

# 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](mailto: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:	L9335/2022/1	Licence file number:	DER2022/000219
Licence holder name:	Thunderbird Operations Pty Ltd		
Trading as:			
ACN:	611 251 743		
Registered business address:	264 Port Drive   PO Box 1876, Broome WA 6725		
Reporting period:	14 / 12 / 2024 to 13 / 12 / 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)
<input type="checkbox"/> Yes – please complete: <ul style="list-style-type: none"><li>• section C;</li><li>• section D (if required); and</li><li>• sign the declaration in Section F.</li></ul>
<input checked="" type="checkbox"/> No – please complete: <ul style="list-style-type: none"><li>• section C;</li><li>• section D (if required);</li><li>• section E; and</li><li>• sign the declaration in Section F.</li></ul>

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
Category 08: Mineral Sands Mining or Processing	11,241,981 tonnes Note: Ore mined as taken from DMU Feed
Category 54: Sewage Facility	WWTP1: 10.76m <sup>3</sup> /day WWTP2: 6.79m <sup>3</sup> /day
Category 89: Putrescible landfill site	1009.3 tonnes

### 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
Category 08: Mineral Sands Mining or Processing (Tailings)	7,465,371 tonnes

### 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:	8	Date(s) of non-compliance:	04/2023 - Ongoing
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Details of non-compliance:

The 2023-2024 AACR reported on multiple exceedances of the concentration limit listed for total nitrogen and total phosphorus during monthly effluent sampling for WWTP1 and WWTP2. Continued sampling of WWTP1 and WWTP2 has shown ongoing exceedance levels results over the current reporting period, although WWTP1 continues to demonstrate better performance overall and nitrogen levels appeared to trend closure towards compliance levels particularly towards the end of the reporting period. (*Appendix B; Figures B1 and B2*).

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.

The discharge volumes continue to be well below the licenced production capacity of each facility. As a result, despite exceeding concentration limits the total loading over the course of the licence period has not exceeded approved limits. Therefore, the actual environmental impact of concentration exceedances is deemed to be negligible. Location of incident is shown in Appendix B; Figure B5.

Cause (or suspected cause) of non-compliance:

The elevated nitrogen and phosphorus levels have been attributed to both a high concentration of urea and a low availability of Mixed Liquor Suspended Solids (MLSS) within the wastewater system. Elevated urea levels within wastewater systems are a common issue across the industry contributing to elevated nutrient levels. MLSS concentrations are important during the aeration process of the waste stream as this accounts for the availability of micro-organisms to consume the organic waste. If the ratio of micro-organisms to waste is not right, unacceptable amounts of waste will continue to move through the wastewater system resulting in the current elevated emission concentrations being discharged. This can be seen with the lower nutrient levels experienced at WWTP1-Village compared to WWTP2-Processing Plant which has had greater variability in its servicing population due to work group locations around site. While works have been ongoing to make improvements to the system, success has been restricted due to interface accessibility of the pump controller restricted by the manufacturer.

Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-

### Section E – Details of non-compliance with licence condition

compliance:

Daily monitoring and adjustments of plant performance continue to be improved with regards to consistency knowledge of the system. Adjustments to the ratio of solids as well as oxygenation levels are consistently made in order to increase microbiological activity and subsequently bring nutrient levels down. As population numbers across site continue to stabilize this will assist in creating a sufficient baseline of system requirements with regards to solids ratios and oxygenation levels.

The project will continue to work towards the prescribed discharge concentrations and implement strategies for plant improvement and Class-A compliance in 2026.

Was this non-compliance previously reported to DWER?

Yes, and

Reported to DWER verbally

Date: / /

Reported to DWER in writing

Date: 11 / 09 / 2023

### 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:	4	Date(s) of non-compliance:	14/09/2023 – 23/09/2025
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Details of non-compliance:

As reported in the 2022-2023 AACR, following a diesel spill at the Thunderbird village, contaminated soil was deposited into Thunderbird Bioremediation facility, causing an exceedance to the licenced quantity limit of 625 m<sup>3</sup> for Cell 1 by 875 m<sup>3</sup>. Works to remediate the soils were deemed successful over the reporting period resulting in a reduction in hydrocarbon levels to within site suitability limits. Remediated soil was excavated from the bio-remediation cells by the 23<sup>rd</sup> September 2025 bringing the stored volume of soils under remediation within licence allowance.

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.

No environmental impact, exceedance of allowed volumes. The bioremediation facility includes a HDPE liner across each of the cells extending up the earthen bund perimeter, minimizing risk of contaminant migration. The side walls of the entire facility have also been raised by an additional 500 mm from the licenced requirement to ensure additional contaminated material is contained in the event of a significant rain event. Emergency dewatering equipment in the form of geo-bags to filter out sediments and oil slicks remain available in the event of significant rain.

The contaminated material underwent treatment with microbe infused material supplied by Enretech Pty Ltd. This treatment enhances contaminant consumption and will enable the material to be safely reused on site. Maintenance included watering and aerating the soil to aid microbial consumption and speed up the degradation of hydrocarbon compounds.

## Section E – Details of non-compliance with licence condition

Regular treatment and sampling has been conducted since Cell 1 reached capacity and was closed for further deposition. Samples are analysed for hydrocarbon contaminants of concern including BTEX, Naphthalene, Total PAH's and TRH's (including TRH-F1, TRH-F2, TRH-F3 and TRH-F4). The predominant contaminants were identified to be within hydrocarbon fractions TRH>C10-C34 (TRH-F2 and TRH-F3), consistent with expectations for non-combusted diesel compounds.

Analytical results from sampling conducted on material in Bio-Remediation Cell 1 indicate that volatile hydrocarbons (BTEX) and Poly-Aromatic Hydrocarbons (PAHs) have been consistently below laboratory reporting limits confirming effective treatment of the more mobile and toxic hydrocarbon fractions. Total petroleum hydrocarbons are dominated by the heavier aliphatic and aromatic fractions (C16–C35), with measured concentrations generally well below applicable landfill acceptance criteria. Of the ten validation samples collected in August 2025, only one sample recorded a C16–C35 aromatic concentration of 580 mg/kg, marginally exceeding the Landfill Class II guideline value of 450 mg/kg. All remaining samples were below this criterion, with an average C16–C35 aromatic concentration of approximately 322 mg/kg. Statistical assessment using the WA Landfill Waste Classification Guidelines approach shows the 95% Upper Confidence Limit (UCL) for C16–C35 aromatics to be 390 mg/kg, which is below the Landfill Class II threshold.

The analytical dataset demonstrates that contaminants of concern (BTEX and PAHs) are nondetectable, significantly reducing risks associated with volatility, leaching, and acute toxicity. Although one isolated exceedance of the Landfill Class II criterion for C16–C35 aromatics was identified, the exceedance is minor and not representative of the overall material quality thus confirming compliance without the need for further treatment.

The material treated in Bio-Remediation Cell 1 was excavated in September 2025 and deposited into the sites Class II landfill cell as backfill, thus bringing the capacity of the bio-remediation cells back within compliance limits.

*See Appendix B for analytical results and maps.*

Cause (or suspected cause) of non-compliance:

The diesel spill at the village is the sole cause of this non-compliance.

Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:

Soils have been remediated to within site suitability criteria and disposed of as backfill in the landfill onsite. Non-compliance has been rectified as at the end of this reporting period.

Was this non-compliance previously reported to DWER?

Yes, and

Reported to DWER verbally

Date: / /

Reported to DWER in writing

Date: 12 / 10 / 2023

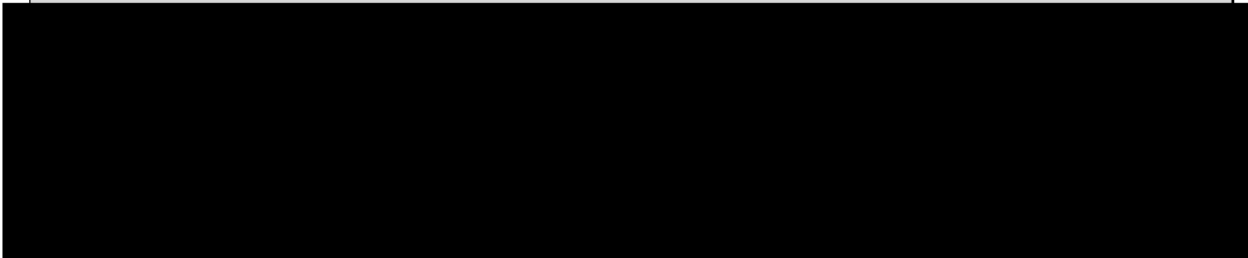
## Section F – Declaration

I / We declare that the information in this Annual Audit Compliance Report is true and correct and

## Section F – Declaration

is not false or misleading in a material particular<sup>1</sup>.

I / We consent to the Annual Audit Compliance Report being published on the Department of Water and Environmental Regulation's (DWER) website.



Date:	11/02/2026	Date:	15/02/2026
Seal (if signing under seal):			

## APPENDICES

**Appendix A:** Supporting Data for Section C – Actual Production Quantity

**Appendix B:** Supporting Data for Section E – Details of Non-Compliance with Conditions

**Appendix C:** Annual Environmental Report

**Appendix D:** Condition 1 – Ore Production Quantities

**Appendix E:** Condition 4 – Waste Types and Volumes

**Appendix F:** Condition 11 – Sewage Volume and Emissions

**Appendix G:** Condition 12 – TSF Water Balance

**Appendix H:** Condition 13 – Groundwater Monitoring

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<sup>1</sup> 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.

<sup>2</sup> 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.

## APPENDIX A

### Supporting Data for Section C – Actual Production Quantity

All quantities provided have been determined through a reconciliation using the following inputs:

- Flow meter readings
- Survey volumes of product stockpiles
- Haulage tonnes
- Lab grades

These inputs are used to calculate the product tonnage and grades from which all the other streams (such as DMU Feed, WCP/CUP Feed, HMC, and tailings) are then back-calculated (or reconciled).

All reconciled numbers are calculated on a 'dry' basis. Where 'wet tonnes' is required, a 5% moisture content has been assumed. Further mining and processing data is available in Appendix D.

### Category 08: Mineral Sands Mining or Processing

Table A1: Ore Mined – Total

Month	Ore Mined – DMU Feed (Dry Tonnes)
Jan-25	832,031
Feb-25	835,275
Mar-25	839,092
Apr-25	890,076
May-25	927,923
Jun-25	1,045,090
Jul-25	933,873
Aug-25	1,032,149
Sep-25	1,078,273
Oct-25	949,977
Nov-25	963,581
Dec-25	914,641
<b>Total</b>	<b>11,241,981</b>

**Table A2: Part 2 Waste Discharge – Tailings**

Month	Waste Discharge - Tailings (Dry Tonnes)
Jan-25	595,683
Feb-25	561,523
Mar-25	553,882
Apr-25	675,363
May-25	715,216
Jun-25	741,491
Jul-25	663,776
Aug-25	597,713
Sep-25	609,624
Oct-25	582,391
Nov-25	637,864
Dec-25	530,845
<b>Total</b>	<b>7,465,371</b>

**Category 54: Sewage Facility**

Flow meters are situated at both WWTP1 and WWTP2 to record the discharge of effluent from the treatment plants to the spray fields. Flow meter readings are recorded weekly, then on the last day of the month as well as at the end of licence reporting period (13<sup>th</sup> December). Flow rates and volumes are subsequently calculated for annual, monthly and average daily discharge rates as displayed in Table A3.

**Table A3: Sewage Processed Through WWTP1 and WWTP2**

Location	Date	Meter Reading (L)	Volume (m3)	Volume - Monthly (m3)	Volume Yearly (m3)	Volume Daily Average (m3)
WWTP: WWTP-1 Village	18/12/2024 13:03	17443465	151			
WWTP: WWTP-1 Village	31/12/2024 16:40	17571628	128			
WWTP: WWTP-1 Village	31/12/2024 23:59			465		
WWTP: WWTP-1 Village	9/01/2025 15:06	17645936	74			
WWTP: WWTP-1 Village	24/01/2025 7:42	17798855	153			
WWTP: WWTP-1 Village	31/01/2025 13:10	17877997	79			
WWTP: WWTP-1 Village	31/01/2025 23:59			306		
WWTP: WWTP-1 Village	7/02/2025 12:33	17942810	65			
WWTP: WWTP-1 Village	15/02/2025 13:46	18013253	70			
WWTP: WWTP-1 Village	28/02/2025 23:59			135		
WWTP: WWTP-1 Village	3/03/2025 12:33	18160662	147			
WWTP: WWTP-1 Village	12/03/2025 11:29	18248157	87			

WWTP: WWTP-1 Village	31/03/2025 15:25	18435053	187			
WWTP: WWTP-1 Village	31/03/2025 23:59			421		
WWTP: WWTP-1 Village	8/04/2025 14:55	18494450	59			
WWTP: WWTP-1 Village	16/04/2025 11:50	18569438	75			
WWTP: WWTP-1 Village	24/04/2025 7:31	18644029	75			
WWTP: WWTP-1 Village	30/04/2025 12:23	18702912	59			
WWTP: WWTP-1 Village	30/04/2025 23:59			59		
WWTP: WWTP-1 Village	8/05/2025 8:27	18779330	76			
WWTP: WWTP-1 Village	14/05/2025 15:23	18838490	59			
WWTP: WWTP-1 Village	28/05/2025 12:59	18975916	137			
WWTP: WWTP-1 Village	10/06/2025 16:13	19087786	112			
WWTP: WWTP-1 Village	19/06/2025 12:24	19171044	83			
WWTP: WWTP-1 Village	30/06/2025 15:02	19272947	102			
WWTP: WWTP-1 Village	9/07/2025 11:52	19345912	73			
WWTP: WWTP-1 Village	23/07/2025 10:04	19478384	132			
WWTP: WWTP-1 Village	13/08/2025 7:50	19669044	66			
WWTP: WWTP-1 Village	20/08/2025 9:30	19730320	61			
WWTP: WWTP-1 Village	3/09/2025 11:35	19880103	150			
WWTP: WWTP-1 Village	9/09/2025 15:59	19949495	69			
WWTP: WWTP-1 Village	18/09/2025 7:48	20043216	94			
WWTP: WWTP-1 Village	24/09/2025 9:02	20123574	80			
WWTP: WWTP-1 Village	1/10/2025 8:56	20207897	84			
WWTP: WWTP-1 Village	9/10/2025 8:33	20312546	105			
WWTP: WWTP-1 Village	15/10/2025 11:07	20392017	79			
WWTP: WWTP-1 Village	29/10/2025 11:38	20589520	198			
WWTP: WWTP-1 Village	5/11/2025 13:14	20692228	103			
WWTP: WWTP-1 Village	12/11/2025 8:03	20781461	89			
WWTP: WWTP-1 Village	19/11/2025 8:19	20900447	119			
WWTP: WWTP-1 Village	30/11/2025 11:03	21088834	188			
WWTP: WWTP-1 Village	10/12/2025 7:19	21223953	135			
<b>WWTP - Village</b>	<b>Total Volume (Yearly) 3928m3</b>		<b>Daily Average</b>	<b>10.76m3/day</b>	<b>3928</b>	<b>10.76164384</b>
WWTP: WWTP-2 Process Plant	18/12/2024 13:37	1950602	90			
WWTP: WWTP-2 Process Plant	31/12/2024 17:00	2080875	130			

WWTP: WWTP-2 Process Plant	31/12/2024 23:59			326		
WWTP: WWTP-2 Process Plant	24/01/2025 7:28	2188597	108			
WWTP: WWTP-2 Process Plant	31/01/2025 12:56	2213954	25			
WWTP: WWTP-2 Process Plant	31/01/2025 23:59			133		
WWTP: WWTP-2 Process Plant	15/02/2025 9:33	2259089	45			
WWTP: WWTP-2 Process Plant	28/02/2025 23:59			45		
WWTP: WWTP-2 Process Plant	3/03/2025 12:39	2304696	46			
WWTP: WWTP-2 Process Plant	12/03/2025 11:20	2333030	28			
WWTP: WWTP-2 Process Plant	31/03/2025 14:58	2387171	54			
WWTP: WWTP-2 Process Plant	31/03/2025 23:59			128		
WWTP: WWTP-2 Process Plant	8/04/2025 14:25	2400989	14			
WWTP: WWTP-2 Process Plant	24/04/2025 7:31	2432714	32			
WWTP: WWTP-2 Process Plant	30/04/2025 12:35	2451133	18			
WWTP: WWTP-2 Process Plant	30/04/2025 23:59			14		
WWTP: WWTP-2 Process Plant	8/05/2025 8:45	2468311	17			
WWTP: WWTP-2 Process Plant	14/05/2025 13:32	2481085	13			
WWTP: WWTP-2 Process Plant	28/05/2025 9:50	2566302	85			
WWTP: WWTP-2 Process Plant	4/06/2025 8:13	2597649	31			
WWTP: WWTP-2 Process Plant	10/06/2025 15:47	2630360	33			
WWTP: WWTP-2 Process Plant	19/06/2025 11:49	2740578	110			
WWTP: WWTP-2 Process Plant	30/06/2025 15:14	2905388	165			
WWTP: WWTP-2 Process Plant	9/07/2025 10:55	3051021	146			
WWTP: WWTP-2 Process Plant	23/07/2025 14:07	3301013	250			
WWTP: WWTP-2 Process Plant	31/07/2025 8:52	3443861	143			
WWTP: WWTP-2 Process Plant	6/08/2025 14:03	3470914	27			
WWTP: WWTP-2 Process Plant	13/08/2025 8:13	3504144	33			
WWTP: WWTP-2 Process Plant	20/08/2025 9:17	3535668	32			
WWTP: WWTP-2 Process Plant	3/09/2025 14:14	3609852	74			
WWTP: WWTP-2 Process Plant	9/09/2025 15:57	36322270	32712			
WWTP: WWTP-2 Process Plant	18/09/2025 7:33	3669051	-32653			
WWTP: WWTP-2 Process Plant	24/09/2025 9:04	3687081	18			
WWTP: WWTP-2 Process Plant	1/10/2025 11:20	3702289	15			
WWTP: WWTP-2 Process Plant	8/10/2025 16:17	3723747	21			

WWTP: WWTP-2 Process Plant	15/10/2025 14:56	3806457	83			
WWTP: WWTP-2 Process Plant	22/10/2025 16:29	3819752	13			
WWTP: WWTP-2 Process Plant	29/10/2025 11:50	3833517	14			
WWTP: WWTP-2 Process Plant	5/11/2025 13:00	3851390	18			
WWTP: WWTP-2 Process Plant	12/11/2025 9:46	3898085	47			
WWTP: WWTP-2 Process Plant	19/11/2025 9:23	3953574	55			
WWTP: WWTP-2 Process Plant	30/11/2025 13:56	4198991	245			
WWTP: WWTP-2 Process Plant	10/12/2025 7:49	4340774	142			
<b>WWTP – Process Plant</b>	<b>Total Volume (Yearly)</b>	<b>2479m3</b>	<b>Daily Average</b>	<b>6.79m3/day</b>	<b>2479</b>	<b>6.791780822</b>

### Category 89: Putrescible landfill site

Landfill cells are surveyed following excavation prior to waste deposition. This initial survey forms the waste capacity baseline for the cell (Figure A1). Aerial drone surveys continue to be completed of the open cell monthly to track disposal rates. The monthly volume is then subtracted from the baseline to establish waste deposited volumes and remaining capacity (see Figure A2 for an example calculation). A final survey flight is completed at the end of the licence period to calculate an annual deposited volume. Surveyed volumes are multiplied by an average density of 0.48 tonnes/m<sup>3</sup> to get weight in metric tonnes, which is tracked against our allocated production capacity (Tables A4 – A6).

*Note: Instances where capacity measurements are represented as negatives occur as a result of backfill and bunding above the natural surface. This will be rectified following full closure of cells allowing for subsidence and earthworks.*

**Table A4: Waste Processed at Thunderbird Landfill Cell 4**

Landfill Cell	Date	Available Capacity (m3)	Surveyed Waste Deposited (m3)	Surveyed Waste Deposited (t)	Waste Deposited - Cell Total (m3)	Waste Deposited - Cell Total (t)
Landfill Cell 4	13/12/2024	772	42	20.16	596	286.08
Landfill Cell 4	15/01/2025	704	68	32.64	664	318.72
Landfill Cell 4	13/02/2025	647	57	27.36	721	346.08
Landfill Cell 4	17/03/2025	578	69	33.12	790	379.2
Landfill Cell 4	15/04/2025	473	105	50.4	895	429.6
Landfill Cell 4	14/05/2025	490	-17	-8.16	878	421.44
Landfill Cell 4	17/06/2025	433	57	27.36	935	448.8
Landfill Cell 4	12/07/2025	346	87	41.76	1022	490.56
Landfill Cell 4	15/08/2025	339	7	3.36	1029	493.92
Landfill Cell 4	26/09/025	118	221	106.08	1250	600
Landfill Cell 4	15/10/2025	-74	192	92.16	1442	692.16
Landfill Cell 4	18/11/2025	-109	35	16.8	1477	708.96
<b>Total</b>				<b>422.88</b>	<b>11699</b>	<b>5615.52</b>

**Table A5: Waste Processed at Thunderbird Landfill Cell 5**

Landfill Cell	Date	Available Capacity (m3)	Surveyed Waste Deposited (m3)	Surveyed Waste Deposited (t)	Waste Deposited - Cell Total (m3)	Waste Deposited - Cell Total (t)
Landfill Cell 5	15/12/2025	1165	186	89.28	373	179.04
Landfill Cell 5	18/11/2025	1351	0	0	187	89.76
<b>Total</b>	-	-	186	89.28	<b>560</b>	<b>268.8</b>

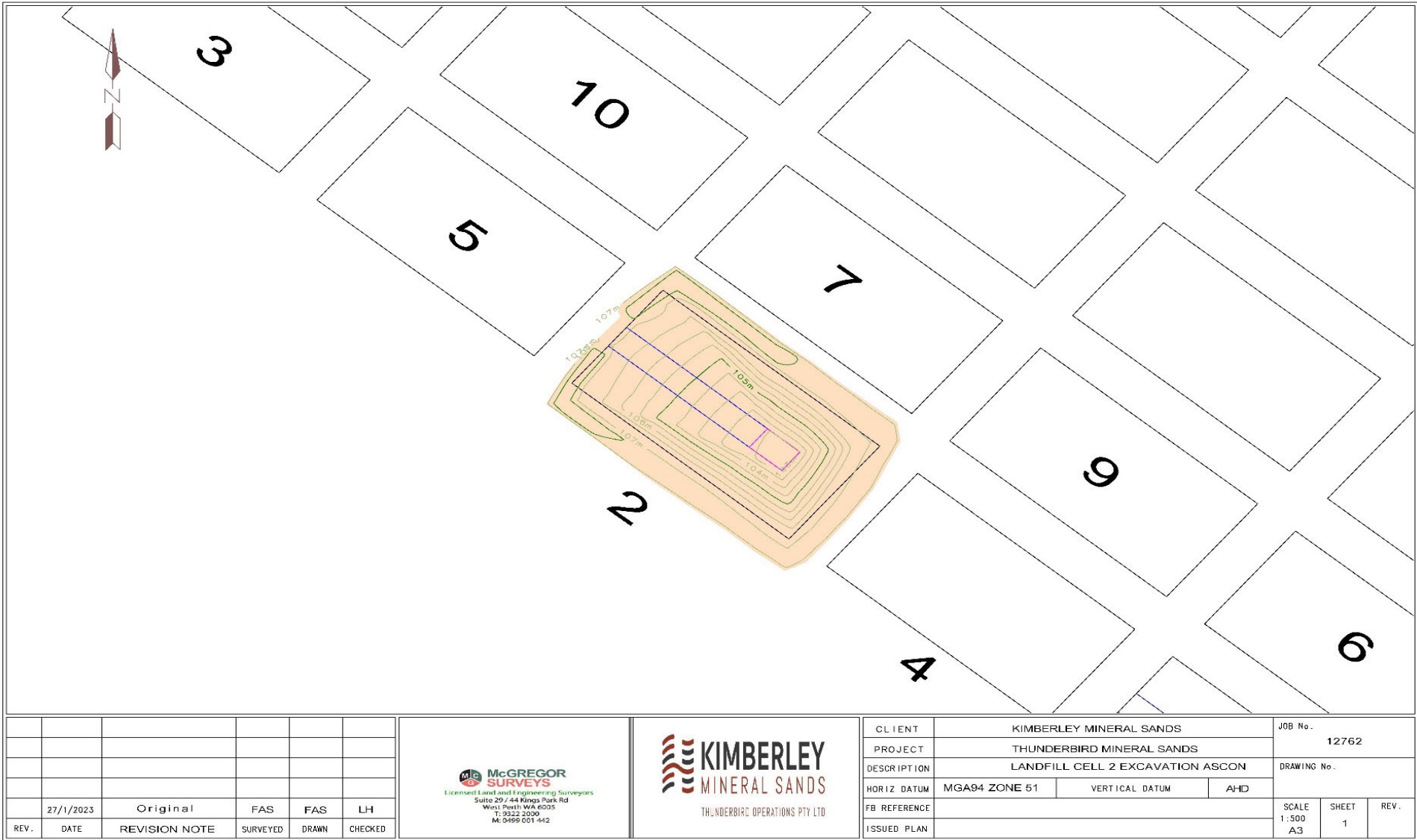
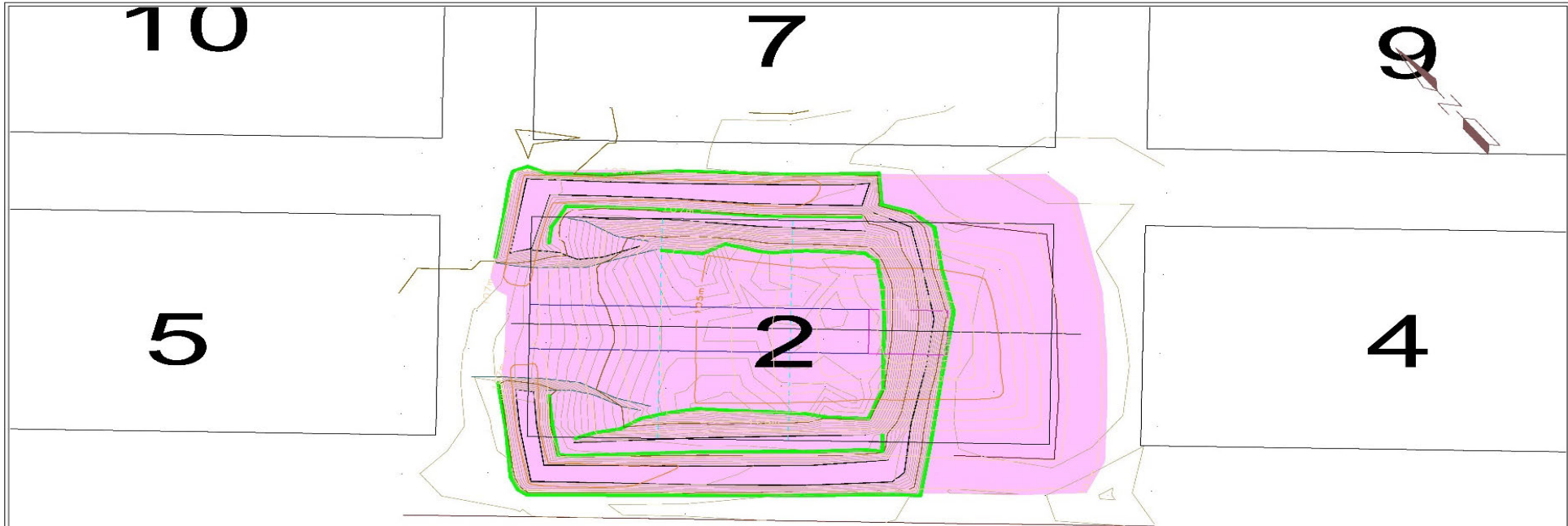


Figure A1. Landfill Cell Construction



**TOTAL VOLUME OF FILL\_230531= 687 m<sup>3</sup>**

**TOTAL VOLUME REMAINING= 531 m<sup>3</sup>**

						 LICENSED LAND AND ENGINEERING SURVEYORS T: 0822 2900      Site: 29/14 Kings Park Rd. E: info@mcgregorsurveys.com.au      West: 110/14 Kings Park Rd. W: mcgregorsurveys.com.au      ABN: 53 066 555 235	 THUNDERBIRD OPERATIONS PTY LTD	CLIENT	KIMBERLEY MINERAL SANDS		JOB No.	12762	
									PROJECT	THUNDERBIRD MINERAL SANDS			
								DESCRIPTION	LANDFILL 2 VOLUME		DRAWING No.		
								HORIZ DATUM	MGA94 ZONE 51	VERTICAL DATUM	AHD		
								FB REFERENCE					
								ISSUED PLAN			SCALE	SHEET	REV.
REV.	DATE	REVISION NOTE	SURVEYED	DRAWN	CHECKED						1:300 A3	1	

Figure A2. Landfill Cell Volume Calculation (example)

## APPENDIX B

### Supporting Data Section E – Details of Non-Compliance with Condition

'Condition 8: The licence holder must ensure that treated wastewater is only discharged via irrigation to the specified discharge points in accordance with the concentration limits and loading limits specified in Table 6'

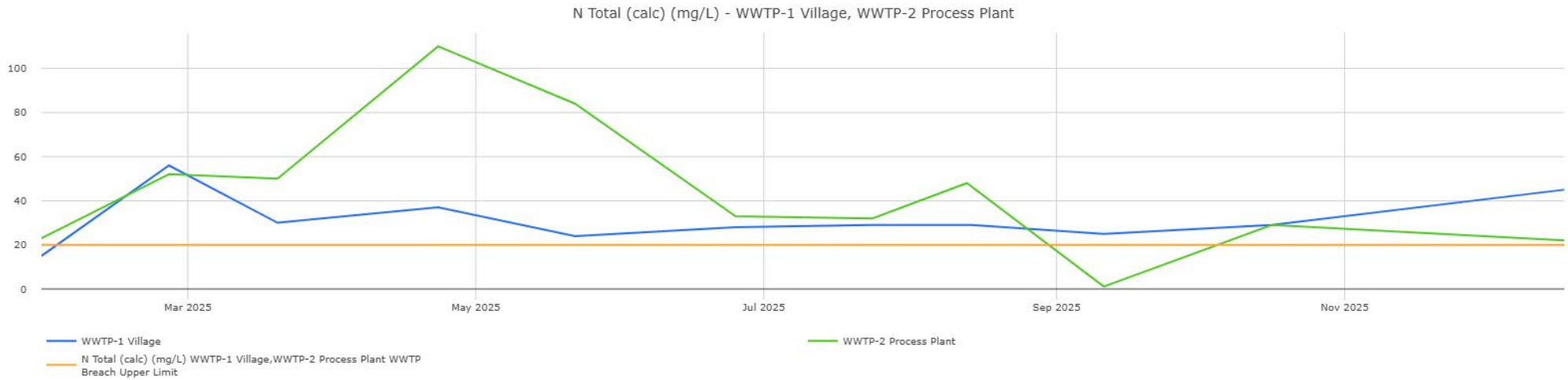
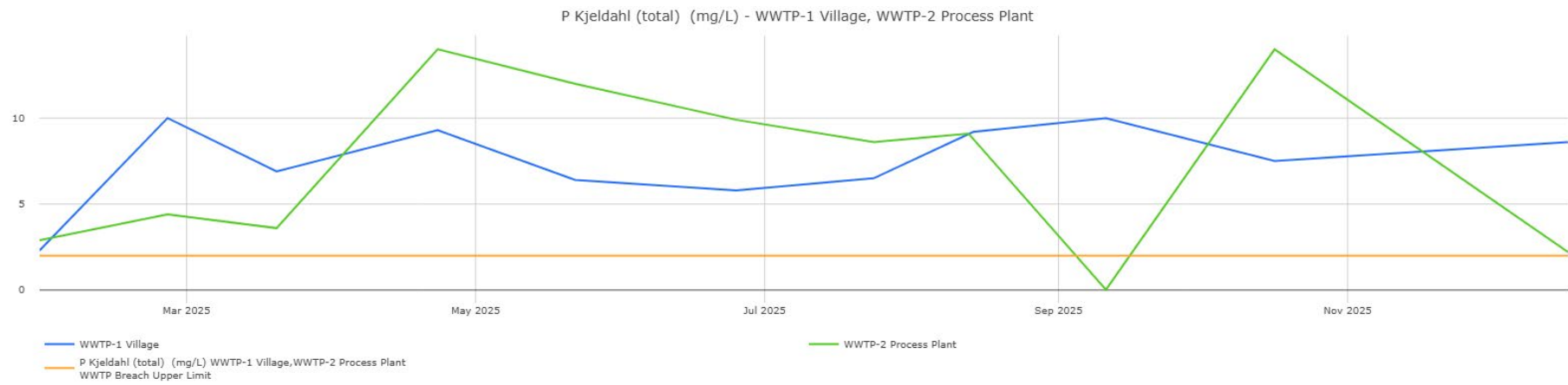


Figure B1. Total Nitrogen at WWTP1 and WWTP2



**Figure B2. Total Phosphorus at WWTP1 and WWTP2**

**Table B1: Bio-Remediation Cell 1 Analytical Assessment – Ecological Investigation Limits**

Sampling Month	Measurement	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	Naphthalene (mg/kg)	Total PAH (18) (mg/kg)	Total F (TRH >C10-C40) (mg/kg)	F1 (TRH C6-C10 Less BTEX) (mg/kg)	F2 (TRH >C10-C16 Less Naphthalene) (mg/kg)	F3 (TRH >C16-C34) (mg/kg)	F4 (TRH >C34-C40) (mg/kg)
Sep-23	Average	<0.1	<0.1	0.65	1.9375	3.75	NA	NA	10332	164	3603	6191	<120
Sep-23	Maximum	<0.1	<0.1	1.1	7.4	8.8	NA	NA	46000	430	15000	33000	10000
Feb-24	Average	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	1130	<25	294	747	<120
Feb-24	Maximum	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	1800	<25	650	1200	<120
May-24	Average	<0.1	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	1121	<10	201	891	34
May-24	Maximum	<0.1	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	1900	<10	370	1500	52
Jun-24	Average	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	1171	<25	292	873	<120
Jun-24	Maximum	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	2800	<25	990	1800	<120
Aug-24	Average	<0.1	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	822	<10	120	702	<20
Aug-24	Maximum	<0.1	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	1300	<10	260	1100	<20
Sep-24	Average	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	1305	<25	365	971	<120
Sep-24	Maximum	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	4600	<25	2000	2500	<120
Oct-24	Average	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	617	<25	74	558	<120
Oct-24	Maximum	<0.1	<0.1	<0.1	<0.3	<0.6	<0.1	<0.8	1200	<25	200	1000	<120
Jun-25	Average	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	NA	1381	<10	357	1001	238
Jun-25	Maximum	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	NA	6700	<10	2700	3900	<20
Aug-25	Average	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	NA	1004	<10	293	766	303
Aug-25	Maximum	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	NA	2800	<10	1300	1800	700
<b>Commercial Ecological Investigation Limit (NEPM, 1999)</b>		75	135	165	95	NR	370	NR	NR	215	170	1700	3300

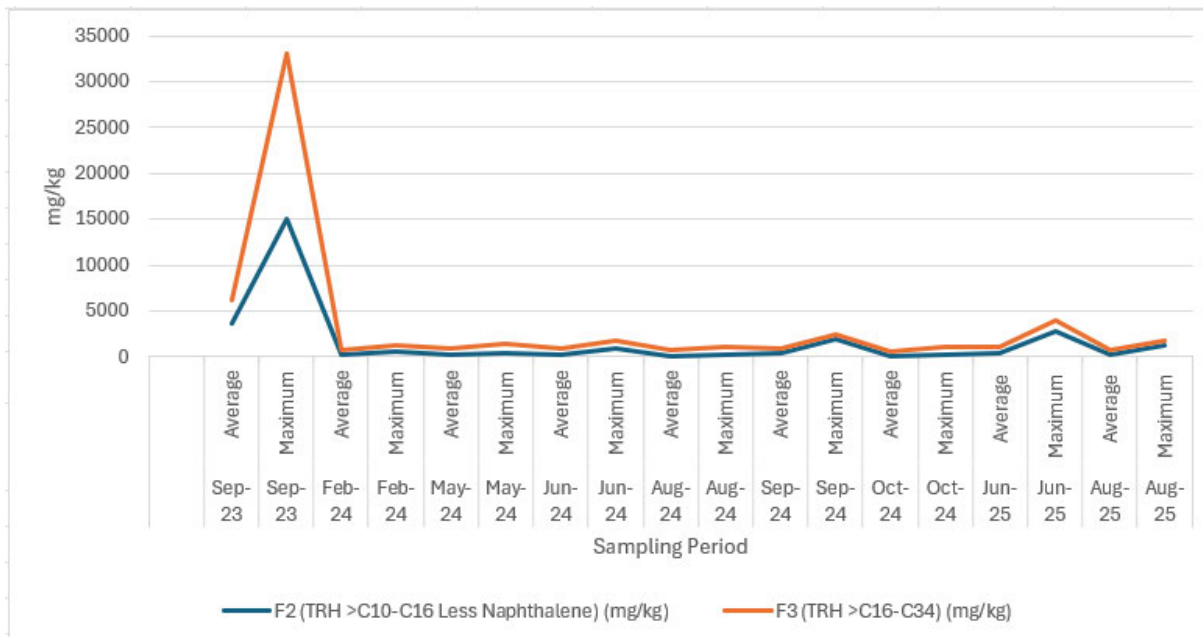
Results in exceedance of criteria

Trigger value reached


**Table B2: Bio-Remediation Cell 1 Analytical Assessment – Waste Classification Criteria**

Sample Details				Organics mg/kg					
Sample ID	Sample Date	Benzene	Ethylbenzene	C6-C9 Hydrocarbons	C16-C35 aromatics	C16-C35 aliphatics	PAH	Toulene	Xylenes
BR Cell 1-01	Aug-25	<0.1	<0.1	<10	300	300	<8	<0.1	<0.5
BR Cell 1-02	Aug-25	<0.1	<0.1	<10	580	580	<8	<0.1	<0.5
BR Cell 1-03	Aug-25	<0.1	<0.1	<10	450	450	<8	<0.1	<0.5
BR Cell 1-04	Aug-25	<0.1	<0.1	<10	350	350	<8	<0.1	<0.5
BR Cell 1-05	Aug-25	<0.1	<0.1	<10	250	250	<8	<0.1	<0.5
BR Cell 1-06	Aug-25	<0.1	<0.1	<10	350	350	<8	<0.1	<0.5
BR Cell 1-07	Aug-25	<0.1	<0.1	<10	220	220	<8	<0.1	<0.5
BR Cell 1-08	Aug-25	<0.1	<0.1	<10	280	280	<8	<0.1	<0.5
BR Cell 1-09	Aug-25	<0.1	<0.1	<10	200	200	<8	<0.1	<0.5
BR Cell 1-10	Aug-25	<0.1	<0.1	<10	240	240	<8	<0.1	<0.5
Maximum	Aug-25	<0.1	<0.1	<10	580	580	<8	<0.1	<0.5
Mean	Aug-25	<0.1	<0.1	<10	322	322	<8	<0.1	<0.5
Mean + Sd	Aug-25	N/A	N/A	N/A	439	439	N/A	N/A	N/A
S.D.	Aug-25	N/A	N/A	N/A	117	117	N/A	N/A	N/A
UCL Mean	Aug-25	N/A	N/A	N/A	390.03	390.03	N/A	N/A	N/A
<i>Waste Classification Criteria</i>									
Uncont. Fill		0.5	55	45*	300**	300**	N/A	85	40
Class 1/2		18	1,080	2,800	450	28,000	100	518	1,800
Class 3		180	10,800	28,000	4,500	280,000	1,000	5,180	18,000
Class 4		720	N/A	112,000	18,000	N/A	4,000	N/A	N/A
Results in exceedance of criteria									
Trigger value reached									

**Figure B3: Remediation Rate of TRH-F2 and TRH-F3 Hydrocarbon Fractions**





**Figure B5**

WWTP & Sprayedfield Locations



Author: Karen Gonzalez  
 Date: 13/02/2026  
 Scale: 1: 17911.649217  
 CRS: EPSG:28351

**Legend**

- Sprayfields
- WWTPs
- Thunderbird Development Envelope

Figure B5. Aerial view showing the location and extent of the WWTP1 and WWTP2 sewage sprayfields within the Thunderbird Development Envelope, including associated irrigation areas and infrastructure.



498000E

498500E

807200N

807200N

807150N

807150N



### Figure B6

Landfill & Bioremediation Pad



Author: Karen Gonzalez  
 Date: 31/01/2026  
 Scale: 1: 3464.145505  
 CRS: EPSG:28351

### Legend



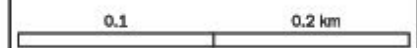
-  Bioremediation Pad Location
-  TBOP - Landfill Cell

Figure B6. Aerial view showing the location of the licensed landfill cell and the bioremediation pad at Thunderbird Operations, in accordance with the approved site layout under DWER Licence L9335/2022/1.



## APPENDIX C

### Annual Environmental Report

*Condition 20: The licence holder must submit to the CEO by no later than 60 days after the end of each annual period, an Annual Environmental Report for that annual period for the conditions listed in Table 9 and which provides information in accordance with the corresponding requirement set out in Table 9.*

‘Table 9: Annual Environmental Report’			
L9335/2022/1 Condition	Requirement	Supporting Data	TOPL Comments
1	<ul style="list-style-type: none"> <li>Amount of ore processed through each WCP/CUP; and</li> <li>Amount of mineral concentrate produced, in wet tonnes.</li> </ul>	Appendices A and D	<p><b>Mined Quantity</b></p> <p>DMU Feed: 11,241,981. t</p> <p>Mining rate compliant with licence for <i>Category 8: Mineral Sands Mining or Processing</i> of 12,500,000 tonnes p/a.</p> <p><b>Processing Quantities</b></p> <p>WCP1: 7,463,670. t CUP1: 1,018,787. t HMC1: 1,067,763. t</p> <p>Note: WCP2/CUP2 yet to be constructed</p>
4	<ul style="list-style-type: none"> <li>Waste types and volumes disposed at landfill; and</li> <li>Volume of hydrocarbon contaminated soil treated at the bioremediation facility.</li> </ul>	Section E Appendices A and E	<p><b>Landfill Facility</b></p> <p>Volume: 512.16 t</p> <p>Waste Types: Putrescible, Inert</p> <p>Volume – Cell 1: 3.75m3 Volume – Cell 2: 392.30m3 Waste Type 1, Inert Waste Type 2, Clean Fill</p> <p>Waste types and volume disposed at <i>Category 89: Putrescible Landfill Site</i> compliant with licenced capacity of 1,100 tonnes p/a.</p> <p><b>Bioremediation Facility</b></p>

11	<p>Summary of the cumulative volume of treated sewage discharged for the purpose of irrigation in tabular form</p>	Section E (Table A3)	<p><b>WWTP1</b> Total Annual Discharge: 3,928 m<sup>3</sup> Average Daily Discharge: 10.76 m<sup>3</sup></p> <p><b>WWTP2</b> Total Annual Discharge: 2,479 m<sup>3</sup> Average Daily Discharge: 6.79 m<sup>3</sup></p> <p><b>Total Annual Discharge: 17.55 m<sup>3</sup></b></p>
	<p>Water quality results to be provided to the CEO must include, but need not be limited to the following:</p> <ul style="list-style-type: none"> <li>• The dates at which monitoring was undertaken for each location;</li> <li>• The raw monitoring data for each location, for each parameter in a tabulated form; and</li> <li>• Results calculated for the period compared against the limits specified in Table 6.</li> </ul>	Appendices A and F	<p><b>Total Nitrogen</b> <i>Average Concentration: 118 mg/L</i> <i>Loading: 144.94 kg/ha/year</i></p> <p><b>Total Phosphorus</b> <i>Average Concentration: 37.8 mg/L</i> <i>Loading: 29.05 kg/ha/year</i></p> <p><b>Biochemical Oxygen Demand</b> <i>Average Concentration: 0.81 kg/day</i></p> <p>Concentration values for nitrogen (total) and phosphorus (total) are being reported in exceedance of licence limits. However, due to discharge volumes being well below the approved limit, the emission loading has not been exceeded. Works are ongoing to improve waste facilities to bring concentrations of both analytes within licence limits. Further details are provided in Appendix E.</p>
12	<p>The water balance provided to the CEO must include, but need not be limited to the following:</p> <ol style="list-style-type: none"> <li>a) The data used to undertake the water balance;</li> <li>b) Details on how the parameters have been calculated / estimated and description of any uncertainties; and</li> <li>c) An interpretation of the data.</li> </ol>	Appendix G	<p>Resource Engineering Consultants completed monthly water balance calculations for the TSF over the reporting period between December 2024 and December 2025.</p> <p>Water losses due to seepage and water discharged to the SSP vary per month between 135,851m<sup>3</sup> and 487,782m<sup>3</sup>. The variation is in most part attributed to seasonal variation. It should be noted that this loss will for the most part</p>

			<p>collect in the SSP as per design and will be stored for re-use in the processing plant.</p> <p>Overall, the balance demonstrates that, for most months, total outflows closely match inflows, resulting in a generally stable supernatant pond volume, with only minor short-term fluctuations during high rainfall periods and attributed to construction works.</p>
13	<p>The results to be provided to the CEO must include, but need not be limited to the following:</p> <p>a) A clear statement of the scope of work carried out;</p> <p>b) The dates at which monitoring was undertaken for each location;</p> <p>c) A description of the field methodologies employed;</p> <p>d) A summary of the field and laboratory quality assurance / quality control (QA/QC) program;</p> <p>e) The raw monitoring data from each location, for each parameter in a tabulated form;</p> <p>f) A diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours, flow direction and hydraulic gradient (relevant site features including discharge points and other potential sources of contamination must also be shown);</p> <p>g) An interpretive summary and assessment of results against previous monitoring results and against relevant assessment levels for water, as published in the Guideline: Assessment and management of contaminated sites; and</p> <p>h) Trend graphs to provide a graphical representation of historical results and to support</p>	Appendix H	<p>The monitoring data collected during this reporting period is compliant with this Environmental Licence.</p> <p>Sampling of TSF bores is conducted by the KMS environmental team quarterly in line with licence requirements. One sampling event annually is completed with the assistance of a hydrogeologist with experience of the Broome Aquifer.</p> <p>Conclusions from this reporting period:</p> <ul style="list-style-type: none"> <li>• The Broome aquifer groundwater levels are rising slightly across site and in TSF bores, which cannot be attributed to TSF operation.</li> <li>• Ongoing monitoring has identified no deleterious impacts to the aquifer, environment or other users have been identified.</li> </ul>

	the interpretive summary.		
<b>16</b>	Complaints Summary	N/A	Regular community engagement is carried out through a range of mechanisms. Only 1 complaint was received during the reporting period with regards to the licenced extent which was in relation to employee relations with a contractor. This complaint was taken up with the relevant contractor for management.

## APPENDIX D

### Condition 1 – Ore Production Quantities

*'Condition 1: The licence holder must ensure that the site infrastructure and equipment listed in Table 1 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 1'*

**Table D1: Ore Mined and Processed at the Thunderbird Mine Site**

Month	Ore Mined			Ore Processed		HMC Produced	
	DMU Feed (Dry Tonnes)	WCP Feed (Dry Tonnes)	CUP Feed (Dry Tonnes)	Dry Tonnes	Wet Tonnes		
Jan-25	832,031.00	595,683.00	71,062.00	70,374.00	74,078.00		
Feb-25	835,275.00	559,822.00	75,348.00	72,703.00	76,529.47		
Mar-25	839,092.00	553,882.00	65,833.00	66,467.00	69,965.00		
Apr-25	890,076.00	675,363.00	79,073.00	76,525.00	80,553.00		
May-25	927,923.00	715,216.00	76,337.00	75,674.00	79,656.00		
Jun-25	1,045,090.00	741,491.00	89,244.00	90,282.00	95,033.00		
Jul-25	933,873.00	663,776.00	95,931.00	96,303.00	101,371.00		
Aug-25	1,032,149.00	597,713.00	98,520.00	98,732.00	103,928.00		
Sep-25	1,078,273.00	609,624.00	108,356.00	106,261.00	111,854.00		
Oct-25	949,977.00	582,391.00	87,848.00	87,619.00	92,230.53		
Nov-25	963,581.00	637,864.00	87,969.00	90,691.00	95,464.21		
Dec-25	914,641.00	530,845.00	83,266.00	82,746.00	87,101.05		
<b>TOTAL</b>	<b>11,241,981.00</b>	<b>7,463,670.00</b>	<b>1,018,787.00</b>	<b>1,014,377.00</b>	<b>1,067,763.26</b>		

## APPENDIX E

### Condition 4 – Waste Types and Volumes

*'Condition 4: The licence holder must ensure that the waste types specified in Table 3 are only subjected to the corresponding processes, subject to the corresponding process limits and/or specifications'*

Waste Processing Volume - Landfill: 1,009.36 tonnes p/a

Waste Processing Types - Landfill:

- **Putrescible:** Domestic waste, food waste, office and packaging waste (paper, cardboard, plastic)
- **Inert Waste Type 1:** Building and demolition waste (concrete, steel, pipework, untreated timber)
- **Inert Waste Type 2 (ex. tires):** Plastics
- **Clean Fill:** Non-contaminated soils / gravels

Off-site disposal is facilitated for any items that do not fall into these categories including; E-Waste, tyres, oily rags/filters, hazardous waste, treated timber, waste oil and oily water.

Waste Processing Volume - Bioremediation of Hydrocarbon Impacted Soils:

**Table E1: Waste Processing – Changes in Bioremediation Cell Volumes**

Cell Number	Starting Volume (m3)	Material Added During Reporting Period (m3)	Material Removed During Reporting Period (m3)	Remaining Volume (m3)	Remaining Capacity (m3)
Cell 1	1500	3.75	1,500	3.75	621
Cell 2	387	5.3015	0	392.30	233

Volume of hydrocarbon impacted soils are recorded within a logbook during deposition. Table E2 shows all records during the reporting period. Various methods of estimating volumes and tonnage are utilised including:

- Surveyed stockpile volumes
- Weighing of larger amounts of material using scaled machinery buckets
- Weighing of smaller bagged material using scales

Where weights only are measured, the volumes are calculated using an average density of pindan soil or is estimated during disposal.

**Table E2: Tracking of Soils under Bioremediation Log-book Entries during Reporting Period**

Date	Cell	Quadrat	In-field Recorded Weight (kg)	In-field Recorded Volume (m3)	Calculated Weight (kg)	Calculated Volume (m3)	Contaminant	Amount of Spill	Location	Incident Number
<i>Average density of bioremediation soil (kg/m3)</i>				1322						
1/02/2025	Cell 2	C3	500	0.5	661	0.5	hydraulic oil	50L	Process Plant	INX3792
3/02/2025	Cell 2	C1	1000	1.5	1983	1.5	washbay dirt	0	Process Plant	N/A
28/04/2025	Cell 2	C2	50	>1	50	0.0375	Mixed Diesel Spill	unknown	Kaynar Laydown	N/A
7/05/2025	Cell 2	C1	200	>1	200	0.15	Diesel Spill	unknown	Fuel Farm INX4043	INX4043
7/09/2025	Cell 2	C2	1500	1	1322	1.126	Mixed Diesel Spill	unknown	Fuel Farm INX4043	N/A
4/10/2025	Cell 1	A1	1000	>1	1000	0.75	hydraulic oil	>20L	Process Plant	N/A
6/11/2025	Cell 1	A1	3000	3	1322	3	washbay dirt	0	Process Plant	N/A
26/11/2025	Cell 2	C2	2000	1.8	2379.6	1.8	washbay dirt	0	Process Plant	N/A
13/12/2025	Cell 2	C2	250		250	0.188	Oil water separator sand	0	Piacentini workshop	N/A
			<b>Total Deposited</b>		<b>Cell 1</b>	<b>3.75</b>				
			<b>Total Deposited</b>		<b>Cell 2</b>	<b>5.3015</b>				

## APPENDIX F

### Condition 11 – Sewage Volume and Emissions

'Condition 11: The licence holder must monitor emissions in accordance with the requirements specified in Table 7 and record the results of all such monitoring'

**Table F1: WWTP1 and WWTP2 Discharge Concentrations**

Average Discharge Concentrations per Quarter					
Sampling Month	BOD (mg/L)	TDS (mg/L)	TN (mg/L)	TP (mg/L)	TSS (mg/L)
Quarter 1	14.7	543.3	37.7	5.0	95.5
Quarter 2	6.1	540.0	52.7	9.6	124.3
Quarter 3	11.0	430.0	27.4	7.6	102.3
Quarter 4	13.9	457.5	32.5	8.7	92.8

**Table F2: WWTP1 and WWTP2 Discharge Volumes**

Wastewater volume discharged			
Month	Volume in KL (m3)	KL/Quarter	L/quarter
January	450.658	1169.214	1169214
February	332.051		
March	386.505		
April	345.727	1340.637	1340637
May	428.256		
June	566.654		
July	843.166	1843.69	1843690
August	428.547		
September	571.977		
October	206.15	632.15	632150
November	210.75		
December	215.25		
<b>TOTAL</b>	<b>4985.691</b>	<b>4985.691</b>	<b>4985691</b>

**Table F3: WWTP1 and WWTP2 Weighted Emissions**

Weighted discharge table					
Month	BOD (kg)	TDS (kg)	TN (kg)	TP (kg)	TSS (kg)
Quarter 1	104	2790	235	55.7	634
Quarter 2	64	2580	164.1	45.4	614
Quarter 3	39	3240	316	57.4	746
Quarter 4	88	3260	226	30.1	964
<b>TOTAL</b>	<b>295</b>	<b>11870</b>	<b>941.1</b>	<b>188.6</b>	<b>2567</b>
<b>Av kg/day</b>	<b>0.808</b>	<b>32.521</b>	<b>2.578</b>	<b>0.517</b>	<b>7.033</b>
<b>Av kg/ha/yr</b>	<b>45.434</b>	<b>1828.123</b>	<b>144.941</b>	<b>29.047</b>	<b>395.349</b>

## APPENDIX G

### Condition 12 – TSF Water Balance

*‘Condition 12: The licence holder must undertake monitoring of the water balance for the TSF each monthly period, and (as a minimum) record the following information*

- a) site rainfall;*
- b) evaporation rate;*
- c) decant water recovery volumes;*
- d) volume of tailings deposited;*
- e) tailings solid content (w/w %);*
- f) volume of water in tailings; and*
- g) calculated seepage.*

Monitoring and review of the Out of Pit TSF is undertaken by REC as the Engineer of Record (EoR) for the facility. Monthly water balance calculations are drawn from these reviews with inputs taken between REC and KMS including flow meter readings, survey measurements, site sourced and area average weather data as well as the metallurgical data of the tailings. The water balance for the Out of Pit TSF for the duration of the reporting period is provided in Table G1.

The water balance indicates that total monthly inflows are dominated by:

1. Slurry water from tailings deposition; and
2. Direct rainfall over the 1,004,000 m<sup>2</sup> catchment area, which varies significantly across the year with wet-season peaks.

The outflows are shown to primarily comprise:

1. Water recovery via abstraction for re-use in the processing plant
  - a. With recovery rates fluctuating between 34.6% and 73.3%
2. Water retention within the tailings mass
  - a. Estimated to be consistent at 21.43%
3. Evaporation losses from the supernatant pond and wet and dry beach areas
  - a. Differentiated by surface type using applied pan and beach factors
  - b. Influenced by seasonal climatic conditions

Water losses due to seepage and water discharged to the SSP vary per month between 135,851m<sup>3</sup> and 487,782m<sup>3</sup>. The variation is in most part attributed to seasonal variation. It should be noted that this loss will for the most part collect in the SSP as per design and will be stored for re-use in the processing plant.

Overall, the balance demonstrates that, for most months, total outflows closely match inflows, resulting in a generally stable supernatant pond volume, with only minor short-term fluctuations during high rainfall periods and attributed to construction works.





## APPENDIX H

### Condition 13 – Groundwater Monitoring

*‘Condition 13: The licence holder must conduct a groundwater monitoring programme in accordance with the requirements specified in Table 8 and record the results of all monitoring activity conducted under the programme’*

- a) *A clear statement of the scope of work carried out;*
- b) *The dates at which monitoring was undertaken for each location;*
- e) *The raw monitoring data from each location, for each parameter in a tabulated form;*

The TSF monitoring program included the installation of six monitoring bores (TSF01-TSF06) around the perimeter of the facility. Installation was completed in November 2022 to coincide with the commencement of construction of the facility. Monitoring at TSF01-TSF06 has since involved the following (Table H1):

- In-field measurements of Standing Water Level (SWL) using an interface dipper as well as in-situ data loggers installed November 2023
- In-field and laboratory verification (where applicable) of physio-chemical properties including Temperature, pH, Electrical Conductivity (EC), Redox Potential, Total Dissolved Solids (TDS) and Dissolved Oxygen (DO)
- Laboratory analysis of major ions, metals and metalloids including Bicarbonate, Calcium, Chloride, Magnesium, Potassium, Sodium, Sulfate, Aluminium, Arsenic, Cadmium, Chromium (Cr and CrVI), Cobalt, Copper, Iron, Mercury, Nickel, Zinc, Selenium, Thallium and Uranium

In-field measurements are conducted using the *ProQuatro Multiparameter YSI Meter*, calibrated to the relevant parameters. Samples taken for laboratory assessment are collected onsite by the Environmental Team and sent to *SGS Australia* (NATA accredited) for analysis. Results from both in-field and laboratory assessment are saved in a database for record keeping purposes and to allow comparative analysis with future sampling events.

Analytical results recorded during the reporting period highlighting any increases in analyte levels are provided in the Compliance Highlighting Report in Attachment H1.

## Compliance Highlighting Report

From 1 Dec 2024 to 31 Dec 2025



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.

Conditional breaches are shown in red

## Water

		Al (dissolved) (mg/L)	Alk Bicarb HC03 (mg/L)	Alk Carbonate CO3 (mg/L)	Alk Total CaCO3 (mg/L)
TSF01	12/01/2025 00:00	0.012	8		6
	30/04/2025 00:00	0.014	10		8
	10/08/2025 00:00	0.006	6	<1	<5
	29/10/2025 09:23	0.017	7		6
TSF02	12/01/2025 00:00	0.023	11		9
	30/04/2025 00:00	0.006	11		9
	09/08/2025 00:00	<0.005	10	<1	8
	29/10/2025 05:31	0.015	11		9
TSF03	12/01/2025 00:00	0.005	17		14
	30/04/2025 00:00	<0.005	19		15
	09/08/2025 00:00	<0.005	17	<1	14
	29/10/2025 06:16	0.006	17		14
TSF04	12/01/2025 00:00	0.017	27		22
	30/04/2025 00:00	0.011	27		22
	09/08/2025 00:00	<0.005	26	<1	21
	29/10/2025 06:52	<0.005	26		21
TSF05	12/01/2025 00:00	<0.005	53		43
	30/04/2025 00:00	<0.005	44		36
	10/08/2025 00:00	<0.005	29	<1	24
	29/10/2025 07:30	<0.005	39		32
TSF06	12/01/2025 00:00	0.008	32		26
	30/04/2025 00:00	0.012	32		26
	10/08/2025 00:00	<0.005	31	<1	25
	29/10/2025 06:42	0.005	30		24



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Ammonia (as NH3) (mg/L)	As (dissolved) (mg/L)	Ca (dissolved) (mg/L)	Cd (dissolved) (mg/L)
TSF01	12/01/2025 00:00		<0.0005	2.3	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	10/08/2025 00:00	<0.05	<0.0005	2.9	<0.00005
	29/10/2025 09:23		<0.0005	2.9	<0.00005
TSF02	12/01/2025 00:00		<0.0005	1.2	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	09/08/2025 00:00	<0.05	<0.0005	1	<0.00005
	29/10/2025 05:31		<0.0005	1.1	<0.00005
TSF03	12/01/2025 00:00		<0.0005	2.4	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	09/08/2025 00:00	<0.05	<0.0005	2.2	<0.00005
	29/10/2025 06:16		<0.0005	2.3	<0.00005
TSF04	12/01/2025 00:00		<0.0005	2.7	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	09/08/2025 00:00	<0.05	<0.0005	2.5	<0.00005
	29/10/2025 06:52		<0.0005	2.6	<0.00005
TSF05	12/01/2025 00:00		<0.0005	2.9	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	10/08/2025 00:00	<0.05	<0.0005	3.6	<0.00005
	29/10/2025 07:30		<0.0005	3.4	<0.00005
TSF06	12/01/2025 00:00		<0.0005	2.6	<0.00005
	30/04/2025 00:00		<0.0005		<0.00005
	10/08/2025 00:00	<0.05	<0.0005	2.5	<0.00005
	29/10/2025 06:42		<0.0005	2.7	<0.00005



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Chloride Cl (mg/L)	Co (dissolved) (mg/L)	Cr (dissolved) (mg/L)	Cr (total) (mg/L)
TSF01	12/01/2025 00:00	29	0.0005		0.013
	30/04/2025 00:00	30	<0.0005	<0.0005	0.0041
	10/08/2025 00:00	30	<0.0005		<0.0005
	29/10/2025 09:23	30	<0.0005		0.0051
TSF02	12/01/2025 00:00	35	<0.0005		0.0059
	30/04/2025 00:00	35	<0.0005	<0.0005	0.004
	09/08/2025 00:00	30	<0.0005		<0.0005
	29/10/2025 05:31	35	<0.0005		0.0073
TSF03	12/01/2025 00:00	39	<0.0005		0.012
	30/04/2025 00:00	39	<0.0005	0.0013	0.014
	09/08/2025 00:00	34	<0.0005		<0.0005
	29/10/2025 06:16	42	<0.0005		0.0059
TSF04	12/01/2025 00:00	59	<0.0005		0.02
	30/04/2025 00:00	58	0.0013	0.013	0.075
	09/08/2025 00:00	55	<0.0005		0.0013
	29/10/2025 06:52	57	0.0007		0.022
TSF05	12/01/2025 00:00	31	<0.0005		0.035
	30/04/2025 00:00	2	<0.0005	0.0024	0.046
	10/08/2025 00:00	95	<0.0005		<0.0005
	29/10/2025 07:30	18	<0.0005		0.015
TSF06	12/01/2025 00:00	74	<0.0005		0.013
	30/04/2025 00:00	74	<0.0005	0.0046	0.027
	10/08/2025 00:00	65	<0.0005		0.0011
	29/10/2025 06:42	74	<0.0005		0.033



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Cr6+ (Hexavalent) (mg/L)	CrVI (dissolved) (mg/L)	Cu (dissolved) (mg/L)	EC (µS/cm)
TSF01	12/01/2025 00:00		<0.001	0.0005	120
	30/04/2025 00:00	<0.001		0.001	150
	10/08/2025 00:00	<0.001		<0.0005	140
	29/10/2025 09:23	<0.001		<0.0005	120
TSF02	12/01/2025 00:00		<0.001	0.001	150
	30/04/2025 00:00	<0.001		0.0016	160
	09/08/2025 00:00	<0.001		<0.0005	140
	29/10/2025 05:31	<0.001		0.0011	130
TSF03	12/01/2025 00:00		0.002 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>	<0.0005	170
	30/04/2025 00:00	<0.001		<0.0005	180
	09/08/2025 00:00	<0.001		<0.0005	170
	29/10/2025 06:16	<0.001		0.0009	160
TSF04	12/01/2025 00:00		<0.001	0.0007	240
	30/04/2025 00:00	0.002 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>		0.0021	240
	09/08/2025 00:00	<0.001		<0.0005	240
	29/10/2025 06:52	0.003 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>		0.0008	260
TSF05	12/01/2025 00:00		0.003 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>	0.0009	200
	30/04/2025 00:00	<0.001		0.0006	100
	10/08/2025 00:00	<0.001		<0.0005	360
	29/10/2025 07:30	<0.001		<0.0005	160
TSF06	12/01/2025 00:00		0.003 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>	0.0009	300
	30/04/2025 00:00	<0.001		0.0006	300
	10/08/2025 00:00	<0.001		<0.0005	280
	29/10/2025 06:42	0.003 <span style="background-color: orange; border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span>		<0.0005	310



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Fe (dissolved) (mg/L)	Hardness total calc (mg/L)	Hg (dissolved) (mg/L)	K (dissolved) (mg/L)
TSF01	12/01/2025 00:00	0.029		<0.00005	0.8
	30/04/2025 00:00	0.016		<0.00005	0.7
	10/08/2025 00:00	<0.005	19	<0.00005	0.4
	29/10/2025 09:23	0.031		<0.00005	0.5
TSF02	12/01/2025 00:00	0.048		<0.00005	1.9
	30/04/2025 00:00	0.026		<0.00005	0.5
	09/08/2025 00:00	0.22	13	<0.00005	0.4
	29/10/2025 05:31	0.022		<0.00005	0.6
TSF03	12/01/2025 00:00	0.008		<0.00005	1.4
	30/04/2025 00:00	0.009		<0.00005	1
	09/08/2025 00:00	<0.005	18	<0.00005	0.9
	29/10/2025 06:16	0.006		<0.00005	1.2
TSF04	12/01/2025 00:00	0.034		<0.00005	2.5
	30/04/2025 00:00	0.021		<0.00005	2.6
	09/08/2025 00:00	0.014	24	<0.00005	2.3
	29/10/2025 06:52	0.006		<0.00005	2.3
TSF05	12/01/2025 00:00	0.008		<0.00005	1.4
	30/04/2025 00:00	<0.005		<0.00005	0.4
	10/08/2025 00:00	<0.005	40	<0.00005	2
	29/10/2025 07:30	<0.005		<0.00005	0.8
TSF06	12/01/2025 00:00	0.027		<0.00005	1.9
	30/04/2025 00:00	0.031		<0.00005	1.4
	10/08/2025 00:00	<0.005	27	<0.00005	1.3
	29/10/2025 06:42	<0.005		<0.00005	1.3



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Mg (dissolved) (mg/L)	Mn (dissolved) (mg/L)	Mo (dissolved) (mg/L)	Na (dissolved) (mg/L)
TSF01	12/01/2025 00:00	2.4			16
	30/04/2025 00:00	2.5			12
	10/08/2025 00:00	2.9	0.011	<0.0005	15
	29/10/2025 09:23	2.2			12
TSF02	12/01/2025 00:00	2.6			23
	30/04/2025 00:00	2.6			18
	09/08/2025 00:00	2.6	0.006	<0.0005	18
	29/10/2025 05:31	2.6			19
TSF03	12/01/2025 00:00	3			26
	30/04/2025 00:00	3			21
	09/08/2025 00:00	3.1	0.009	<0.0005	21
	29/10/2025 06:16	3.1			22
TSF04	12/01/2025 00:00	4.3			37
	30/04/2025 00:00	4.3			31
	09/08/2025 00:00	4.3	0.005	0.0009	30
	29/10/2025 06:52	4.4			31
TSF05	12/01/2025 00:00	4.5			33
	30/04/2025 00:00	4.6			8.9
	10/08/2025 00:00	7.6	0.004	<0.0005	45
	29/10/2025 07:30	5.2			15
TSF06	12/01/2025 00:00	5.1			49
	30/04/2025 00:00	5.1			42
	10/08/2025 00:00	5	0.004	<0.0005	39
	29/10/2025 06:42	5.5			43



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Ni (dissolved) (mg/L)	ORP (mV)	Pb (dissolved) (mg/L)	pH
TSF01	12/01/2025 00:00	0.005	416		5.7
	30/04/2025 00:00	0.004	445		5.8
	10/08/2025 00:00	0.001	398	<0.0005	5.9
	29/10/2025 09:23	0.005	414		5.7
TSF02	12/01/2025 00:00	0.003	406		5.7
	30/04/2025 00:00	0.002	446		5.7
	09/08/2025 00:00	<0.001	387	<0.0005	6.2
	29/10/2025 05:31	0.004	418		5.8
TSF03	12/01/2025 00:00	0.006	398		5.8
	30/04/2025 00:00	0.006	443		5.9
	09/08/2025 00:00	0.003	359	<0.0005	6.3
	29/10/2025 06:16	0.003	412		6.0
TSF04	12/01/2025 00:00	0.017	395		6.1
	30/04/2025 00:00	0.089	440		6.1
	09/08/2025 00:00	0.015	370	<0.0005	6.4
	29/10/2025 06:52	0.036	412		6.2
TSF05	12/01/2025 00:00	0.012	385		6.6
	30/04/2025 00:00	0.005	427		6.7
	10/08/2025 00:00	<0.001	373	<0.0005	6.6
	29/10/2025 07:30	0.007	395		6.6
TSF06	12/01/2025 00:00	0.011	393		6.2
	30/04/2025 00:00	0.025	433		6.2
	10/08/2025 00:00	0.006	375	<0.0005	6.6
	29/10/2025 06:42	0.024	415		6.3



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

## Water

		Phos as P (reactive) (mg/L)	Sb (dissolved) (mg/L)	Se (dissolved) (mg/L)	Sulphate (SO4) (mg/L)
TSF01	12/01/2025 00:00			<0.0010	3
	30/04/2025 00:00			<0.0010	16
	10/08/2025 00:00	0.004	<0.001	<0.0010	5
	29/10/2025 09:23			<0.0010	6
TSF02	12/01/2025 00:00			<0.0010	<1
	30/04/2025 00:00			<0.0010	1
	09/08/2025 00:00	0.003	<0.001	<0.0010	1
	29/10/2025 05:31			<0.0010	2
TSF03	12/01/2025 00:00			<0.0010	1
	30/04/2025 00:00			<0.0010	2
	09/08/2025 00:00	0.008	<0.001	<0.0010	1
	29/10/2025 06:16			<0.0010	3
TSF04	12/01/2025 00:00			<0.0010	2
	30/04/2025 00:00			<0.0010	2
	09/08/2025 00:00	0.010	<0.001	<0.0010	18
	29/10/2025 06:52			<0.0010	2
TSF05	12/01/2025 00:00			<0.0010	2
	30/04/2025 00:00			<0.0010	1
	10/08/2025 00:00	0.009	<0.001	<0.0010	2
	29/10/2025 07:30			<0.0010	3
TSF06	12/01/2025 00:00			<0.0010	5
	30/04/2025 00:00			<0.0010	5
	10/08/2025 00:00	0.019	<0.001	<0.0010	3
	29/10/2025 06:42			<0.0010	5



Readings exceeding limits are highlighted as follows:

Internal

Warning

Breach

High Priority Breach

Lower limit breaches are highlighted to the left of the reading and upper limit breaches to the right.  
Conditional breaches are shown in red

### Water

		TDS (mg/L)	TI (dissolved) (µg/L)	U (dissolved) (mg/L)	Zn (dissolved) (mg/L)
TSF01	12/01/2025 00:00	110	<0.5	<0.0005	0.0180
	30/04/2025 00:00	87			0.0630
	10/08/2025 00:00	130			<0.0010
	29/10/2025 09:23	120			0.0170
TSF02	12/01/2025 00:00	170	<0.5	<0.0005	0.0160
	30/04/2025 00:00	95			0.0150
	09/08/2025 00:00	140			0.0010
	29/10/2025 05:31	130			0.0150
TSF03	12/01/2025 00:00	160	<0.5	<0.0005	0.0160
	30/04/2025 00:00	110			0.0240
	09/08/2025 00:00	160			<0.0010
	29/10/2025 06:16	150			0.0640
TSF04	12/01/2025 00:00	240	<0.5	<0.0005	0.0210
	30/04/2025 00:00	150			0.0570
	09/08/2025 00:00	230			<0.0010
	29/10/2025 06:52	210			0.0120
TSF05	12/01/2025 00:00	140	<0.5	<0.0005	0.0380
	30/04/2025 00:00	62			0.0380
	10/08/2025 00:00	290			<0.0010
	29/10/2025 07:30	78			0.0240
TSF06	12/01/2025 00:00	250	<0.5	<0.0005	0.0370
	30/04/2025 00:00	180			0.0190
	10/08/2025 00:00	250			<0.0010
	29/10/2025 06:42	230			0.0100

**Table H1. L9335/2022/1 - Monitoring of ambient groundwater quality**

Monitoring Location	Parameter	Unit	Frequency	Averaging period	Method
TSF01 TSF02 TSF03 TSF04 TSF05 TSF06	SWL <sup>1,2</sup>	mbgl	Quarterly	Spot Sample	AS/NZS 5667.1 AS/NZS 5667.11
	pH <sup>1</sup>	pH units			
	Electrical Conductivity @25°C <sup>1</sup>	µS/cm			
	Redox potential <sup>1</sup>	mV			
	Total Dissolved Solids <sup>1</sup>	mg/L			
	Bicarbonate				
	Calcium				
	Chloride				
	Magnesium				
	Potassium				
	Sodium				
	Sulphate				
	Total Dissolved Solids				
	Aluminium				
	Arsenic				
	Cadmium				
	Chromium (Total Cr and CrVI)				
	Cobalt				
	Copper				
	Iron				
Mercury					
Nickel					
Selenium					
Thallium					
Uranium					
Zinc					

<sup>1</sup> In-field non-NATA accredited analysis permitted.

<sup>2</sup> SWL to be determined prior to the collection of other samples.

*c) A description of the field methodologies employed;*

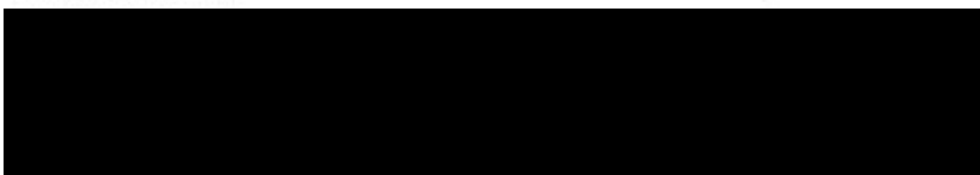
In-field sampling is conducted via the use of a stainless-steel bailer attached to a stainless steel braided cord. All equipment including an interface dipper, steel bailer and cord, are decontaminated using Decon90© prior to sampling including between each bore. A standing water level is taken initially using an interface dipper, followed by the bailing out of any stagnant water that may be in the well prior to sampling. At each bail, physico-chemical parameters are monitored for fluctuations in the water column. A YSI Meter is used to display pH, EC, ORP and temperature, and once stabilisation is achieved a water sample is taken. All sample containers are labelled prior to filling with the sampled water and are then stored either with ice or in the fridge before being sent for testing. Samples are packaged into laboratory supplied eskies with ice to be freighted to Perth and analysed by SGS Australia (NATA Accredited).

A hydrogeologist experienced in the aquifer systems of the Kimberley's is contracted annually to conduct site-wide groundwater sampling, inclusive of the TSF bores. Prior to sampling, each well is thoroughly purged. Bore completion records and existing water levels assist in the determination of the wetted casing volumes and the subsequent target purge volumes. At least three wetted casing volumes are purged out of each bore using a A 12V Tsunami or Airwell pump. Water quality parameters were measured during purging at suitable intervals such that about 5-6 tests were completed at reasonably even intervals during the purging process, with meaningful volumes of water pumped between tests, typically 20-50 L. Physico-chemical parameters are measured including EC, pH and ORP using calibrated field instruments until stabilised at which point samples were taken. Table H1 details the extent of the 2024's monitoring schedule.

The annual engagement of an external consultant ensures greater reliability across the monitoring strategy as it allows in-house results to be verified and ensures our monitoring methods are providing for reproduceable results. The 2025 Hydrogeo Groundwater Sampling Report is provided in Attachment H2.

11 February 2026

Thunderbird Operations Pty Ltd  
264 Port Drive  
MINYIRR WA 6726



**SUBJECT: Thunderbird Operations Pty Ltd  
Thunderbird Mine  
Kimberley, WA  
Groundwater Sampling**

Groundwater Consulting Services provided groundwater purging and sampling services in order to collect groundwater samples for laboratory analysis from a range of monitoring bores at the Thunderbird site. The site is located about 95 km north-east of Broome, and accessed by road via the Great Northern Highway.

Sampling was conducted in order to maintain compliance with the conditions of the amended Groundwater Licence Operating Strategy (Rockwater, March 2025). A network of monitoring bores was installed through the project history in various campaigns and for varying purposes. The bores are characterised by a range of conditions which make purging problematic including some narrow diameter bores, deep groundwater levels and relatively large submerged casing volumes. Groundwater Consulting Services completed a purging and sampling event between 8 and 11 August 2025.

The bores that were sampled are all screened in the Broome aquifer which is a regionally extensive, mostly unconfined aquifer hosting generally fresh groundwater. High yielding bores are readily constructed in thicker parts of the aquifer. The Thunderbird mine lies near the eastern extent of the aquifer which pinches out against the underlying Jarlemai Siltstone. The Jarlemai Siltstone is exposed at Mt Reeves, located immediately west of the Thunderbird Village and east of the mine site.

Minor changes to the suite of bores to be sampled were made in the revised operating strategy. Some additional bores were included to capture water quality data for other purposes.

The need to purge significant volumes of water from larger depths in narrow bores limits the range of suitable sampling equipment. In 2024, a similar sampling programme was run, based on use of a manually installed Airwell system. The system provided timely purging and was suitable for the work, however it is relatively cumbersome and time consuming to install and retrieve, requiring manual handling effort that introduced some operator risk. An alternative system was sought.

Introduction of two new bores, THAC252 and THAC427, with resting water levels over 40 m deep introduced additional performance requirements for a pumping system.

### **Pump Selection**

A review of available pumping systems was conducted informally, and communicated by email. Proactive makes a range of effectively disposable 12V powered pumps. The higher capacity models operate from a boosted power supply up to 24V DC (ramped up using a dedicated controller). Groundwater Consulting Services uses these pumps for a range of sampling and replacements are commonly required. As the pumps increase in performance, the cost increases exponentially and they are considered a relatively high risk investment. Despite some reticence, they are likely suitable for the bulk of the sampling programme with effective pumping depths in the range up to 35 m readily achievable. Addition of THAC252 and THAC427 to the suite of bores to be sampled precluded even the higher capacity of these pumps and they were since disregarded.

Alternative narrow diameter pumping systems include Grundfos Rediflo and Geosub2. Both are 240V powered systems and operate a high speed/low torque narrow diameter pump. The Rediflo system has higher performance (greater maximum pumping depth and greater flow rate for any pumping depth). The Rediflo system has a higher power demand and requires use of a portable generator. The Geosub system, powered by a 12-240V inverter, was selected due reduced operational logistics and documented performance sufficient for the sampling programme. Following discussion, it was decided to hire a system to trial the performance in the field, substantially influenced on its capacity to operate from a 12V power source. A Geosub2 system was rented from Eco Environmental for the project

The Geosub2 comprises a 240V powered variable speed submersible pump which can be supplied by a ~1000W sine wave inverter, in turned powered by the vehicle battery, or a generator. Nominal performance for the unit ranges from open flow of 13 L/minute and a dead head of 60 m. Assuming an arbitrary minimum purge flow rate of 4 L/minute, the pump can lift water from about 45 m depth. The performance range exceeded that of the Proactive submersible pumps and would deliver suitable purge flow rates against the highest forecast total dynamic heads (approaching 50 m). Mine dewatering may further reduce groundwater levels in some bores.

Pipe friction in the supplied 10mm internal diameter tubing, assuming a 60m length is in use, ranges from about 1.7 m at 2 L/min, 6 m at 4 L/m, and 13 m at 6L/minute. The effect of pipe friction is to reduce the achievable flow rate but it cannot affect the total dead head, at which point it falls to zero.

Once pit dewatering commences, reductions in groundwater levels near the active dewatering area may further increase the required pumping heads.

### **Field Programme**

Groundwater Consulting Services prepared for and mobilised on 8 August 2025, and the field programme was conducted between 8 and 11 August 2025. Thunderbird Operations Environmental Advisor Ben Smith-Robson co-ordinated the campaign, collection and handling of water samples for laboratory testing. Dataloggers were removed from the bores to permit sampling, and reinstalled without downloading. No changes to dataloggers or installation depths were made.

Groundwater Consulting Services selected suitable pumping equipment, installed and operated the equipment and collected purge records with assistance of Thunderbird Operations.

The bores selected for sampling were as nominated in the Groundwater Licence Operating Strategy. Additional bores were also sampled to provide radiation testing samples (THAC 243 and THAC357), and to improve baseline database ahead of operational groundwater extraction and future pit expansion and associated dewatering (THAC252 and THAC427). Thunderbird Operations guided the order of sampling and scope of monitoring bores sampled.

Bore completion records and existing water level data were used to determine wetted casing volumes and target purge volumes in advance of the programme. Purge volumes were selected so that approximately three wetted casing volumes were removed prior to sampling, incorporating a correction for the static portion of the wetted casing volume. A summary of bore completion details is provided in *Table 1*. *Appendix A* provides photographs of the bores and purging activities.

Water quality parameters were measured during purging at suitable intervals such that about 5-6 tests were completed at reasonably even intervals during the purging process, with meaningful volumes of water pumped between tests, typically 20-50 L. Electrical conductivity, pH and oxidation/reduction potential were measured using calibrated field instruments. In most cases, stable water quality parameters were obtained. For some bores, pH and/or oxidation/reduction potential had not stabilised but due to the high volume of groundwater purged, a decision was made to either extend the purge volume before sampling or to collect a sample. Purge logs are recorded in *Table 2*.

Water quality during purging was measured using handheld field water quality instruments. A WTW330i was used for electrical conductivity, and Adwa AD14 for pH and oxidation/reduction potential. The units were calibrated prior to the programme, and checked periodically during the programme.

In all cases, bores produced groundwater at the rate required by the installed pumping system and this observation is consistent with them being screened in the relatively permeable Broome aquifer. Measured groundwater levels and a summary of field water quality results are provided in *Table 3*. The groundwater level in THAC427 drew down during pumping, exemplified by a visible reduction in flow rate, but due to the large depth to water, narrow casing, and pumping tubing, pumping water level measurements were not obtained.

12V pumps were used to purge two bores with relatively shallow water levels, TMB5 and TMB6.

Supplementary issues or comments related to the water sampling programme are listed below:

#### **Geosub performance**

At face value the Geosub system successfully purged and provided water for sampling water samples from all bores, however its performance and reliability were marginal.

On the first sampled bore, the vehicle engine was started to maintain charging while the inverter was running, and soon afterwards the controller emitted smoke and was shut down. After consultation with the equipment owner, a trial restart was conducted and the system performance had reduced to well below the rated performance. A spare entire Geosub system was air-freighted to site. It is likely that the system stopped during loss of electrical power as the vehicle engine was started, and restarted at high load, consequently overloading the electrical drive system. Following that event, the vehicle engine was started prior to powering up the pump to maintain continuous electrical power.

The system was used during a cool time of the year (outside ambient temperatures ranging about 20-32C during daylight hours), and despite operating the unit inside a vehicle cab, shaded and cooled with air conditioning vents, overheating was a clear drawback. A large copper coil in the unit became very hot during operation and the cooling ventilation fan in the unit was incapable of maintaining stable coil temperatures. The aluminium control panel and the base of the waterproof enclosure (Pelican style case) were uncomfortably hot to touch after 30 to 60 minutes of continuous use.

Two controller systems were used alternately to provide for a longer cooling period between samples. Quantitative measurements could not be taken, however it appeared the heating rate during use exceeded the cooling capacity of the units and the internal temperature was rising during active pumping periods. The last bore to be purged, THAC427, could only be pumped with one of the controllers due loss of performance of the other controller, and with a low flow rate, limited by the high vertical lift, the purge time exceeded two hours. The controller circuit breaker popped and even once cool, could not be reset. Overheating was the presumed cause. At this bore, most of the samples had been taken prior to pump failure. The discharge water was being collected in a clean 20L bucket, and the final sample was taken from the bucket.

We do not recommend reliance on the Geosub system for water sampling for extended period in warm conditions.

**Grundfos Rediflo 2**

The Grundfos Rediflo2 system is a well-established sampling pump with a long history. Its nominal performance range is from 34 L/min open flow to 76 m dead head, with a flow of ~4 L/min against a total dynamic head of about 60 m. Its documented performance is superior to the Geosub2. The additional complication is the requirement to operate the unit from a generator with capacity about 3.5kW to handle the in-rush current when the pump starts.

We suggest the Rediflo2 unit should be trialled at the next annual monitoring event, on a rental basis.

Discussion of observations with respect to the TSF and dewatering are intended to initiate discussions and capture the site observation, but not to formally advise Thunderbird Operations. We seek guidance of Thunderbird Operations with respect to the need for and nature of additional work, if any, required.

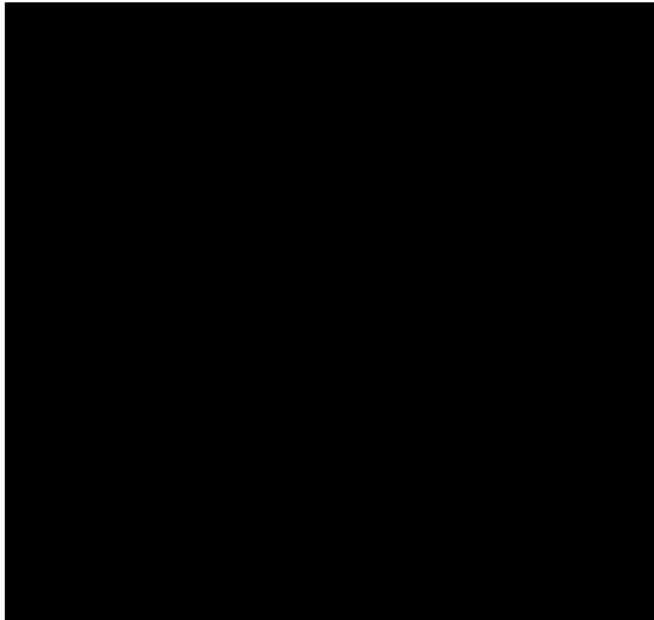


Table 1 Details of Sampled Bores

BORE ID	Context	Drilled depth (m)	Constructed depth (m)	Screened interval (m bgl)	Depth to water (mbtc)	Casing ID (mm)	Three Volumes (L)
TMB02	GLOS	54	53.4	36.8 - 52.8	33.44	50	102
TMB04	GLOS	76	76	69.6 - 75.6	31.395	50	42
TMB05	GLOS	36	23.12	17.12 - 22.72	0.48	50	40
TMB06	GLOS	42	35.35	29.2 - 35.2	16.57	50	42
TSF01	GLOS	45	42.2	36.0 - 42.0	29.72	100	166
TSF02	GLOS	42	40.8	34.6 - 40.6	36.455	100	166
TSF03	GLOS	45	42.2	36.0 - 42.0	31.54	100	166
TSF04	GLOS	45	44.5	38.3 - 44.3	27.94	100	166
TSF05	GLOS	45	43	36.8 - 42.8	27.59	100	166
TSF06	GLOS	42	41.6	35.4 - 41.4	30.47	100	166
THAC243	Radiation	60	57(?)	0-57	28.53	50	168
THAC252	Dewatering	96	93(?)	57-93	44.76	50	288
THAC357	Radiation	83	?	NR	28.41	50	324
THAC427	Dewatering	90	90(?)	72-90	47.39	50	258

Notes: Construction details provided by Thunderbird Operations Pty Ltd or from project reference documentation

Three volumes calculated based on assumed 1m drawdown during pumping, static column length above the pump removed from casing volume

Table 2 Purge Logs

Bore	Date	Controller/Pump Pair	Target Purge Volume (L)	Volume (L)	EC (uS/cm)	pH	ORP (mV)
TMB02	09/08/2025	Geosub4/Pump4	102	20	135	5.15	174
				60	125	5.12	173
				100	123	5.1	184
				140	123	5.1	193
				180	123	5.1	190
TMB04	09/08/2025	Geosub4/Pump4	42	20	158	5.17	230
				40	130	5.04	223
				60	128	5.12	223
				100	127	5.66	169
				140	128	5.12	168
			180	128	5.16	172	
TMB05	08/08/2025	Monsoon	40	10	258	5.2	212
				40	230	5.4	207
				70	231	5.4	193
				100	233	5.38	192
				150	235	5.36	184
TMB06	08/08/2025	Monsoon	42	40	337	5.58	93
				100	334	5.6	98
				150	331	5.68	120
				200	330	5.7	129
				250	330	5.73	136
TSF01	10/08/2025	Geosub1/Pump1	166	40	132	5.4	239
				80	139	5.4	245
				120	144	5.37	258
				160	143	5.44	244
				180	142	5.43	243
TSF02	09/08/2025	Geosub1/Pump1	166	40	148	5.28	183
				80	142	5.23	131
				120	141	5.22	110
				160	141	5.21	144
				200	142	5.2	148
TSF03	09/08/2025	Geosub4/Pump1	166	40	170	5.43	170
				80	171	5.31	172
				120	171	5.41	175
				160	168	5.43	171
				180	170	5.38	174

Table 2 Purge Logs (continued)

Bore	Date	Controller/Pump Pair	Target Purge Volume (L)	Volume (L)	EC (uS/cm)	pH	ORP (mV)
TSF04	09/08/2025	Geosub1/Pump1		40	231	5.67	199
				80	236	5.67	200
				120	237	5.65	204
				160	238	5.57	217
				166	240	5.59	220
TSF05	10/08/2025	Geosub4/Pump1		40	116	6.56	227
				80	357	6.18	212
				120	362	6.14	208
				160	360	6.13	213
				166	360	6.11	217
TSF06	10/08/2025	Geosub1/Pump1		40	300	6.1	216
				80	295	6.11	208
				120	289	6.16	223
				160	285	6.11	229
				166	287	6.12	230
THAC243	10/08/2025	Geosub4/Pump1		40	181	6.15	29
				80	180	6.09	30
				120	177	6.11	37
				160	175	6.07	56
				168	174	6.04	62
THAC252	11/08/2025	Geosub4/Pump1		40	90	6.11	241
				80	86	6.15	255
				120	86	6.15	238
				160	85	6.12	238
				288	85	6.11	236
THAC357	08/08/2025	Geosub4/Pump4		10	308	5.83	169
				30	277	5.67	163
				60	276	5.79	169
				90	277	5.69	161
				324	277	5.69	159
THAC427	11/08/2025	Geosub4/Pump1		20	188	7.18	-48
				60	187	6.85	-40
				100	122	6.41	35
				140	103	6.06	99
				258	99	6.03	120



TMB02



TMB04



TMB05



TMB06



TSB01



TSB02



TSB03



TSB04



TSF06



TSF06



THAC243



THAC252



THAC357



THAC427



TSF03 purging

*d) A summary of the field and laboratory quality assurance / quality control (QA/QC) program;* Groundwater sampling is conducted in line with the Thunderbird Groundwater Monitoring Procedures and industry best practises. In-field sampling is performed by qualified and experienced environmental advisors with the aid of an experience hydrogeologist for one sampling event annually. Stagnant water is bailed from the bores and physico-chemical readings (pH, EC, and temperature) are allowed to stabilise prior to sampling to ensure volumes of the actual aquifer are presented for analysis.

All in-field equipment is calibrated and decontaminated using Decon90© between bores and prior to sampling being conducted. Nitrile gloves are used to avoid cross-contamination and are changed between each bore. Sample bottles are rinsed with sample water (except for those containing preservatives) following which they are filled, omitting any headspace that may result in analysis error due to oxygenation and volatile loss. Samples are stored in eskies with ice or placed in the fridge as soon as practicable after sampling and are transported with ice to minimise impacts due to higher temperatures and solar radiation.

Packaging of samples is undertaken strictly within sample management procedures to preserve the quality of the samples and prevent tampering. Packaged samples are sent as priority air freight on the first flight available to Perth to allow analysis within holding times, minimise temperature fluctuations and decrease the potential for chemical decomposition. All samples are clearly labelled with the sample reference, date and time and are packaged in a clearly labelled and sealed esky. Sample packages are accompanied by a chain of custody certificate signed by the qualified and experienced person responsible for the sampling which includes a list of all samples taken, the date at time of the sampling and the requested analysis.

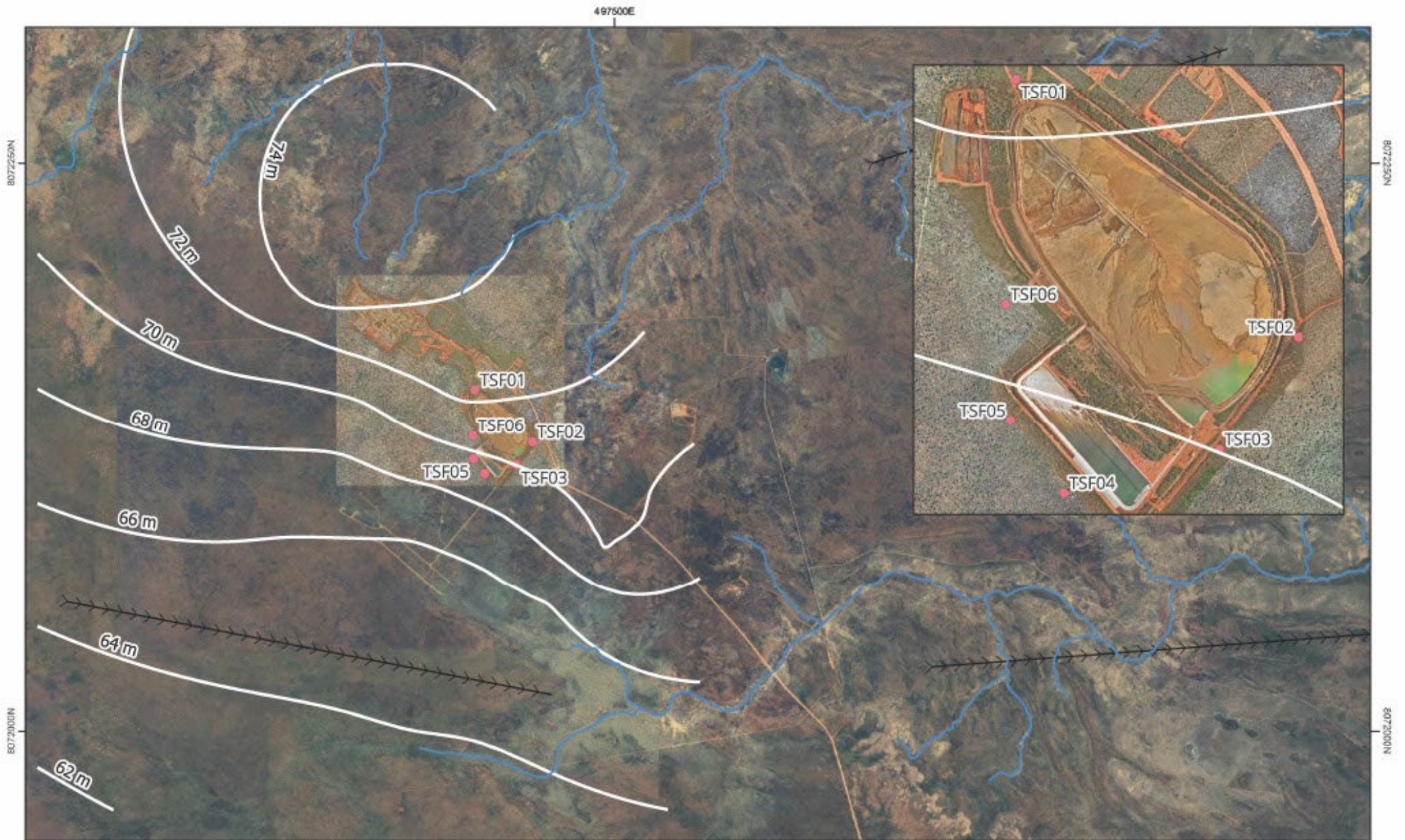
While no in-field duplicate samples were collected as part of the 2025 groundwater sampling program the consistently low and stable analytical results across all TSF monitoring bores, together with results below trigger values and minimal variability between locations, provide confidence in the dataset and reduce reliance on duplicate sample comparison for data quality assurance.

Laboratory analysis is undertaken by a NATA Accredited organisation with experience in performing the requested analysis in-line with the adopted standards and required. In-laboratory quality assurance methods include:

- Method Blank (MB) Analysis where a known blank sample is tested for an analyte with the result compared to the laboratory limit of reporting (LOR)
- Spike recovery analysis using Laboratory Control Samples (LCS) and Matrix Spikes (MS) where a percentage is derived based on the amount of analyte recovered from the sample compared to the amount of analyte spiked into the sample
- Duplicate samples and Matrix Spike Duplicates (MSD) are analysed with results compared to their original counterpart samples

*f) A diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours, flow direction and hydraulic gradient (relevant site features including discharge points and other potential sources of contamination must also be shown);*

See figure H1: Monitoring Locations of TSF



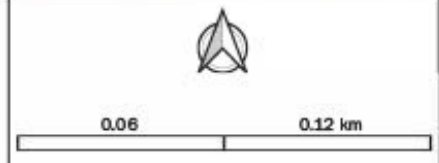
**Figure H2**  
Locations of TSF Monitoring Bores

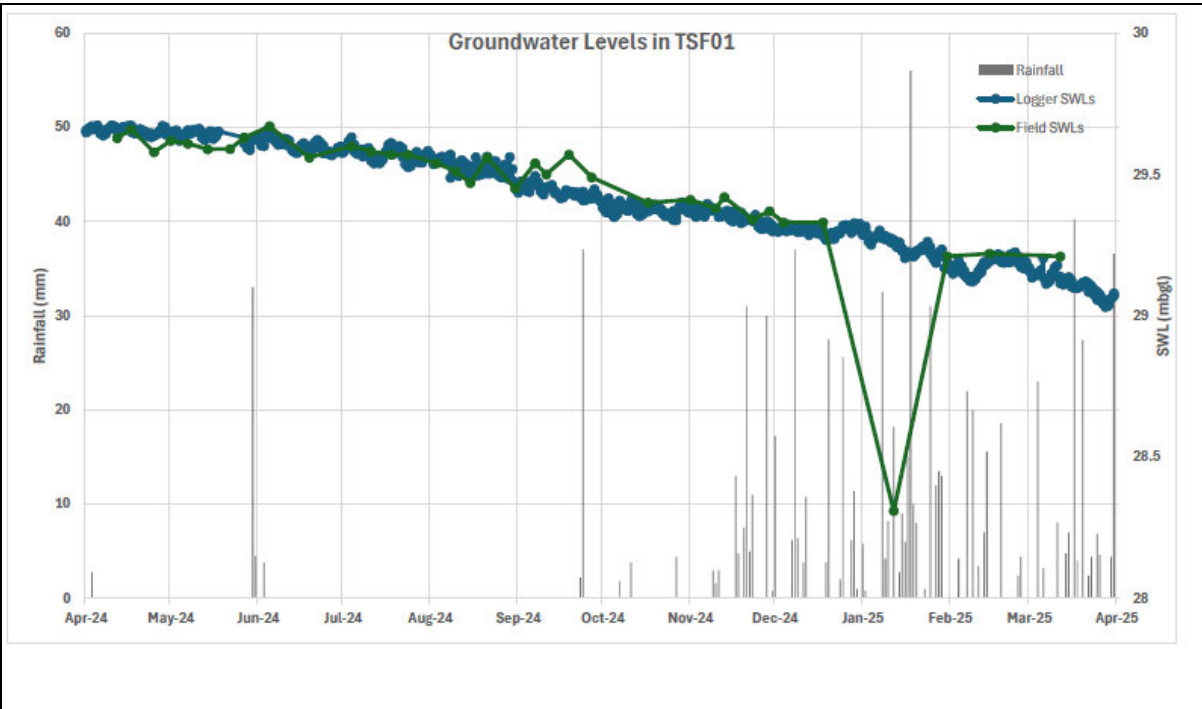


Author: Karen Gonzalez  
Date: 29/01/2026  
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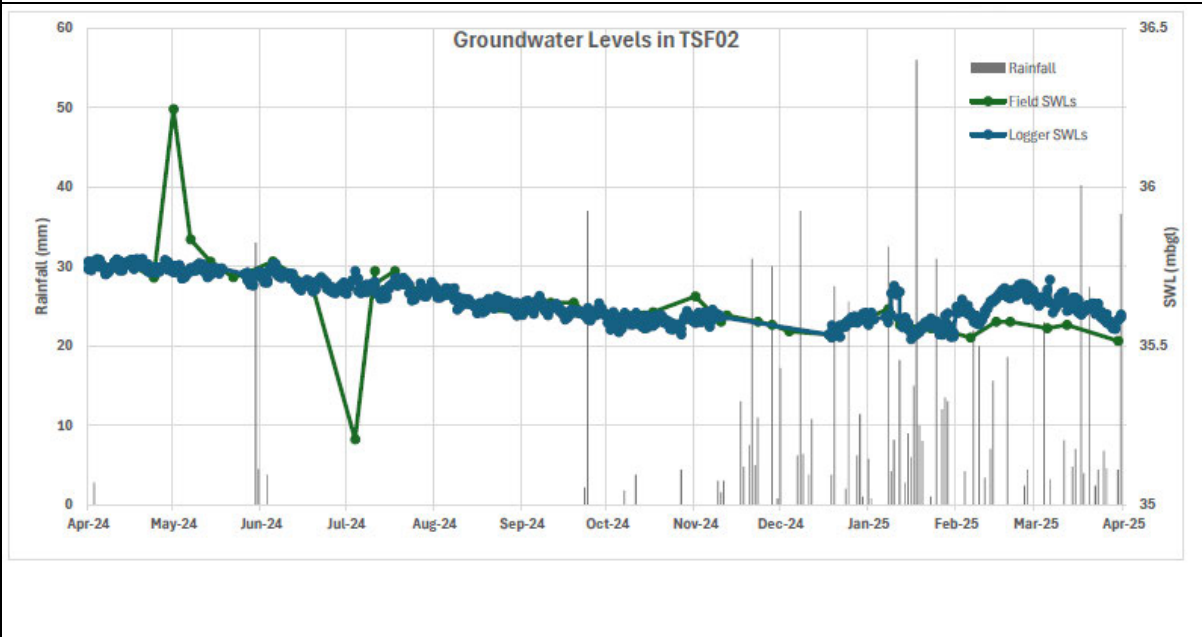
**Figure 13D. Legend**

-  Thunderbird Development Envelope
-  Regional Watercourses
-  TSF Monitoring
-  drainage\_direction
- Interpreted Broome Aquifer Groundwater Levels (Rockwater 2016)

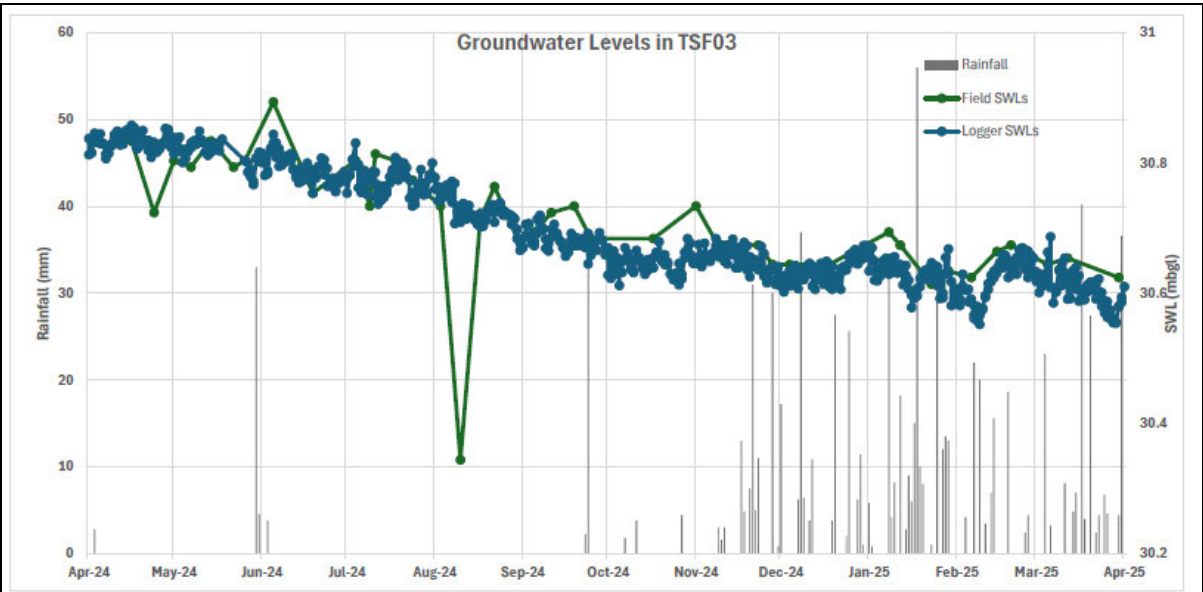




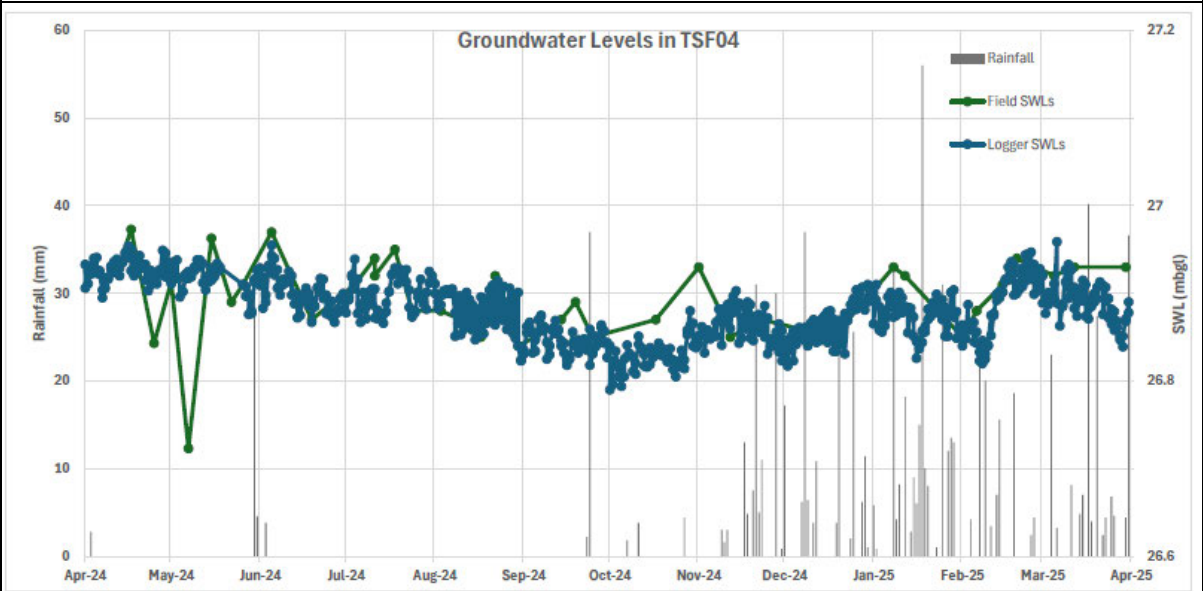
**Figure H2 - Monitoring of SWL in TSF01**



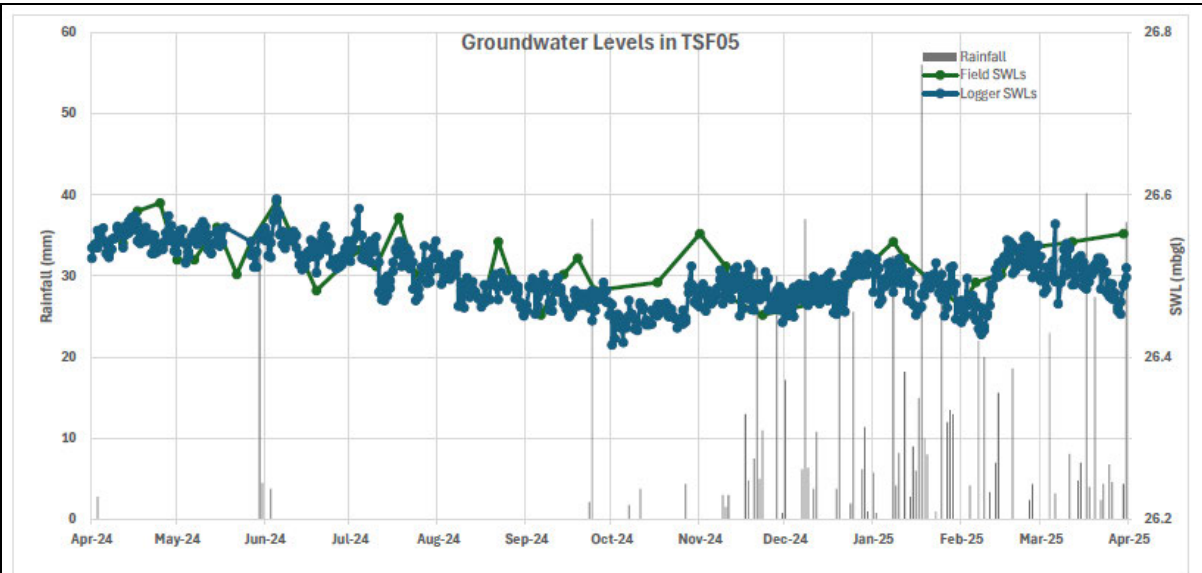
**Figure H3 - Monitoring of SWL in TSF02**



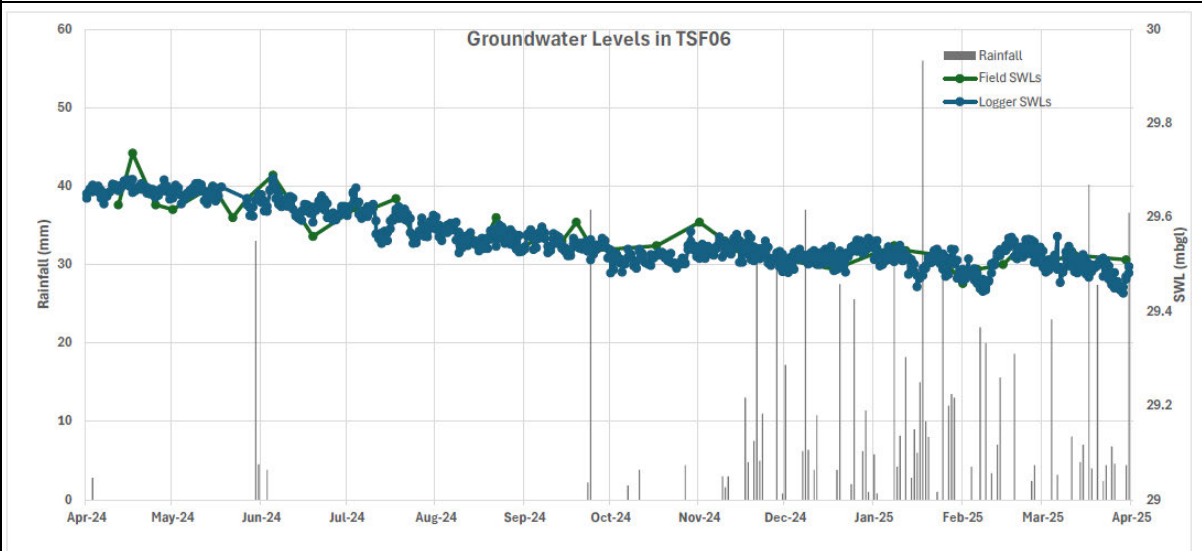
**Figure H4 - Monitoring of SWL in TSF03**



**Figure H5 - Monitoring of SWL in TSF04**



**Figure H6 - Monitoring of SWL in TSF05**



**Figure H7 - Monitoring of SWL in TSF06**