, and all parameters are within range.			
Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:			
Site teams were made aware of licence obligations and implications via PSI. Environmental team to develop toolbox shares to reinforce compliance awareness.			
Was this non-compliance previously reported to DWER?			
☒ No			

Section F – Declaration

I / We declare that the information in this Annual Audit Compliance Report is true and correct and is not false or misleading in a material particular[1].

I / We consent to the Annual Audit Compliance Report being published on the Department of Water and Environmental Regulation's (DWER) website.

[redacted]

Date:	24 November 2025	Date:	30 November 2025
Seal (if signing under seal):			

[1] It is an offence under section 112 of the *Environmental Protection Act 1986* for a person to give information on this form that to their knowledge is false or misleading in a material particular.

[2] AACRs can only be signed by the licence holder or an authorised person with the legal authority to sign on behalf of the licence holder.