ANGLOGOLDASHANTI
AUSTRALIA

SUNRISE DAM GOLD MINE
PRESCRIBED PREMISES LICENCE – L8579/2011/2
ANNUAL ENVIRONMENTAL REPORT
2025

REPORTING PERIOD 1 JANUARY 2025 – 31 DECEMBER 2025

This document has been prepared by AngloGold Ashanti Australia Limited on behalf of Sunrise Dam Gold Mine to meet Environmental Protection Act Licence L8579/2011/2 requirements. This Annual Environmental Report and Annual Audit Compliance Report has been prepared for the reporting period 1 January 2025 to 31 December 2025.

Document History

[redacted]

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1 INTRODUCTION

AngloGold Ashanti Australia Limited (AGAA) owns and operates the Sunrise Dam Gold Mine (SDGM) operation, located 55 kilometres south of Laverton in the Goldfields region of Western Australia. The mine is situated on the Mt Weld Pastoral Lease owned by GSM Mining Company Pty Ltd. The project comprises underground and open pit operations, a processing facility and ancillary services including a natural gas (with diesel backup) power station, administration facilities, aerodrome, and accommodation village. The SDGM Premises Categories and applicable throughputs are summarised in Table 1.

Table 1: Process Volumes by Licence Categories – 2025 Reporting Period

Category	Category Description	2025 Throughput/Design Capacity	PPL Limit / Threshold
05	Processing or beneficiation of metallic or non-metallic ore	3.87 Mtpa	5.5 Mtpa
06	Mine dewatering discharge	720,738 tonnes per year	5 Mtpa
52	Electric power generation	48 MW	48 MW
54	Sewage facility	Total annual throughput: 67,425 m3. Daily average: 184.72 m3 per day.	250 m3 per day
57	Used tyre storage	< 1000 tyres	1,000 tyres
64	Class II putrescible landfill site	2,292.06 tonnes	10,000 tonnes per year

Conditions 31, and 33 and 34 of the Prescribed Premises Licence (PPL) require the preparation of an Annual Audit Compliance Report (AACR) and Annual Environmental Report (AER), respectively, for submission to the Department of Water and Environmental Regulation (DWER) within 60 calendar days after the end of the annual period. This report has been developed to meet the PPL condition requirements and covers the period 1 January 2025 to 31 December 2025 (the reporting period). A copy of the AACR is provided as Appendix A.

In accordance with the PPL requirements, this AER has been developed to specifically address the items in Condition 33, Table 13 as follows:

- 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;
- Operating hours for diesel generators;
- Monitoring of point source emissions to surface water;
- Process monitoring;
- Ambient groundwater monitoring;
- Annual dewatering discharge report;
- Annual vegetation assessment report;
- Compliance in the form of the Annual Audit Compliance Report; and,
- Complaints Summary.

2 Failure or Malfunction of Pollution Control Equipment and Environmental Incidents

Environmental incidents are recorded and tracked through AGAA's Event Management System (iSIMS) from January to November, before transitioning to the Environment Management Application (EMA) as of December 1st 2025.

During the reporting period a total of 73 environmental incidents were recorded as summarised in Table 2. Each environmental incident was risk assessed according to AGAA's risk matrix (Figure 1) as Insignificant, Minor or Moderate (Figure 2). All incidents were managed through normal operating procedures, of which one fulfilled the requirements to be externally reported under the PPL.

There were three non-compliance's for the 2025 reporting period, all relating to one incident.

On the 22 June 2025, dewatering effluent overtopped the Golden Delicious Turkey's Nest. This incident was reported to DWER on the 25 June 2025. Pumping to the Turkey's Nest was immediately ceased following the incident, and the affected area was remediated to remove any salts present on the surface. To prevent recurrence, the mill control Citec alarm escalation process has been reviewed to ensure critical alerts are attended to and escalated appropriately in a timely manner. An engineering review of freeboard monitoring telemetry across all ponds and dams has been completed, and all water storages dams have been audited to confirm that freeboard limits are clearly marked on pond walls and that level sensors activate prior to the 300 mm freeboard limit. Further detail can be found in the AACR (Appendix A). The three conditions that were breached are as follows:

- Condition 13: The Licence Holder shall ensure that any saline dewatering effluent shall only be discharged in the following manner:
  - (a) used for dust suppression in a manner that minimises damage to surrounding vegetation; or
  - (b) discharged to Lake Carey in accordance with the conditions in section 2 of this Licence.
- Condition 15: The Licence Holder shall manage all containment infrastructure in Table 5 such that a minimum top of embankment freeboard of 300 mm or a 1 in 100 year/72 hour storm event (whichever is greater) is maintained.
- Condition 37: The Licence Holder shall ensure that the parameters listed in Table 14 are notified to the CEO in accordance with the notification requirements of the table.
  - Part A: As soon as practicable but no later than 5pm of the next usual working day.
  - Part B: As soon as practicable

Table 2: Summary of Environmental Incidents (2025)

Event Category	Number of Events
Fauna - Mortality	18
Non-Compliance (other)[1]	1
Procedural Non-Conformance	15
Loss of containment - Hydrocarbon	8
Loss of containment - Tailings	5
Loss of containment - Process	6
Loss of containment - Other	20
Total	**73**

1. *Non-compliance to legislation or regulatory requirements other than the Environmental Protection Act Protection Act 1986, Part V.*

Consequence			Risk Classification					
Extreme environmental effect with impairment of ecosystem function. Long-term, widespread effects on significant area. > US$50 million	Extreme	C6	-/+21	-/+30	-/+32	-/+34	-/+35	-/+36
Serious environmental effect with some impairment of ecosystem function. Relatively widespread, medium-long term impact. US$10 million - 50 million	Major	C5	-/+17	-/+27	-/+28	-/+29	-/+31	-/+33
Significant effect on biological or physical environment not affecting ecosystem function. Significant short-medium term widespread impact. US$1 million - 10 million	High	C4	-/+14	-/+22	-/+23	-/+24	-/+25	-/+26
Moderate effect on biological or physical environment. Moderate short-medium term damage to minimal, low significance area. US$100,000 - 1million	Moderate	C3	-/+8	-/+15	-/+16	-/+17	-/+18	-/+19
No lasting effect/ low- level impact on biological or physical environment. Minor damage to small, low significance area. US$10,000 - $100,000	Minor	C2	-/+2	-/+9	-/+10	-/+11	-/+12	-/+13
Negligible. <US$10,000	Insignificant	C1	-/+1	-/+3	-/+4	-/+5	-/+6	-/+7
		Likelihood	L1	L2	L3	L4	L5	L6
			Almost impossible	Very unlikely	Unlikely	Likely	Very likely	Almost certain

Figure 1: AGAA Environmental Risk Matrix

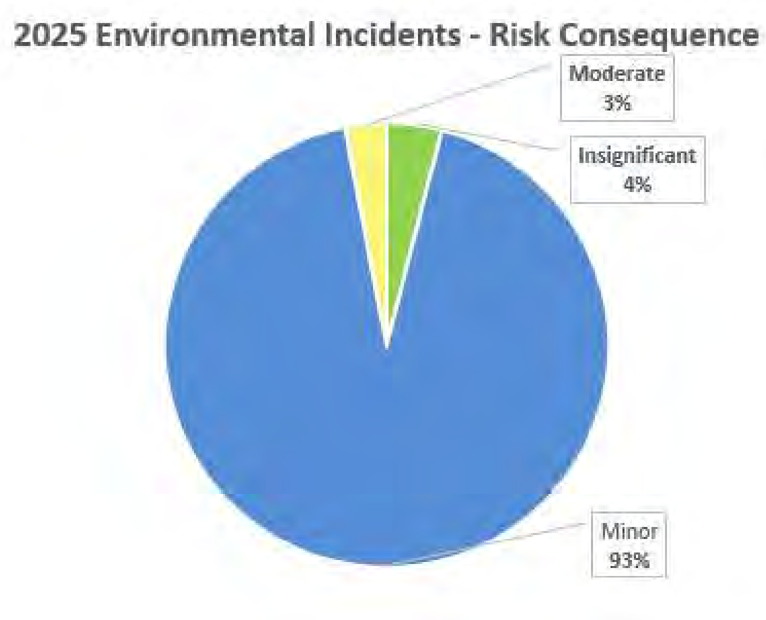

Figure 2: Summary of Environmental Incidents by risk consequence (2025)

3 OPERATING HOURS FOR DIESEL GENERATORS

The operating hours for diesel generators, expressed as a percentage of the total operating hours for all generators, is provided in Table 3.

During the 2025 reporting period, the gas fuelled generators were operated for a combined 133,807 hours (96.91% of total operating hours). The diesel generators were operated for a combined 4,272 hours (3.09% of total operating hours).

Table 3: Operating Hours for Gas and Diesel Generators 2025

Gas Generators		Diesel Generators	
Generator	**Run Hours**	**Generator**	**Run Hours**
10	7628	**1**	397
11	6550	**2**	351
12	8295	**3**	290
13	7282	**4**	833
14	7014	**5**	409
15	7791	**6**	0
16	6602	**7**	654
17	5941	**8**	319
18	8487	**9**	0
19	5552	**22**	0
20	8563	**23**	1019
21	6008		
24	8097		
25	7516		
26	8497		
27	8654		
28	6654		
29	8676		
Total operating hours 2025			
Total Gas Hours	133,807	**Total Diesel Hours**	4,272
% of Total operating hours	96.91	**% of Total operating hours**	3.09

4 Monitoring of Point Source Emissions to Surface Water

4.1 Volume

A total volume of 720,738 tonnes (t) of water was discharged from SDGM to Lake Carey discharge site during the 2025 reporting period (Table 4), which equated to 14.4% of the annual licence limit (5,000,000 t). This was a decrease in discharge of 893,327 t from the discharge volume of the previous year (1,614,065 t). The associated decrease is attributed to lower rainfall in 2025 compared with the previous year (2024). This is consistent with the findings presented in Appendix B.

Table 4: Monthly dewatering discharge volumes to Lake Carey 2025

Month	Monthly Dewatering Volumes (t)
January	99,802
February	95,943
March	157,307
April	111,587
May	65,317
June	56,974
July	35,575
August	26,085
September	34,791
October	11,191
November	14,591
December	11,575
Total	**720,738**

4.2 Water Quality

All required analyses were conducted during the 2025 reporting period and comparisons between analyte results are shown in Table 5. Average pH decreased from 7.42 in 2024 to 6.7 in 2025, with total dissolve solids (TDS) also declining from 125,034 mg/L in 2024 to 111,625 mg/L in 2025. Major ions such as sodium, potassium, magnesium, chloride, sulphate, bicarbonate, and strontium increased in 2025, along with magnesium, chloride, and sulphate, particularly visible in Q4. In contrast, calcium levels declined from 978 mg/L in 2024 to 604 mg/L in 2025. Nutrients showed mixed variances: nitrate increased on average, iron remained essentially unchanged with marginal increase, and manganese showed a small increase. In general, 2025 reflects a trend toward higher salinity and dissolved ion concentrations, despite slightly lower pH and TDS.

Table 5: Point source emissions from dewatering discharge to Lake Carey (2024 and 2025 reporting periods)

Analytes (mg/L)	2024					2025				
	Q1	Q2	Q3	Q4	Yearly Mean	Q1	Q2	Q3	Q4	Yearly Mean
pH *(pH units)*	7.01	7.65	7.61	7.47	**7.42**	7.1	6.19	6.5	7.15	**6.7**
Total Dissolved Solids (mg/L)	112000	139318	156409	169000	**125034**	113000	106800	115800	110900	**111625**
Sodium (mg/L)	97800	72300	62100	76000	**77050**	93200	87300	11100	11300	**101125**
Potassium (mg/L)	1920	1380	1120	1370	**1447.5**	1720	1580	1850	3940	**2272.5**
Calcium (mg/L)	645	1170	1340	755	**977.5**	598	854	520	443	**603.75**
Magnesium (mg/L)	6520	4190	3550	4290	**4637.5**	5820	5220	6400	13600	**7760**
Chloride (mg/L)	157000	122000	85000	109000	**118250**	133000	148000	179000	167000	**156750**
Carbonate (mg/L)	1.0	1.0	1.0	1.0	**1.0**	1.0	1.0	1.0	1.0	**1.0**
Bicarbonate (mg/L)	86	74	85	73	**79.5**	76	83	86	106	**87.8**
Sulphate (mg/L)	16500	11500	13100	15200	**14075**	14800	18100	20700	40000	**23400**
Nitrate (mg/L)	14.7	8.55	4.6	14.4	**10.6**	11.1	9.17	10.2	19.4	**12.5**
Iron (mg/L)	1.25	1.25	0.5	1.25	**1.06**	1.25	1.25	1.25	1.25	**1.25**
Manganese (mg/L)	2.18	1.4	1.2	1.3	**1.5**	1.88	1.59	2.11	0.94	**1.6**
Strontium (mg/L)	14.3	12.7	13.4	11.7	**13**	13.7	13.6	15.4	25.8	**17.1**

Note: pH and TDS levels shown are representative of field readings and not laboratory analysis. Additionally, the Q1 and Q2 results for 2024 have been updated to reflect the data currently shown in our database.

5 Process Monitoring

Volume of tailings deposited to the CTD TSF are based on the tonnes processed through the milling circuit and converted to m^3.

Water recovered from the CTD TSF is the volume of water pumped from the decant pond to the process plant. Water within the decant pond is a mixture of water from tailings discharge, water recovered from the three seepage trenches, seepage recovery bores and underdrainage, and any rainfall/ surface water flow.

Water within the seepage trenches is a combination of seepage, natural groundwater, and surface water flow from rainfall events.

The volume of water recovered from the CTD TSF, and volume of seepage recovered are presented as a combined figure in Table 6.

Table 6: Monthly tailings deposition to the CTD TSF 2025

Month	Volumes of tailings deposited to the TSF (m^3)	Volume of water recovered from the TSF (m^3)
January	160,693	29,331
February	151,489	25,469
March	161,302	26,154
April	150,141	24,752
May	195,731	58,200
June	188,540	28,085
July	199,331	39,325
August	186,941	53,831
September	160,286	45,566
October	191,221	58,886
November	157,834	58,821
December	263,606	31,928
Total	**2,167,115**	**480,348**

6 AMBIENT GROUNDWATER QUALITY MONITORING

6.1 GROUNDWATER LEVELS

Groundwater levels were recorded for each monitoring bore prior to the collection of groundwater quality samples using a water level meter.

Graphs of water levels are displayed in Figure 3 to Figure 6. Discussion of groundwater level trends has been grouped according to location around the CTD TSF. Groundwater levels in 2025 largely stabilised or declined under average annual rainfall conditions, following increases observed in most bores after rainfall events in early 2024.

Northern Bores

In 2025 the northern monitoring bores ground water levels are consistent with 2024 levels. The declining trend (0.5-1.5 m) seen in the four years prior to 2024, caused by low rainfall, ceased after two major rain events in January and March of 2024, which saw the ground water levels rise accordingly. Across all 6 northern bores, ground water levels have declined from their peak in 2024 by 0.09 m to 0.018 m and from Q1 2025 to Q4 2025 by 0.09 m to 0.23 m (Figure 3).

CTDMB13 is located nearby to production bore CTDRB1, thus, variations in abstraction rate from the production bore locally affect the water levels recorded at CTDMB13.

Eastern Bores

In 2025 the eastern monitoring bores are consistent with 2024 ground water levels. Monitoring bores CTDMB29A/B had the largest rise in Q1 2025 of 0.29m and 0.32m with tailing deposition and supernatant pooling nearby from the TSF extension. All bores are lower than 2025 Q1 levels by 0.01m to 0.87m, with the five bores closest to the TSF CTDMB29A/B and CTDMB41A/B/C seeing the largest decline in water levels but have risen long term from the tailing's deposition, increased seepage and ground water mounding. CTDMB17A/B are both remaining steady but are located further away from the CTD and not likely to be affected by the same mounding (Figure 4).

Western Bores

Western monitoring bores began 2025 at similar levels to 2024, with all bores showing declines of 0.14m to 1.16m during the year. Data shows that from 2020-2023 water levels remained relatively stable, a rise in 2024 due to the large rain events and 2025 levels starting to decrease. The bores in the North had the largest decline while bores to the south are declining at a slower rate with the tailings deposition occurring nearby, leading to increased seepage and ground water mounding (Figure 5).

Southern Bores

In 2025 the southern monitoring bores are consistent with 2024 levels and have a longer-term trend of rising levels from 2021 to 2025 (Figure 6). This year only two bores CTDMB37A/B increased from Q1 to Q4 by 0.06m and 0.11m and CTDMB37C had no change, these are the most southern bores and least affected by tailings deposition. All other southern bores decreased from Q1 to Q4 by between 0.08m at CTDMB36A and 0.49m at CTDMB40A.

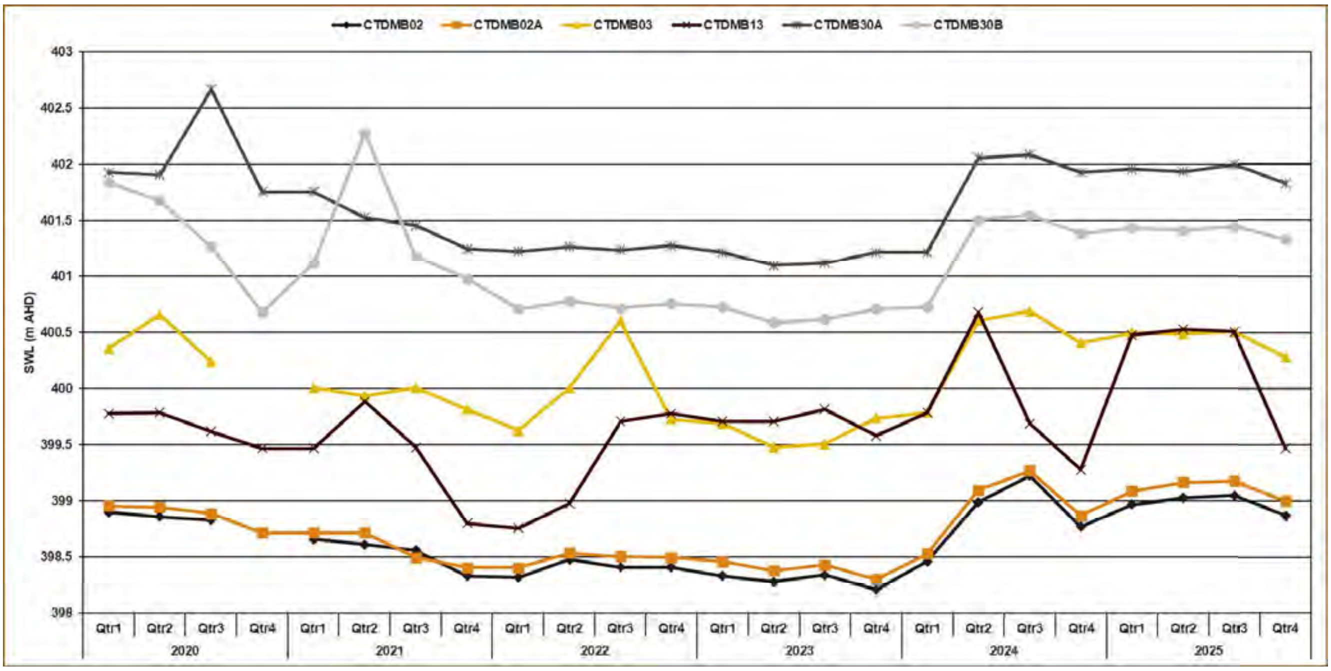

Figure 3: Current and historical Standing Water Levels at Northern CTD Monitoring Bores 2020-2025

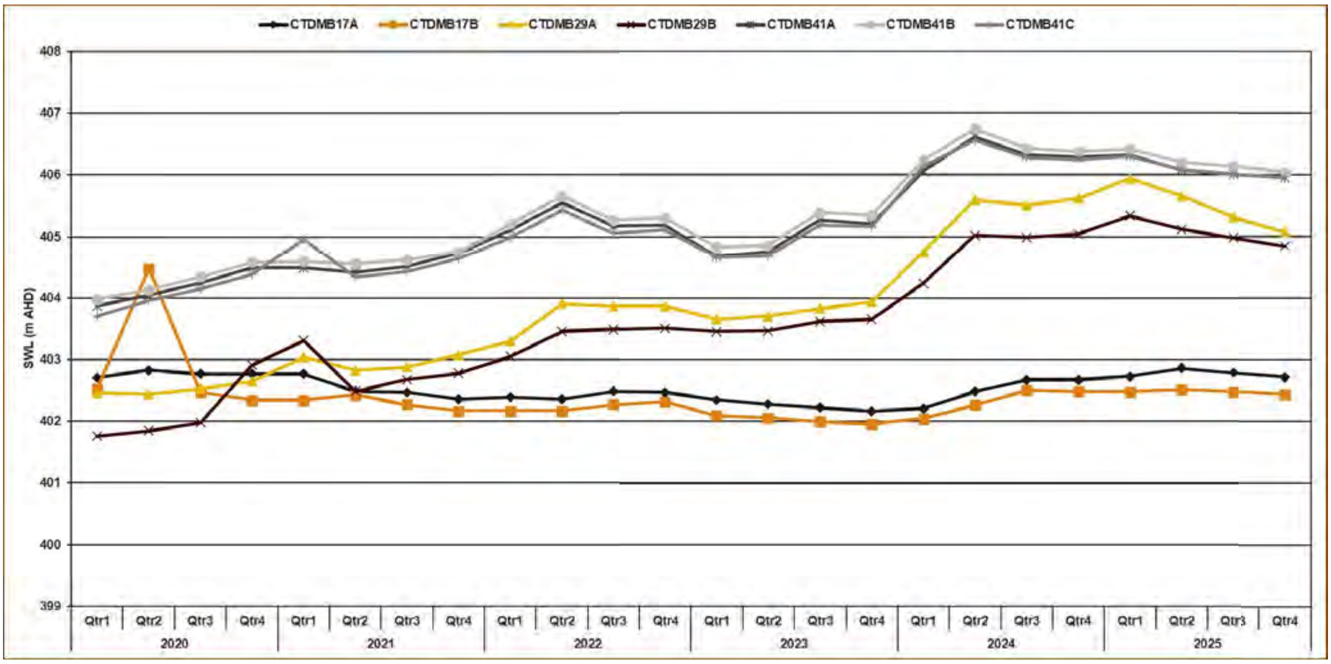

Figure 4: Current and historical Standing Water Levels at Eastern CTD Monitoring Bores 2020-2025

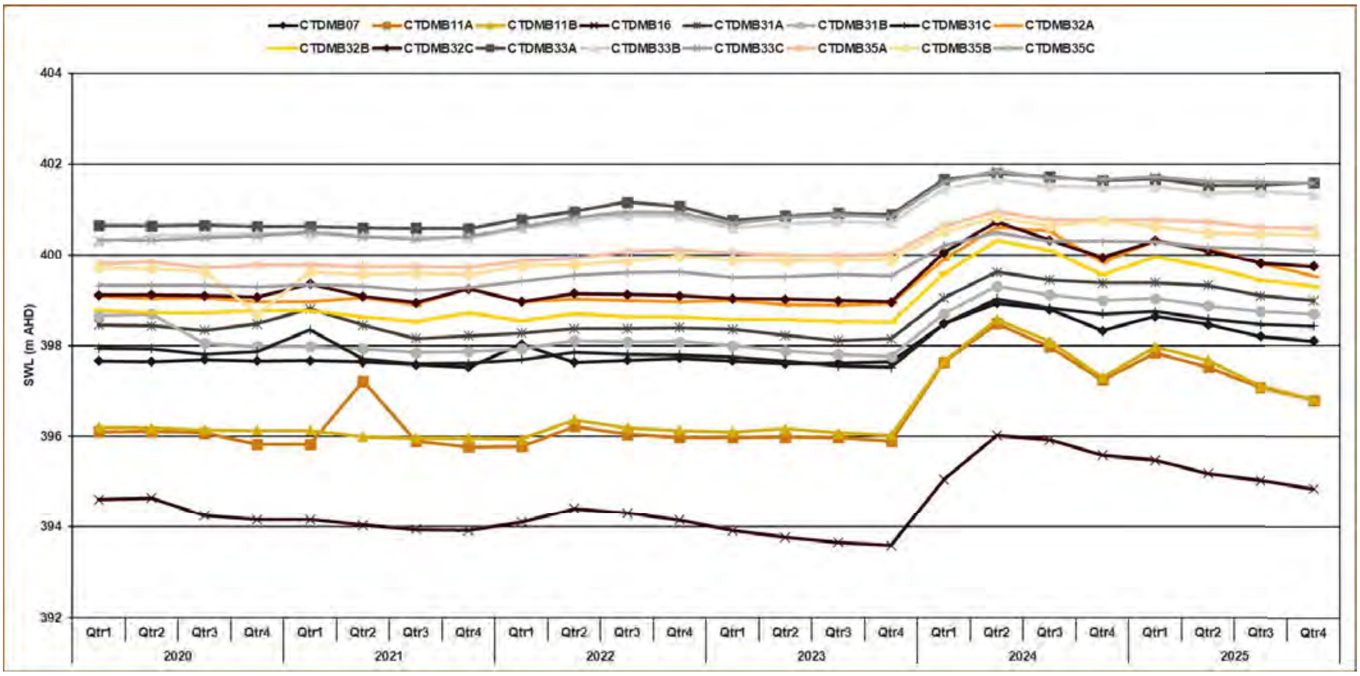

Figure 5: Current and historical Depth to Water at Western CTD Monitoring Bores 2020-2025

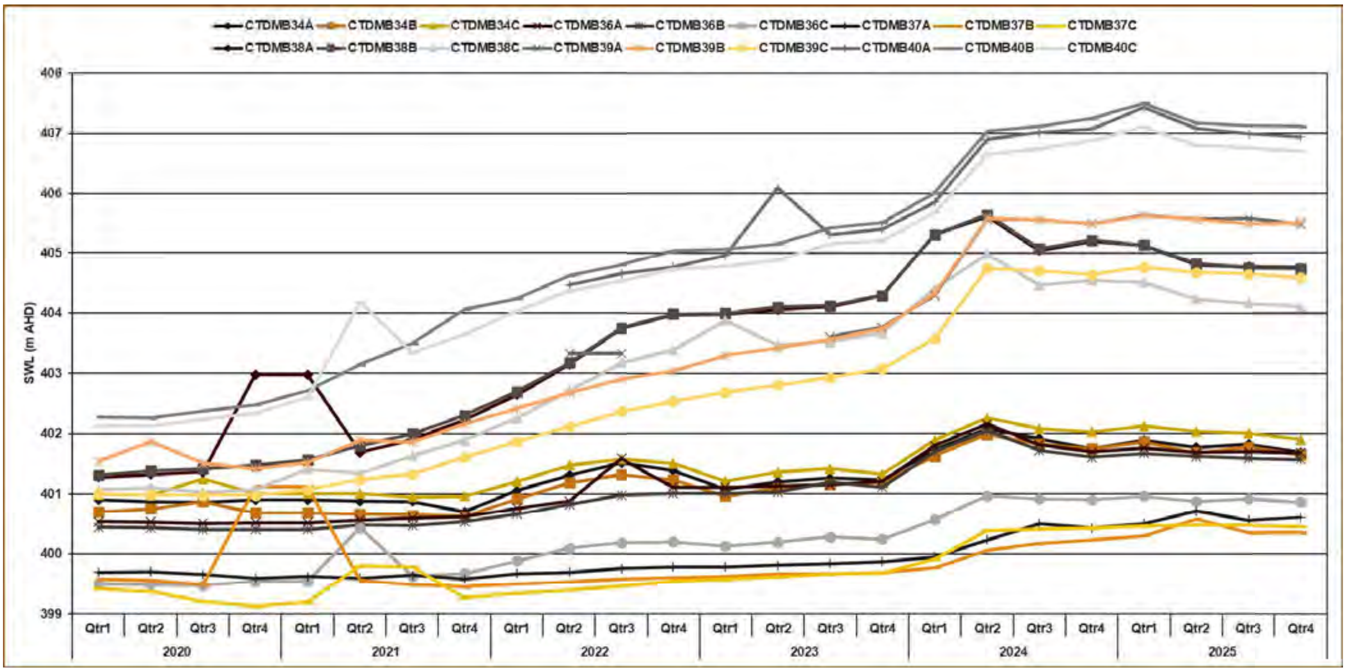

Figure 6: Current and historical Standing Water Levels at Southern CTD Monitoring Bores 2020-2025

6.2 Water Quality

Annual groundwater quality data for each CTD monitoring bore was collected in the 2025 reporting period.

Comparison of results between 2024 and 2025 is provided below. pH classifications used in this report are based on the Foged 1978 classifications used by Stantec in the Annual Vegetation Report for consistency.

Northern Bores 2025

- The pH across the northern bores remained stable and are consistent to previous years. With five of the six bores in the circumneutral range (6.5-7.5) The sixth bore CTDMB02A measured a pH of 6.25.
- Total Dissolved Solids (TDS) levels decreased across all bores in the area except CTDMB30A which increased by 6,508 mg/L. TDS decreased from 333 mg/L (CTDMB30B) to 68,216 mg/L (CTDMB13), which is influenced by a recovery bore next to it. All bores remain in the hypersaline category (TDS >50,000 mg/l). The two exceptions being, CTDMB13 and CTDMB30A measuring 36,666 mg/L and 46,925 mg/L, respectively.
- Boron concentrations increased in all bores except for CTDMB02A which decreased by 0.007 mg/L. All increases in concentration during the reporting period ranged from 0.13mg/L (CTDMB02) to 0.516 mg/L (CTDMB13)
- Calcium concentrations at CTMB02A increased by 5.91 mg/L and CTDMB30A by 49.58 mg/L. All other bores returned decreasing concentrations, with the largest decrease observed at CTDMB13 764 mg/L in the reporting period. The highest concentration remains in CTDMB02 measuring 2346 mg/L.
- Magnesium concentrations decreased at all bores except for CTDMB30A which had a rise of 90 mg/L, Concentrations decreased in all the other bores between 16-108 mg/L except for CTDMB13 which decreased by 1113 mg/L.
- Potassium concentrations decreased all bores except for CTDMB30A which increased by 49.6 mg/L The remaining bores decreased between 17.1 - 40.33 mg/L and CTDMB13 decreased by 353.3 mg/L.
- Sodium concentrations decreased across all bores except for CTDMB30A which increased by 1,225 mg/L. The remaining bores decreased between 2,000 – 2,683 mg/L except for CTDMB13 decreased by 21,433 mg/L
- Arsenic, chromium, copper, lead, manganese, nickel, and selenium concentration all remained less than the laboratory Limit of Reporting (LOR) or showed decreasing concentrations across all bores.

Eastern Bores 2025

- The pH in the bores all remained stable and consistent to previous years. No bores fall within the circumneutral range of (6.5-7.5), with CTDMB41A 6.27, CTDMB41C 5.98 and CTDMB29B 5.92. The remaining bores are slightly acidic with levels of 4.84 CTDMB41B and 3.95 at CTDMB29A.
- TDS levels decreased across all bores (CTDMB29A/B & 41A/C) between 775-9,033 mg/L except for CTDMB41B which increased by 19,600 mg/L. All bores remained in the hypersaline category (TDS >50,000 mg/L).
- Boron concentrations increased at all bores from 0.30 mg/L to 2.6 1mg/L with the largest rise at CTDMB41A but this has been trending down from Q1 2025. All bores averaged readings between 4.19 mg/L to 9.19 mg/L for the year.
- Calcium concentrations decreased between 3.33 mg/L and 133.66 mg/L at all bores (CTDMB29A/B & 41A/C), except for CTDMB41B which had a rise of 156.66 mg/L. All bores averaged calcium levels for the year between 616 mg/L and 1,406.66 mg/L.
- Magnesium concentrations decreased at all bores between 60 mg/L and 337 mg/L, with average levels of all the bores being between 616 mg/L and 1,403 mg/L.
- Potassium concentrations decreased by up to 68 mg/L or increased up to 126 mg/L from the previous year at all bores, with all the bores averaging between 335 mg/L and 716 mg/L.
- Sodium decreased across all bores between 400 mg/L and 4,767 mg/L except for CTDMB41B which rose to 3,966 mg/L. All bores averaged levels for the year between 20,500 mg/L and 35,067 mg/L.
- Chromium concentrations remained stable with the largest change being a decrease of 0.01 mg/L at CTDMB41B and others below the laboratory LOR.
- Manganese concentrations decreased at CTDMB29B by 1.76 mg/L continuing its trend down while all other bores were within 0.04 mg/L from last year's averages.
- Nickel concentrations across all bores changed by decreasing 0.030 mg/L or increasing up to 0.057 mg/L with all bores ranging between 0.016 mg/L to 0.130 mg/L.
- Selenium, arsenic, copper, and lead concentration all remained less than the LOR or showed small changes of 0.02 mg/L from the previous years lead and copper concentrations.

Western Bores 2025

- The pH of bores in the area remained relatively stable in 2025, all remain circumneutral except for CTDMB32B/C, CTDMB33B/C and CTDMB35C all between 6.17 – 6.42 and are consistent with previous year's levels. CTDMB11A recorded 7.48 during Q3 and 10.87 in Q4 but has historically ranged between 6.5 – 7.8. The Q4 result looks to be an outlier and will be closely monitored during sampling in Q1 of 2026.

- TDS levels decreased in nine bores during the reporting year from 2,333 mg/L to 16,333 mg/L (CTDMB32C) and increased at six bores from 350 mg/L up to 5,683 mg/L (CTDMB11B). All bores remain in the hypersaline category (TDS >50,000 mg/L).
- Boron concentrations remained steady or increased at most bores, with increases ranging from 0.11 mg/L to 1.42 mg/L (CTDMB33A). Five bores had a decrease in levels from 0.18 mg/L to 0.28 mg/L (CTDMB16). All bores had average levels between 3.07 mg/L and 4.31 mg/L (CTDMB16)
- Calcium concentrations remained steady for 10 bores with the largest changes being decreases at the remaining 6 bores of between 53.3 mg/L and 232.5 mg/L (CTDMB11B). All bores averaged between 387 mg/L and 1,280 mg/L (CTDMB16).
- Potassium concentrations were steady with levels decreasing at four bores up to 73.8 mg/L (CTDMB31B) and increasing up to 204.6 mg/L (CTDMB33C). All bores averaged levels between 573 mg/L (CTDMB11A) and 1,360 mg/L (CTDMB31C).
- Sodium concentrations declined at 13 bores ranging from 600 mg/L to 4,283 mg/L (CTDMB31B) and increased at three bores CTDMB11B 1,033 mg/L, CTDMB33C 2,066 mg/L and CTDMB35C 933 mg/L. Average levels for the year were lowest at CTDMB11A 21,350 mg/L and highest at CTDMB31C 52,200 mg/L.
- Magnesium concentrations decreased at eleven bores with nine declining from 113 mg/L to 378 mg/L (CTDMB31B). Five bores had an increase starting from 53 mg/L up to 323 mg/L (CTDMB33C). Average levels for the year were lowest at CTDMB11A 1,450 mg/L and highest at CTDMB31C 4,525 mg/L.
- Chromium concentrations saw small decreases at nine bores, remained stable at three bores and increased at four bores. The largest change was an increase of 0.21 mg/L at CTDMB11B returning concentrations to those of 2021-2023. Average levels for the reporting year were lowest at CTDMB07 (below LOR) and the highest at CTDMB31B reporting 628 mg/L.
- Manganese, arsenic, copper, lead, selenium and nickel concentration all remained less than the laboratory LOR or remained stable with previous years level.

Southern Bores 2025

- The pH levels of all bores are consistent with previous years, fifteen bores are in the circumneutral range, and five bores are just outside of it at 6.12 - 6.35.
- TDS levels decreased in 10 of the 20 bores between 233 mg/L and 18,333 mg/L (CTDMB24A) and increased in 10 bores between 400 mg/L and 5,166 mg/L (CTDMB38C). The average TDS readings for all bores sit between 38,850 mg/L (CTDMB39B) and 135,333 mg/L (CTDMB37C). CTDMB38A, CTDMB39A/B remain out of the hypersaline category (TDS >50,000mg/l), with CTDMB36A just falling out with 49,933 mg/L.
- Boron concentrations are increased at 15 of the Southern Bores, ranging from 0.016 mg/L to 0.98 mg/L (CTDMB40A). Boron decreases occurred at CTDMB36B, CTDMB38A/C, CTDMB39A and CTDMB40C, ranging from 0.18 mg/L to 0.70 mg/L (CTDMB39A). All bores averaged levels from 2.25 mg/L (CTDMB38C) up to 5.22 mg/L (CTDMB40A)

- Concentrations of calcium remained steady at 15 of the 20 bores and largest change being decreases at CTDMB34A of 45.6 mg/L, CTDMB36B 63.3 mg/L, CTDMB39B 140.5 mg/L, CTDMB40A 230 mg/L and 393.5 mg/L at CTDMB39A.
- Sodium concentrations decreased at all bores except for CTDMB37B which has a small rise of 633 mg/L. The decreases ranged between 641 mg/L and 3,833 mg/L (CTDMB36B).
- Magnesium concentrations were consistent with last year's levels, with 5 bores seeing increases and 15 decreasing. The largest decrease was 340 mg/L (CTDMB39A) and the largest increase of 186.6 mg/L (CTDMB37B).
- Potassium concentrations were consistent with last year's levels, with 8 bores seeing increases and 12 bores decreasing. The largest decrease was 91.5 mg/L (CTDMB36B) and the largest increase of 150 mg/L (CTDMB34C).
- Chromium, arsenic, copper, manganese, nickel and lead concentration all remained less than the laboratory LOR or showed similar concentrations across all bores to previous levels.

WAD CN – All Monitoring Bores

Weak Acid Dissociable (WAD) cyanide (CN) was below the detectable limit for all monitoring bores during the reporting period (<0.04 mg/L). As SDGM does not have a licence limit for WAD CN, the International Cyanide Management Code limit of 1.00 mg/L WAD CN for environmental protection is considered to be the internal guidance value. During the 2025 reporting period, the results for all monitoring bores were below the 1.0 mg/L guidance value.

7 Annual Audit Compliance Report

The Annual Audit Compliance Report (AACR) is attached as Appendix A.

8 Annual Dewatering Discharge Report

The Annual Dewatering Discharge Report was prepared by Stantec Australia see Appendix B.

9 Annual Vegetation Assessment Report

The Annual Vegetation Assessment Report was prepared by Stantec Australia see Appendix C.

10 Complaints Summary

In 2025 SDGM managed complaints or community concerns through its event management databases iSims and EMA. No community complaints and/ or incidents regarding activities within the PPL boundary or general operational area were received during the reporting period.

APPENDICES

APPENDIX A – ANNUAL AUDIT COMPLIANCE REPORT

Annual Audit Compliance Report Form

Environmental Protection Act 1986, Part V

Section A – Licence Details			
Licence number:	L8579/2011/2	Licence file number:	2012/006902-1
Licence holder:	AngloGold Ashanti Australia Limited		
Trading as:	AngloGold Ashanti Australia Limited		
ACN:	008 737 424		
Registered address:	Level 10, 140 St Georges Tce, Perth WA 6000		
Reporting period:	01/01/2025 **to** 31/12/2025		

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)
☐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 at 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**
05 - Processing or beneficiation of metallic or non-metallic ore	3.87 Mtpa
06 - Mine dewatering	720,738 tonnes
52 - Electric power generation	48 MW
54 - Sewage facility	184.72 m^3 per day
57 - Used tyre storage	<1,000
64 - Class II putrescible landfill site	2,292.06 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**
Tailings	3,873,509 tonnes
Mine Dewatering	720,738 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:	13. The Licence Holder shall ensure that any saline dewatering effluent shall only be discharged in the following manner: (a) used for dust suppression in a manner that minimises damage to surrounding vegetation; or (b) discharged to Lake Carey in accordance with the conditions in section 2 of this Licence.	Date(s) of non-compliance:	22/06/2025
Details of non-compliance:			
Dewatering effluent overtopped the Golden Delicious Turkey Nest (Figure 3), flowing along the toe of the Turkey Nest to the immediately adjacent area (Figure 4). Further flow was restricted to disturbed hardstand, limited by surrounding pipeline bunding and the adjacent road (Figure 5). Located next to the Golden Delicious Pit, only remnant vegetation exists in the immediate area around the turkey nest and is not contiguous with the environment surrounding the pit.			
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.			

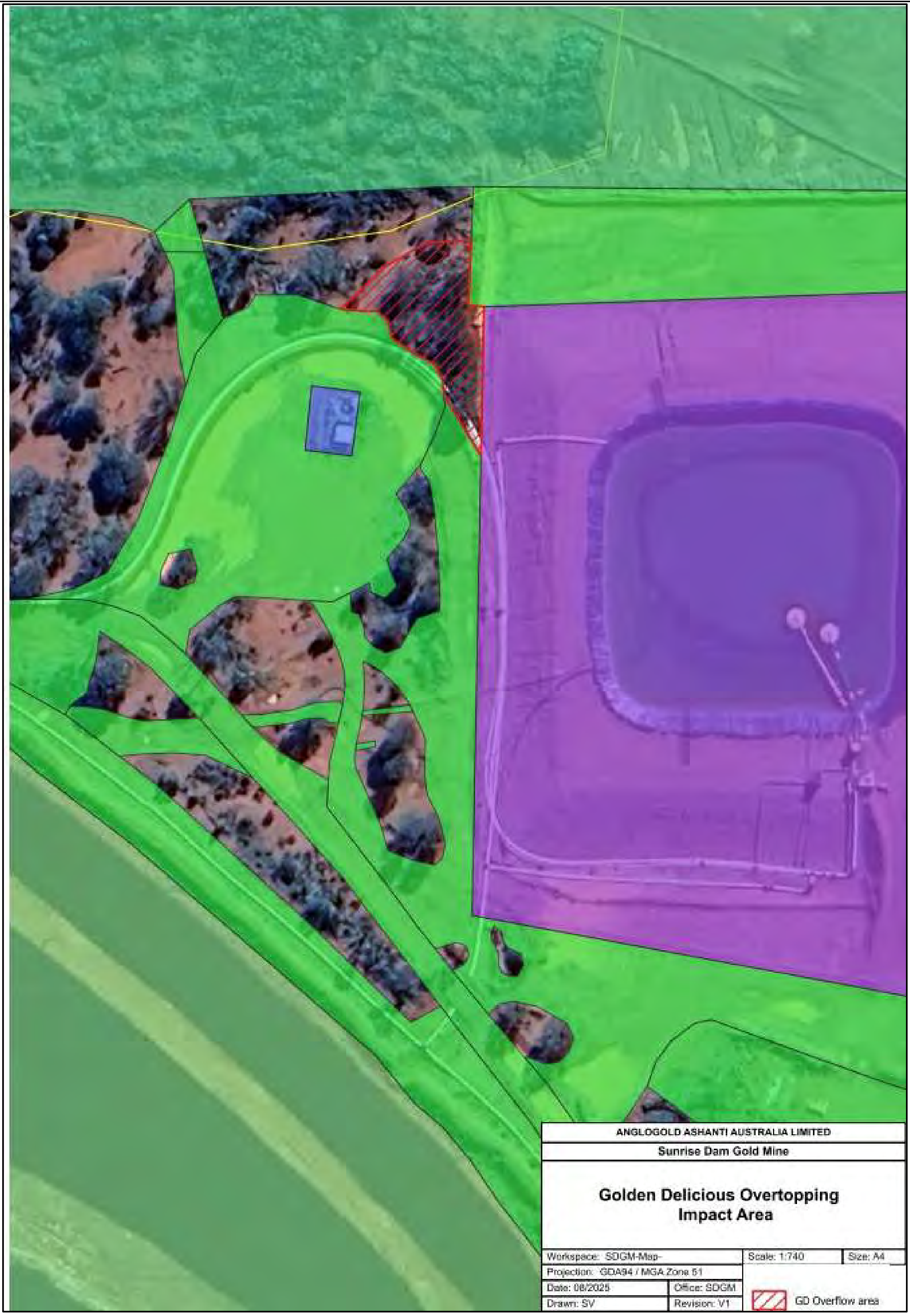

Figure 1: Golden Delicious Turkey's Overtopping Impact Area

Figure 2: General Layout of the Golden Delicious Turkey Nest within initial flow path in yellow

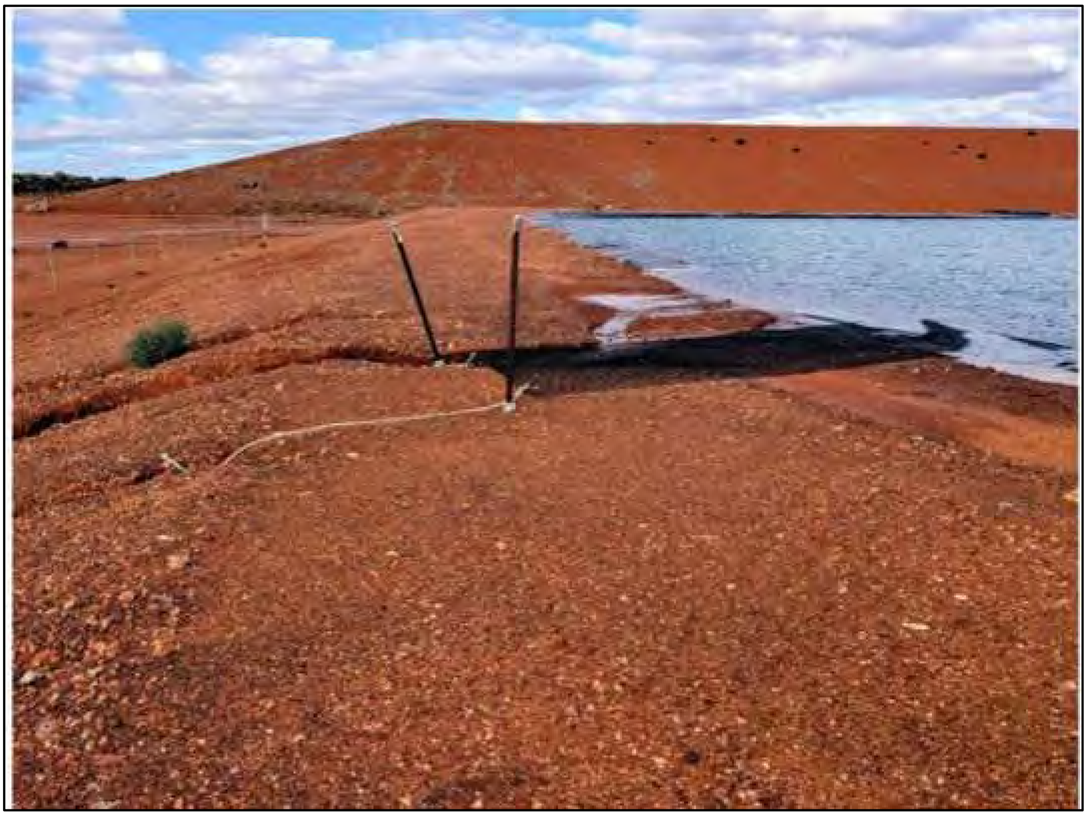

Figure 3: Turkey's Nest overflow point (22/06/2025)

Figure 4: Immediate toe of the Turkey's Nest (22/06/2025)

Figure 5: Remanent vegetation and hardstand adjacent to the Turkey's Nest (22/06/2025)

Section E – Details of non-compliance with licence condition

Figure 6: Remaining effluent contained to roadway (25/06/2025)

The affected area is located centrally to the Golden Delicious mining operation, approximately 90 m from the pit edge. The size of the affected area is ~300 m^2 (0.03 ha) and is bound on three sides by growth media stockpiles, the toe of the Turkey Nest and access road to the adjacent pumping infrastructure (Figure 3). A visual inspection indicated that some shallow rooting shrub species show signs of stress including wilting and drooping of foliage, or partial desiccation with some mortality. The impacted vegetation consists primarily of shallow rooted annual or perennial shrubs i.e. Solanum centrale, Ptilotus sp. and Maireana sp. Approximately 50-100 individual plants are located within the affected area.

Cause (or suspected cause) of non-compliance:
Findings and contributing factors to the incident: It was found that the contributing factors that caused the incident were: - Equipment Fault in the Turkey's Nest outflow pumps; and - The pump from the GD Pit being on local control and not at the time controlled through SCADA (Citec).

Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:
Mitigate - Pumping immediately ceased to the Turkey's Nest. - Remediate area of any salts on surface. Prevent recurrence - Review mill control Citec alarm handling and escalation process to ensure critical alarms cannot be silenced without being actioned. - Complete an engineering review of all ponds/dams' freeboard monitoring telemetry - Audit all water storages to ensure freeboard limits are marked on pond walls and confirm level sensors trigger prior to 300mm limit.

Section E – Details of non-compliance with licence condition	
- Assign clear ownership of pit dewatering pump - Review manual inspection routines to ensure they meet licence requirements.	
Was this non-compliance previously reported to DWER?	
☒ Yes, and	
☐ Reported to DWER verbally	Date: / /
☒ Reported to DWER in writing	Date: 25/ 06 /2025

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:	15. The Licence Holder shall manage all containment infrastructure in Table 5 such that a minimum top of embankment freeboard of 300 mm or a 1 in 100 year/72 hour storm event (whichever is greater) is maintained.	Date(s) of non-compliance:	22/06/2025
Details of non-compliance:			
Freeboard minimum requirement of 300mm was breached as outlined above. Please refer to the previous Non-Compliance for Condition 13 for details.			
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.			
Please refer to the previous Non-Compliance for Condition 13 for details.			
Cause (or suspected cause) of non-compliance:			
Please refer to the previous Non-Compliance for Condition 13 for details.			
Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:			
Please refer to the previous Non-Compliance for Condition 13 for details.			
Was this non-compliance previously reported to DWER?			
☒ Yes, and			
☐ Reported to DWER verbally	Date: / /		
☐ Reported to DWER in writing	Date: 25 / 06 / 2025		

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:	37. The Licence Holder shall ensure that the parameters listed in Table 14 are notified to the CEO in accordance with the notification requirements of the table. Part A: As soon as practicable but no later than 5pm of the next usual working day. Part B: As soon as practicable	Date(s) of non-compliance:	22/06/2025
Details of non-compliance:			
The Non-Compliance for Condition 13 and 15 occurred on the 22/06/2025, contact was made with DWER on the 25/06/2025.			
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 non-compliance relates to the timing of external notification, rather than to the overtopping event itself. The short delay in submitting the Form N1 did not result in, or contribute to, any additional environmental impact. Environmental impacts associated with the overtopping event were not influenced by the notification timeframe, and no escalation or worsening of impacts occurred during the period between internal identification and submission of the Form N1.			
Cause (or suspected cause) of non-compliance:			
The delay in notification occurred because, at the time the event was initially reported and logged internally on 22 June, there was no onsite environmental subject matter expert at Sunrise Dam to assess external reporting obligations. The event was subsequently identified as potentially externally reportable during a system review on the evening of 24 June, at which point AGAA leadership was notified and the Form N1 was submitted on 25 June.			
Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:			
No mitigation actions were required in relation to environmental impacts, as the non-compliance did not result in any additional or increased impacts. To prevent recurrence, AGAA has reviewed internal incident escalation and notification processes to ensure timely identification of externally reportable events in the absence of onsite environmental personnel.			

Section E – Details of non-compliance with licence condition	
Was this non-compliance previously reported to DWER?	
☒ Yes, and	
☐ Reported to DWER verbally	Date:
☒ Reported to DWER in writing	Date: 25 / 06 / 2025

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:	26 February 2026	Date:	26 February 2026
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.

APPENDIX B – ANNUAL DEWATERING DISCHARGE REPORT

Technical Report

Sunrise Dam Gold Mine

Biannual Monitoring Program & DDLR, 2025

DATE: 6/02/2026

Ref: 304501854

PREPARED FOR:

Sarah Visser
AngloGold Ashanti Australia Limited

PREPARED BY:

Kate Walker, Richard de Lange, Emma McQuie, Fiona Taukulis
Stantec Australia Pty Ltd

Stantec

[redacted]

Disclaimer

The conclusions in the report are Stantec's professional opinion, as of the time of the report, and concerning the scope described in the report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The report relates solely to the specific project for which Stantec was retained and the stated purpose for which the report was prepared. The report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorised use or reliance is at the recipient's own risk.

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Executive Summary

Stantec Australia Pty Ltd (Stantec) was commissioned by AngloGold Ashanti Australia Limited (AGAA), owner and operator of the Sunrise Dam Gold Mine (SDGM), to complete the 2025 Biannual Monitoring Program and Dewatering Discharge Licence Report (DDLR) for Lake Carey (2025 Program). Dewatering discharge at the site is licensed by the Department of Water and Environmental Regulation (DWER) under L8579/2011/2. This allows for up to 5,000,000 tonnes (t) of excess mine water to be discharged annually to the eastern shore of Lake Carey. This DDLR fulfills the annual reporting requirement stated under Condition 28 of L8579/2011/2.

The reporting period was from January 1st to December 31st, 2025, assessing the potential effects of dewatering discharge on the receiving environment of the lake. Specific objectives were addressed in two parts; Discharge Assessment and Ecological Assessment, to comply with licence requirements. AGAA collected data on hydrological scenarios, discharge quantity and quality, which were incorporated into the Discharge Assessment. The Ecological Assessment was undertaken by Stantec, with two field surveys completed in June and September 2025, sampling a range of abiotic and biotic components. Eight aquatic and riparian vegetation sites were monitored on the lake and along its margins, and were classified as discharge outfall, discharge, or control sites. The key findings are presented in this DDLR.

Discharge Assessment

A summary of the Discharge Assessment is provided in **Table ES-1**, based on the data and information provided to Stantec by AGAA. During the 2025 reporting period, water was discharged to the lake during predominantly dry conditions. The discharge water created a shallow pool, extending from the outfall and onto the playa of Lake Carey. With below average rainfall received in 2025, this hydrological scenario was prevalent for most of the 2025 reporting period.

A total volume of 720,738 m^3 of water was discharged to the lake by AGAA during the 2025 reporting period, which equated to approximately 14% of the annual licence limit (5,000,000 m^3). This was a substantial decrease from the previous year (1,614,065 m^3), attributed to the predominantly dry conditions experienced in 2025. AGAA has remained well within the annual licence since it was introduced in 2011. The salt crust, attributed to the dewatering discharge that extends from the outfall point, covered an area of 1.4 km^2 in October 2025. Aerial imagery of Lake Carey since 2010 indicated the typical extent of the salt crust during dry conditions varies from between 1.2 km^2 to 9 km^2. The latter represents less than 2% of the lake's total surface area.

An estimated 218,023 t of salt was deposited onto Lake Carey from discharge during the 2025 reporting period; a substantial decrease from 2024 (371,253 t), corresponding to reduced discharge volumes in 2025. The discharge water was characterised as neutral and hypersaline (>250,000 mg/L). Concentrations of lead and zinc exceeded the ANZG (2018) Default Guideline Values (DGVs) for the protection of 80% of species in marine water.

Table ES-1: Summary of Discharge Assessment for the 2025 Program.

Discharge Assessment	Key Findings
Hydrological Scenario	• Predominantly dry lake conditions • Shallow, localised pool extending from discharge outfall onto the playa
Discharge Volume	• 720,738 m^3, representing 14% of licence limit (5,000,000 m^3)
Salt Balance Estimate	• Salt crust extent of 1.4 km^2 under dry conditions • 218,023 t of salt deposited to lake
Discharge Water Quality	• Neutral pH • Hypersaline conditions (>250,000 mg/L) • Lead and zinc exceeded the ANZG (2018) DGV for 80% protection species marine water

Note: Discharge volumes are based on an estimate using available flow meter data.

Ecological Assessment

A summary of the Ecological Assessment is provided in **Table ES-2**, based on the results of the field surveys completed by Stantec in June and September during the 2025 Program. Surface water was limited to within the vicinity of the discharge outfall, and was characterised as neutral, hypersaline (>250,000 mg/L), and dominated by sodium chloride. Nutrients were comparable between surveys, and below the Lake Carey control site ranges (CSRs) 80th percentiles, and most metals were below analytical detection limits. However, lead and zinc exceeded the ANZG (2018) trigger values for the protection of 80% species in marine waters.

Sediment quality typically showed elevated concentrations of salts, nutrients and metals compared to 2024, following the return to dry conditions. Salinity and total nitrogen at the discharge outfall and discharge sites exceeded the Lake Carey CSR 80th percentiles, whereas total phosphorous was elevated at control sites. Numerous metal exceedances were also identified, arsenic, copper, lead, manganese, nickel, and zinc, mostly at the discharge outfall and discharge affected sites, with arsenic and nickel also exceeding the ANZG (2018) trigger values.

A total of nine diatom taxa were recorded during the 2025 Program, with nine and seven taxa in the June and September surveys respectively. Diversity and abundance were highest at control site SDN1 and discharge site SDS1 during both surveys, likely due to elevated nutrients in the lake sediments. Over time, 54 diatom taxa have been identified from the lake, dominated by common saline species such as *Amphora coffeaeformis*, *Hantzschia* sp. aff. *baltica*, *Luticola mutica* and *Navicula* sp. aff. *incertata*, consistent with this reporting period. The discharge outfall has also exhibited lower diversity historically, in comparison to the historical discharge and control sites. Overall, diatom diversity and abundance was lower in 2025 compared to the 2024 flood event, linked to the return to dry conditions.

The eggs of four crustacean taxa were recorded from the lake sediment during the 2025 Program, with all four taxa recorded during the June and September surveys. The discharge sites had a higher abundance than the other sites, likely due to the geomorphology of the lake, with lower elevation naturally accumulating resting stages. Twelve crustacean taxa have been identified over time, dominated by salt tolerant ostracods and *Parartemia* sp. (brine shrimp), reflecting the aquatic invertebrate assemblage during flooded conditions. The propagules of two macrophyte taxa comprising charophytes and *Ruppia* sp., have also been recorded, with the former recorded during the 2024 major flood event.

Riparian vegetation was characterised by halophytic Chenopodiaceae (*Tecticornia* spp.) and Poaceae (*Eragrostis pergracilis*) families during the 2025 Program, with 43 taxa recorded (and 89 taxa identified over time). The Priority 3 (poorly known) taxon *Tecticornia mellarium* was also identified, currently known from Lake Carey and several other salt lakes in the Goldfields. Plant cover and density decreased between the June and September surveys, with changes most evident at the discharge sites. This was attributed to site geomorphology, with these low-lying sites potentially subject to the accumulation of windblown salts from the discharge. As the lake has entered the drying phase in this reporting period, soil salinity has subsequently increased.

Table ES-2: Summary of the ecological assessment for the 2025 Program.

Ecological Assessment	Key Findings	Total Taxa	Dominant Taxa	Significant Taxa
Surface Water Quality	• Associated with discharge water on the playa • Neutral pH • Hypersaline conditions (>250,000 mg/L), dominated by sodium and chloride • Nutrient concentrations comparable between surveys • Pb and Zn exceeded the ANZG (2018) DGVs	• N/A	• N/A	• N/A
Sediment Quality	• Moderately alkaline • Salinity and major ions exceeded the Lake Carey CSR 80th percentile (101,600 mg/kg) at the discharge outfall and discharge affected sites • Variable nutrients, total phosphorous higher at control sites • As, Cu, Pb, Mn, Ni, and Zn exceeded the the Lake Carey CSR 80^{th} percentiles, mostly at discharge outfall and discharge sites • As and Ni also exceeded the ANZG (2018) DGV	• N/A	• N/A	• N/A
Diatoms	• Composition consistent with previous years, comprising common, salt-tolerant taxa • High diversity and abundance at control site SDN1 and discharge affected site SDS1 due to elevated total phosphorous • Consistently low diversity and abundance at the discharge outfall due to elevated salinity	• 9	• *Navicula* sp. aff. *incertata* • *Hantzschia* sp. aff. *baltica* • *Navicula* sp. aff. *salinicola*	• None
Resting Stages	• Composition consistent with previous years, comprising resident crustacean eggs • Discharge sites with higher abundance due to lake geomorphology • Composition consistent with other salt lakes	• 4	• Ostracods • *Parartemia*	• N/A
Riparian Vegetation	• Dominated by Chenopodiaceae, consistent with other salt lakes • Cover and diversity decreased between surveys • Low-lying discharge sites most susceptible to changes associated with rainfall and soil properties (salinity)	• 43	• *Tecticornia calyptrata* • *Tecticornia* sp. Dennys Crossing • *Tecticornia pruinosa* • *Eragrostis pergracilis*	• *Tecticornia mellarium* (P3)

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1. Introduction

1.1 Project Background

Stantec Australia Pty Ltd (Stantec) was commissioned by AngloGold Ashanti Australia Limited (AGAA), owner and operator of the Sunrise Dam Gold Mine (SDGM), to complete the 2025 Biannual Monitoring Program and Dewatering Discharge Licence Report (DDLR) for Lake Carey (2025 Program). Dewatering discharge in Western Australia is regulated by the Department of Water and Environmental Regulation (DWER) under Part V of the Environmental Protection Act 1986 (EP Act) and Schedule 1 of the Environmental Protection Regulations 1987 (EP Regs), with a premise where mine dewatering of more than 50,000 tonnes (t) per year occurs considered to be a prescribed premise (category 6). AGAA are licensed (L8579/2011/2; **Appendix A**) to discharge up to 5,000,000 t (equivalent to m^3) annually of excess mine water to the eastern shore of Lake Carey. Condition 28, prescribed within L8579/2011/2 (**Appendix A**), is relevant to the 2025 Program.

AGAA have funded biannual or annual monitoring of Lake Carey in the vicinity of SDGM since 2002, with a revision of the survey design and sampling regime undertaken in 2019. The 2025 Program follows this revised survey design, which was updated to comply with L8579/2011/2. This report informs the 1st January to 31st December, 2025, reporting period (2025 reporting period). Specific objectives of the 2025 Program were addressed in two parts; Discharge Assessment and Ecological Assessment, with the key tasks undertaken outlined in more detail below:

- Discharge Assessment:
  - Assess the quantity and quality of dewatering discharge, highlighting any parameters that have exceeded licence conditions.
  - Undertake salt and water balance estimates (outlining hydrological scenarios), in relation to the dewatering discharge.
- Ecological Assessment:
  - Undertake a two-phase field survey (June and September 2025) to assess the ecology of the lake in relation to the dewatering discharge (sampling discharge and control sites).
  - Analyse water and sediment from the lake, in relation to the Lake Carey control site ranges (CSRs).
  - Assess algae (including diatoms) and aquatic invertebrates (where present), resting stages (dormant egg and seed bank), riparian vegetation and soil quality.
  - Compare the spatial and temporal variation of the lake's ecology, in relation to the dewatering discharge.

1.2 Site Description & Dewatering Discharge

The SDGM is located approximately 55 km south of Laverton in the northeastern Goldfields of Western Australia (**Figure 1-1**). The mine has been operating for more than 20 years, with gold production commencing in 1997, beginning as an open pit and transitioning to the Cleo/Sunrise underground from March 2014. Mined ore is treated in a conventional gravity and carbon-in-leach (CIL) processing plant.

Dewatering infrastructure consists of production bores and an in-pit sump (AGAA 2024) (**Figure 1-2**). During the 2025 reporting period, one in-pit dewatering bore (CDG77) was active. Dewatering of the underground mine is transferred to a pump station and then into ponds on the Sunrise Waste Dump for settling. From the ponds, water is either fed into the process plant or discharged to Lake Carey as required. The discharge water is gravity fed to a trench around the south-eastern side of the waste dump, and into a channel that opens onto the eastern shoreline of Lake Carey (**Figure 1-2**).

Discharge to the lake has been occurring since 1996, initially from an undocumented location, then to the historical discharge outfall from 1997 to 2001, on the north-eastern side of the Cleo Waste Dump. Due to continued expansion, in 1999, the discharge outfall was moved to its current location on the southern edge of the Cleo Waste Dump and has remained active since then.

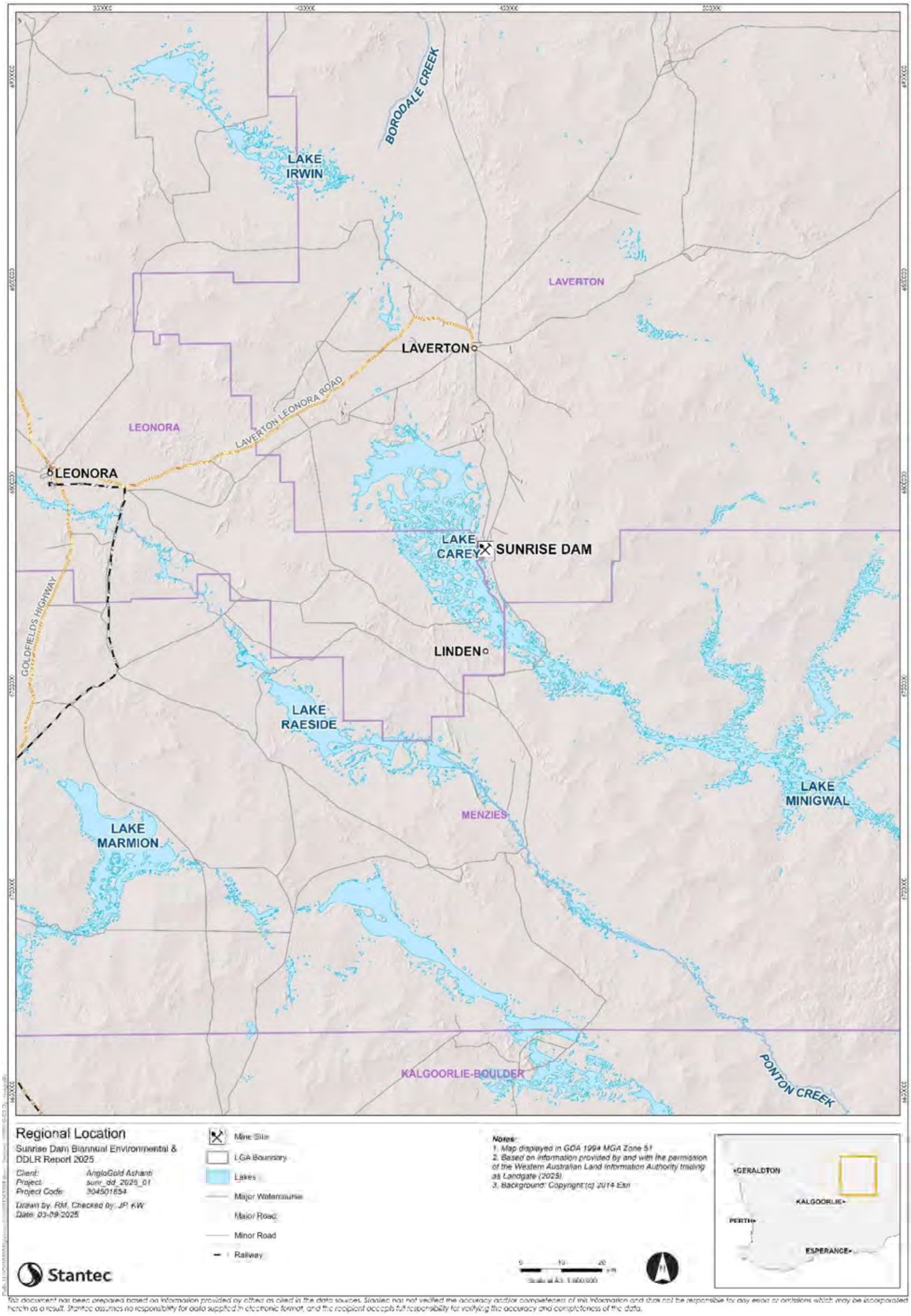


Figure 1-1: Regional location of SDGM and Lake Carey in the north-eastern goldfields, Western Australia.

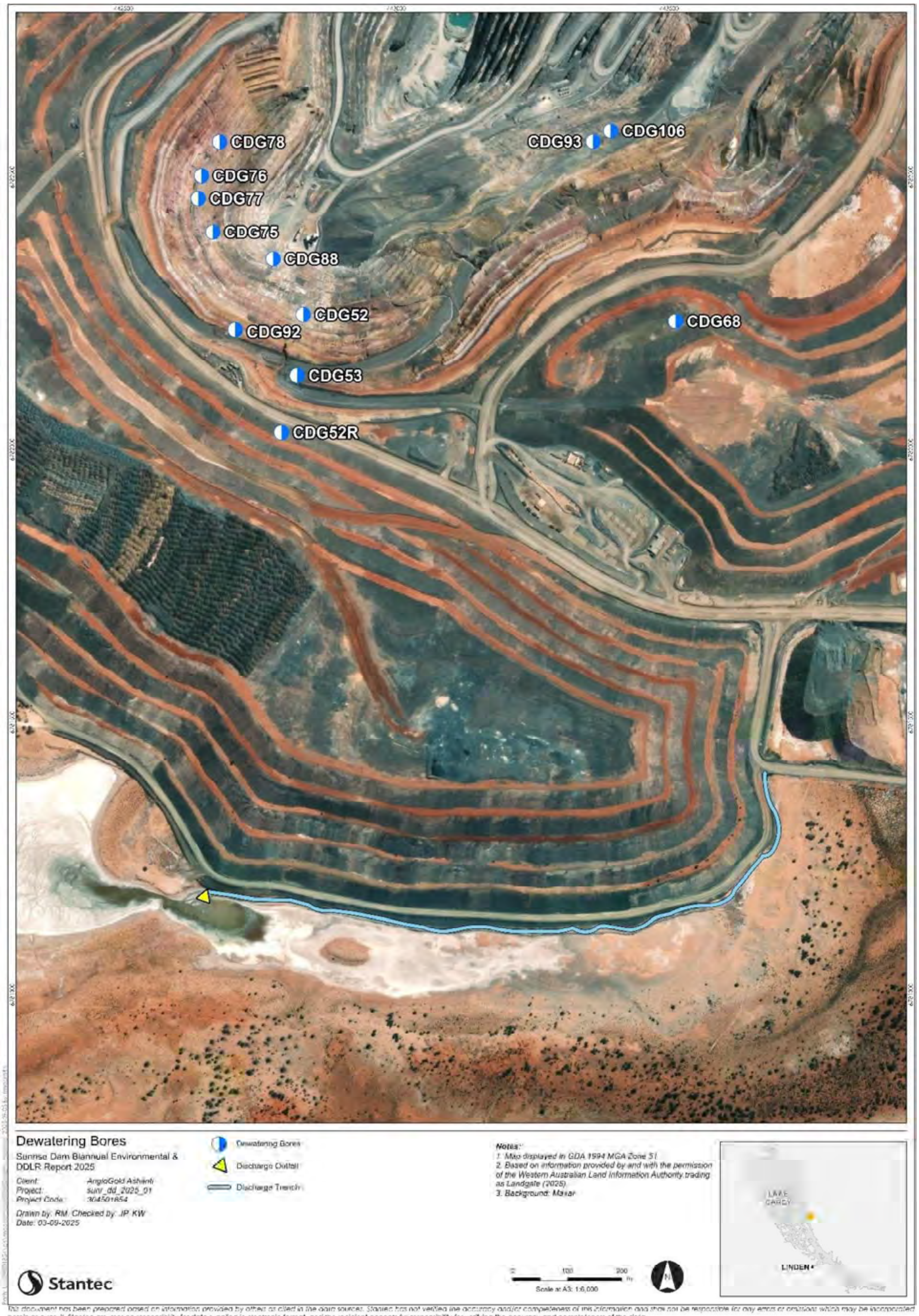


Figure 1-2: Aerial image of SDGM Cleo/Sunrise Pit, showing dewatering bores, discharge trench and discharge outfall along the eastern margin of Lake Carey.

2. Lake Carey

2.1 Drainage, Geology and Topography

Lake Carey forms part of a chain of salt lakes located in the eastern portion of the Yilgarn Craton. These lakes are the surface expression of the Carey Palaeodrainage system (**Figure 2-1**) (Timms 1992). Drainage is endorheic (internal), occurring in a south-easterly direction during surface sheet flow. Major flood events are rare, and the lake only fills after substantial winter rains or cyclonic events (Timms *et al.* 2006).

The lake covers an area of approximately 1,000 km^2, of which around 250 km^2 is made up of islands and peninsulas (Beavis 1999), with numerous small wetlands and claypans scattered around the periphery. Lake sediment comprises of fine silt material on the surface, underlain by clay, with lenses of coarse gypsum deposits (*actis* Environmental 1999); (Timms *et al.* 2006).The area surrounding Lake Carey is dominated by calcareous and gypsiferous dunes, salt pans and sheet wash deposits (Gray and Britt 2005).

The topography of the region is flat to gently undulating and closely related to underlying geology. The playa is typically flat and low-lying, with a relative difference in topography of between 0.2 m to 0.4 m (*actis* Environmental 2009). Islands on the lake are elevated by no more than 15 m above the lake's surface (Coleman 2001).The greatest topographical relief in the area is provided by waste dumps associated with mining operations adjacent to Lake Carey, including SDGM. The height of the Cleo Waste Dump is approximately 50 m.

2.2 Surface Hydrology and Hydrogeology

Following heavy rainfall, runoff from the catchment is directed onto the Lake Carey playa via numerous tributaries (**Figure 2-2**), most of which are located in the northern part of the catchment (*actis* Environmental 2006). During the initial stages of flooding, the lake is less saline, with salts concentrating in surface water as the system enters the drying phase. Major flood events occur infrequently, on average once every seven to 10 years, although minor floods are more regular, occurring every three to five years. During major floods, such as 2004, 2011, 2017 and, most recently, in 2024, depths of up to 0.6 m or greater have been recorded on the lake (Outback Ecology and *actis* Environmental Services 2013).

A shallow, hypersaline water table lies below the surface of Lake Carey, with groundwater salinity recorded in excess of 200,000 mg/L (Lindbeck and Beavis 1998).The lake also functions as a natural accumulation basin for salts, with a thin, naturally occurring salt crust often covering the lake bed in dry conditions. The addition of salts from dewatering discharge causes thickening of the salt crust in the vicinity of the discharge outfall. However, following substantial rainfall that causes major flooding, salts on the playa are readily dissipated.

Figure 2-1: Lake Systems and associated palaeodrainage in the eastern goldfields region of Western Australia, showing SDGM on the periphery of Lake Carey.

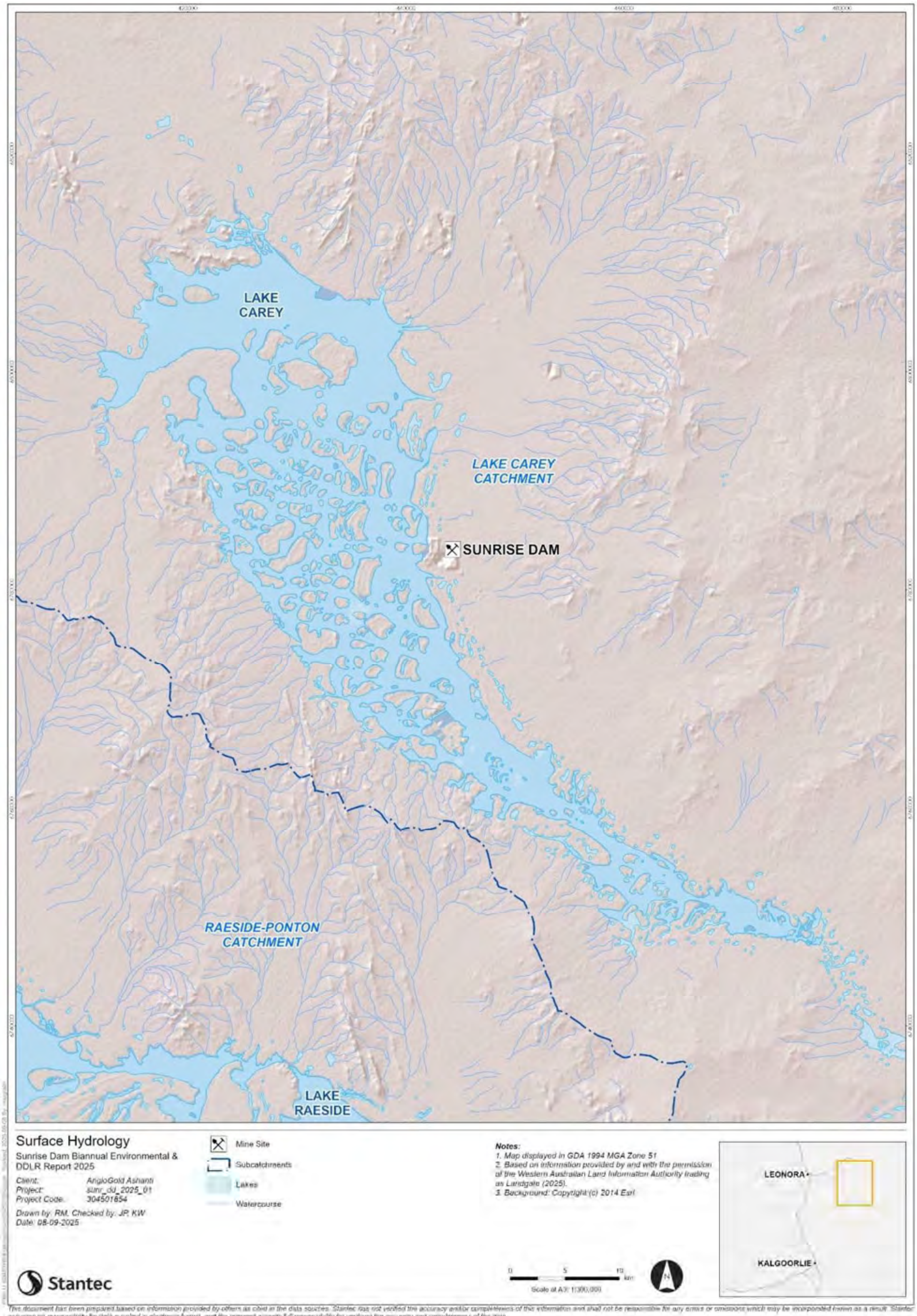


Figure 2-2: Surface hydrology, showing tributaries surrounding Lake Carey, in relation to SDGM.

2.3 Climate

The Lake Carey catchment is located in the semi-arid region of the north-eastern Goldfields, characterised by temperatures ranging from below zero in winter, to over 40 C in summer. Rainfall is low, although can be highly variable, with an annual long-term average for Laverton Aero of 275 mm (BoM 2025). The majority of rain falls in late summer, generally as the result of ex-tropical cyclones (Gray and Britt 2005), and average annual evaporation is high, at approximately 2,630 mm per year (AECOM 2018).

Since 2005, total annual rainfall at Laverton Aero has been variable, typically falling below the long-term annual average (**Figure 2-3**). However, several years have recorded rainfall substantially above the long-term annual average, including 2004, 2011, 2017 and 2024, associated with tropical lows and/or localised thunderstorm activity (**Figure 2-3**). Rainfall during these years also resulted in major flood events at Lake Carey, with surface water persisting on the lake for many months.

In contrast, in 2025, the lake remained predominantly dry, with the total annual rainfall at SDGM (208 mm) substantially lower than the long-term annual average (275 mm) (**Figure 2-3**) (BoM 2025). The highest rainfall months at SDGM occurred in March, April, August and December, which recorded between 1 mm and 10 mm above the long-term monthly average recorded at Laverton Aero (**Figure 2-4**). Temperatures at Laverton Aero were lowest in July (<10°C) and highest in January (>38°C) (**Figure 2-4**).

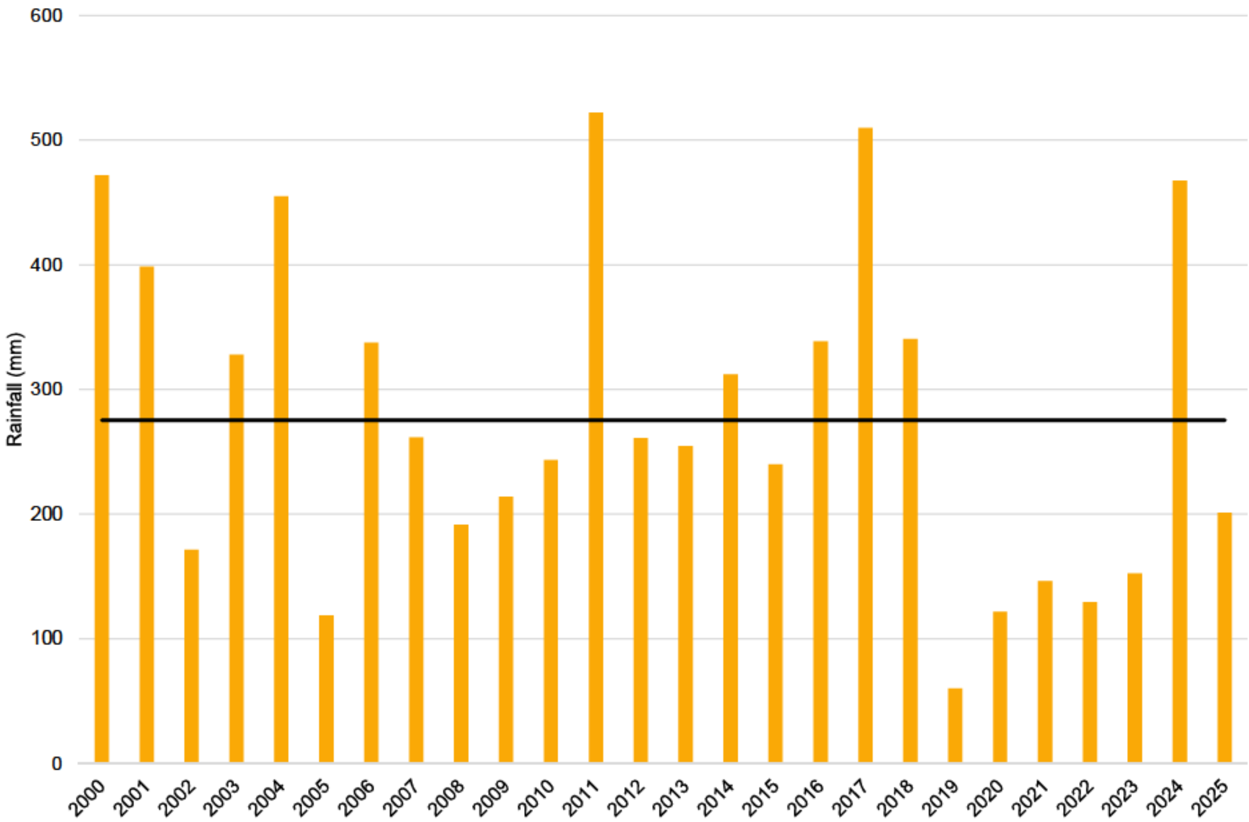


Figure 2-3: Annual rainfall recorded between 2000 and 2025 (■), compared to the long-term annual average rainfall (—) at Laverton Aero weather station (#012305) (BoM 2025).

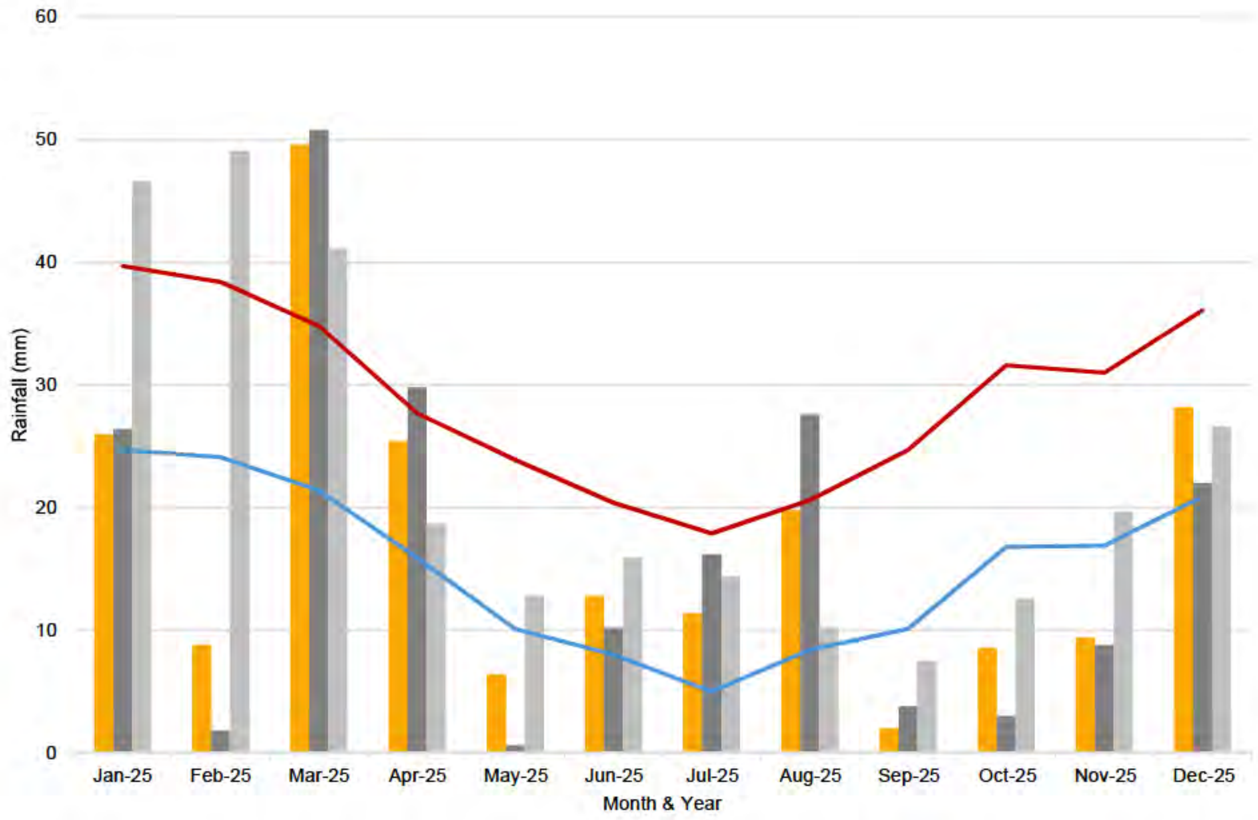


Figure 2-4: Monthly rainfall recorded during the 2025 reporting period at SDGM (■), in comparison to Laveton Aero (■) and Laverton Aero long-term monthly average (■), with Laverton Aero mean minimum (▬) and maximum (▬) temperatures (BoM 2025).

2.4 Aquatic Ecology

Since 2002, AGAA have funded biannual or annual monitoring of Lake Carey in the vicinity of SDGM. During this period, they have also been an active member of the Lake Carey Catchment Management Group (LCCMG), and have commissioned numerous environmental studies of the lake on a regional scale during dry and flooded conditions (Outback Ecology and *actis* Environmental Services 2013). The findings of these studies have shown that the influence of the dewatering discharge is typically localised in dry conditions, with elevated salinity creating an inhospitable environment for aquatic biota. Elsewhere in the lake, diatoms persist as the dominant primary producer in the moist sediment. The desiccation resistant propagules (resting stages) of aquatic invertebrates, algae and macrophytes also lie dormant in the sediment, emerging in response to flood events (Outback Ecology 2012a; Stantec 2019b; 2020). The riparian zone is dominated by samphires (*Tecticornia*), which are adapted to the saline soil on the lake's periphery and are typically not directly impacted by the discharge water (Outback Ecology and *actis* Environmental Services 2013).

During major floods, such as those that occurred during 2004, 2011, 2017 and 2024, lake productivity substantially increases, irrespective of the presence of dewatering discharge, with a diverse array of aquatic biota responding to an influx of freshwater and nutrients (Outback Ecology and *actis* Environmental Services 2013). With the onset of flooding, and a marked decrease in salinity, the lake supports an abundance of macrophytes, algae and aquatic invertebrates (mostly crustaceans), which provide a food source for waterbirds (Stantec 2019b).

To date, the total number of species recorded from Lake Carey and peripheral wetlands comprises 102 algae, 79 diatoms, three macrophytes, 83 aquatic invertebrates, 32 waterbirds and 59 riparian plant species (Gregory *et al.* 2009; Outback Ecology 2012b; Stantec 2019a; 2025b). The fairy shrimp *Branchinella simplex* (**Plate 2-1A**) has been identified from the lake and is a Priority 1 (P1) species (DBCA 2024). The brine shrimp *Parartemia bicorna* (**Plate 2-1B**) and several copepod species are also potentially restricted to Lake Carey. Two new species of ostracod (*Reticypris* sp. BOS962 and *Reticypris* sp. BOS1087) were identified for the first time during the 2017 major flood event, and also appear restricted to the lake (Stantec 2019a). The Priority 3 (P3) samphire *Tecticornia mellarium* (DBCA Department of Biodiversity Conservation and Attractions 2026) has also been identified within the riparian zone of Lake Carey, although this species is widespread in the local area (Outback Ecology and *actis* Environmental Services 2013; Stantec 2025b). During historical major flooding, one significant waterbird species has been recorded from Lake Carey; the Red necked Stint (*Calidris ruficolis*)(Migratory species (MI), BC Act / MI EPBC Act), which was observed in the south of the lake adjacent to the Bindah Causeway (Stantec 2019a). Ongoing monitoring and assessment of the lake will continue to provide important information for future environmental management in relation to the effects of the dewatering discharge.

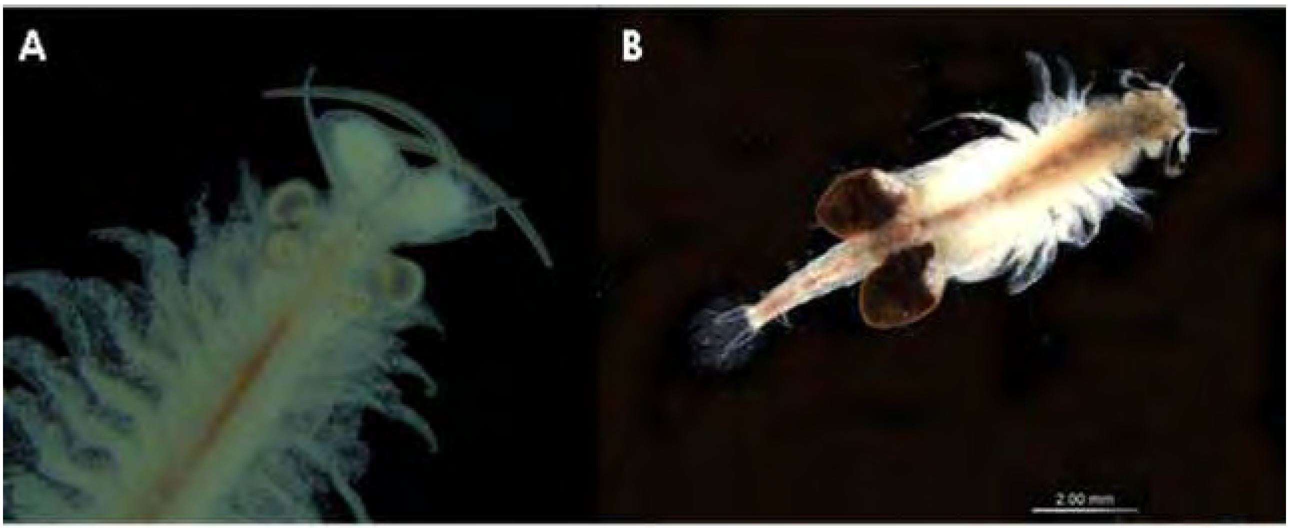


Plate 2-1: Significant or restrcited taxa recorded from Lake Carey including: A) *Branchinella simplex* (P1), and B) *Parartemia bicorna* (potentially restricted).

3. Methods

3.1 Discharge Assessment

3.1.1 Hydrological Scenarios, Discharge Volumes and Salt Balance

The quantity of water discharged to Lake Carey (discharge volume) was measured on a monthly basis by AGAA during the 2025 reporting period. This data was provided to Stantec to undertake the Discharge Assessment for the 2025 Program. Monthly and total discharge volumes were summarised and compared to the DWER annual discharge license limit. Hydrological scenarios were assessed in relation to rainfall and surface water extent on the lake (dry or flooded conditions) and according to previous hydrogeological and surface water modelling (AECOM 2018). The quarterly discharge water salinity data was used to calculate the salt balance (monthly and annual total), in relation to estimated catchment salt loads.

3.1.2 Discharge Water Quality

AGAA collected water samples from the discharge outfall in February, May, August and November during the 2025 reporting period. The samples were analysed for a suite of parameters much broader than outlined in the DWER licence conditions (**Appendix A**). Water quality results were compared to the Lake Carey control site ranges (Lake Carey CSRs), described in **Section 3.2** below, as well as the ANZG (2018) default guideline values (DGVs) for the protection of 80% of species in marine water. In addition, cyanide concentrations were compared to the trigger value within the International Cyanide Management Code (ICMI 2015).

3.2 Lake Carey CSRs

To effectively manage a lake ecosystem, detailed information on the local environment is required. One approach involves collecting reference data to develop site-specific trigger values (Batley *et al.* 2003), to provide a more accurate indication of local conditions instead of applying default water quality trigger values such as those presented in ANZG (2018). Local water and sediment quality data has been collected from regional control sites on the lake during flood events by the LCCMG, enabling the development of the site-specific Lake Carey CSR. These ranges consist of the 20th and 80th percentiles for many parameters, based on water and sediment data collected from the lake between 2001 and 2025. The upper limit of the Lake Carey CSR (80th percentile), and the lower limit for pH, provides the basis for the comparison of water and sediment quality recorded across the lake. However, it should be noted that water quality data used to develop the Lake Carey CSRs are limited due to the infrequency of flooding.

3.3 Ecological Assessment

3.3.1 Monitoring Program & Site Classification

Field work for the Ecological Assessment of the 2025 Program was undertaken in June and September 2025, with eight aquatic ecology (AQ) and riparian vegetation (RV) sites sampled (**Figure 3-1**, **Table 3-1**, **Table 3-2**). Sampling was undertaken by experienced Stantec aquatic scientists; Jay Puglisi (Principal Aquatic Scientist) in June, and Kate Walker (Aquatic Scientist) in September. Photographic monitoring was undertaken at all sites to maintain a record of changing conditions over time (**Appendix B**).

Aquatic ecology sites located on the playa of Lake Carey were classified as discharge outfall (DO; SDDIS), discharge-affected or discharge (D; SDS1, SDS2, SDS4), historical discharge (HD; SDHD) and control (C; SDN1, SDN2, SDN4) (**Figure 3-1**, **Table 3-1**).The three discharge sites were located within the zone of influence south of the discharge outfall. The historical discharge site was located to the north of the discharge outfall, having received discharge between 1999 to 2001. The control sites were located to the north of the historical discharge and have not been impacted by dewatering discharge. Surface water was only present at one site (SDDIS) during June and September (**Table 3-2**). The riparian vegetation sites were located adjacent to the aquatic ecology sites (**Figure 3-1**). The ecological components sampled are outlined in **Table 3-2**, with detailed methods provided in subsequent sections.

Figure 3-1: Location of aquatic ecology and riparian vegetation sampling sites on Lake Carey, during the 2025 Program.

Table 3-1: Site classifications and locations for the Lake Carey sites during the 2025 Program (■ discharge outfall, ■ discharge, ■ historical discharge, and ■ control sites).

Sites	Classification	GPS Coordinates	Elevation	Habitat	Location
SDDIS	Discharge outfall (DO)	442498 6781149	395 m	Channel	SDGM discharge outfall
SDS1	Discharge (D)	441850 6780830	395 m	Playa	0.7 km southwest of DO
SDS2	Discharge (D)	442084 6780191	399 m	Playa	1.0 km southwest of DO
SDS4	Discharge (D)	442396 6779492	399 m	Playa	1.6 km south of DO
SDHD	Historical discharge (HD)	441575 6784286	395 m	Embayment	3.2 km north of DO
SDN1	Control (C)	441894 6784787	395 m	Playa	3.7 km north of DO
SND2	Control (C)	441989 6785709	395 m	Playa	4.6 km north of DO
SDN4	Control (C)	442396 6786493	395 m	Playa	5.4 km north of DO

Table 3-2: Ecological components sampled for the 2025 Program (• = sample collected).

Sites	Water Quality		Sediment Quality		Diatoms		Resting Stages		Riparian Vegetation		Soil Quality	
	June	Sep	June	Sep	June	Sep	June	Sep	June	Sep	June	Sep
SDDIS	•	•	•	•	•	•	•	•	•	•	•	•
SDS1			•	•	•	•	•	•	•	•	•	•
SDS2			•	•	•	•	•	•	•	•	•	•
SDS4			•	•	•	•	•	•	•	•	•	•
SDHD			•	•	•	•	•	•	•	•	•	•
SDN1			•	•	•	•	•	•	•	•	•	•
SDN2			•	•	•	•	•	•	•	•	•	•
SDN4			•	•	•	•	•	•	•	•	•	•

3.3.2 Surface Water Quality

Due to extremely low water levels, surface water samples were only collected from one site during June and September 2025, with parameters analysed listed in **Table 3-3**. Samples were stored in sterilised bottles (containing preservative where required) provided by Australian Laboratory Services (ALS), a NATA-accredited service provider (Accreditation No. 2562). Bottles were completely filled with water and sealed excluding air from the samples. Following collection, the samples were couriered to ALS in Perth for analysis. Holding times were met for all parameters except for pH in both June and September, with the latter considered indicative only. *In situ* basic water quality measurements were also recorded from each site using a YSI ProDSS multiparameter water quality meter, where the depth of surface water was sufficient for analysis.

Surface water pH was assessed according to the classification system developed by Foged (1978), comprising acidic water (4.5 to 6.5), neutral water (6.5 to 7.5), and alkaline water (>7.5). Salinity was compared to Hammer (1986), classifying surface water into freshwater (<3,000 mg/L), hyposaline (3,000 to 20,000 mg/L), mesosaline (20,000 to 50,000 mg/L) and hypersaline (>50,000 mg/L) categories.

Water quality data was compared to the Lake Carey CSRs, as well as the ANZG (2018) ANZG DGVs for the protection of 80% of species in marine water, due to the limitations associated with some parameters within the Lake Carey CSRs, due to the infrequency of lake flood events. In addition, cyanide concentrations were compared to the trigger value within the International Cyanide Management Code (ICMI 2015).

Table 3-3: Water parameters analysed during the 2025 Program.

Basic and Nutrients	Anions and Cations	Dissolved Metals, Metalloids & Cyanide	
pH	Chloride	Aluminium	Lead
Electrical Conductivity	Sulphate	Arsenic	Manganese
Total Dissolved Salts	Carbonate	Barium	Mercury
Total Nitrogen	Bicarbonate	Beryllium	Nickel
Total Phosphorus	Hydroxide	Cadmium	Selenium
Total Kjeldahl Nitrogen	Sodium	Chromium	Strontium
Nitrite + Nitrate	Magnesium	Cobalt	Vanadium
	Calcium	Copper	Zinc
	Potassium	Iron	Weak Acid-dissociable Cyanide

3.3.3 Sediment Quality

In June and September, at each aquatic ecology site, the top 2 cm of lake sediment was scraped into a sterilised glass jar (excluding voids), which was then sealed and sent to ALS for analysis (**Table 3-4**). Samples were collected and stored using containers and instructions provided by ALS. Holding times were met for all parameters.

Sediment quality data was compared to the Lake Carey CSR 20th and 80th percentiles, which were calculated using the methods outlined in **Section 3.2**. Comparison was also provided against the ANZG (2018) DGVs and the Guideline Value High (GV-High) values; the latter are the concentrations where toxicity-related effects may be observed. Sediment pH was assessed according to the classification system developed by Hazelton and Murphy (2007), comprising slightly acidic (6.1 to 6.5), neutral (6.6 to 7.4), mildly alkaline (7.4 to 7.8) and moderately alkaline (7.9 to 8.4) categories.

Table 3-4: Sediment parameters analysed during the 2025 Program.

Basic and Nutrients	Anions and Cations	Total Metals and Trace Elements	
pH	Chloride	Aluminium	Lead
Total Soluble Salts	Sulphate	Arsenic	Manganese
Total Nitrogen	Carbonate	Barium	Mercury
Total Phosphorus	Bicarbonate	Beryllium	Nickel
Total Kjeldahl Nitrogen	Sodium	Cadmium	Selenium
Nitrite + Nitrate	Magnesium	Chromium	Silicon
	Calcium	Cobalt	Vanadium
	Potassium	Copper	Zinc
		Iron	

3.3.4 Diatoms

During the 2025 Program, a sample of the surface sediment from Lake Carey was collected to assess diatom community structure, with the sample placed into a 70 mL vial. All samples were kept cool to preserve diatom structure. In the Stantec laboratory, diatoms were treated in 70% nitric acid (to remove organic material) and permanent slides were prepared according to John (1983). Three replicate slides were prepared for each site and enumeration was carried out at 100X magnification under a compound microscope. A maximum of up to 100 diatoms were counted from each site (where possible). In very sparse samples the total area of all three slides was examined, and all diatoms present recorded. The number of taxa (diversity) and abundance was recorded to gain an understanding of diatom community structure. Species were identified using appropriate taxonomic guides by Graduate Aquatic Scientist Charlie Corr and Senior Aquatic Scientist Richard de Lange.

3.3.5 Resting Stages

Surface sediment was collected from each site during the field survey, to identify the presence of dormant eggs and seeds of aquatic biota, known as resting stages. From each site, a scraping of the surface sediment (25 cm x 25 cm at approximately 1 cm to 2 cm deep) was collected and placed into calico bags. Samples were oven dried at 40ºC in the Stantec laboratory. A 200 g sub-sample was sieved through stacked Endecott® brass sieves with mesh sizes of 500 µm and 106 µm. Material (1 g) retained in the 106 µm sieve was added to a 1:1 (weight : volume) sugar and water solution according to Briski *et al.* (2013), and left to settle to allow resting stages to float to the surface. The subnatant was carefully decanted and rinsed with distilled water through a 53 µm sieve and placed into a petri dish containing distilled water. Resting stages were counted and identified by Charlie Corr (Graduate Aquatic Scientist) with support Richard de Lange (Senior Aquatic Scientist) and appropriate literature. The abundance of resting stages was calculated per 100 g of sediment, to provide an indication of density.

3.3.6 Riparian Vegetation & Soil Quality

Riparian vegetation was surveyed using established contiguous 3 m x 3 m quadrats along a 30 m transect at all sites. The transects extended from the playa margin, inland across the primary dune system. In each quadrat, plant measurements including density, cover and health were recorded. Plant health was rated on a scale of 1 to 5 for each transect, based on a system modified from Keighery (1994) (**Table 3-5**).

Soil samples were collected at the beginning and end of each transect (0 m and 30 m) in sterilised glass jars at the start (0 m; edge of the playa) and end of each of the 30 m transect (landward side) and sent to ALS for the analysis of pH, total soluble salts (TSS) and moisture content. Holding times were not met for pH and moisture content and results should be considered indicative only. The data from 2025 were compared to the results from 2019 to 2024. Due to the restructuring of transects in 2019, historical data prior to 2019 was not comparable with the 2025 data.

Table 3-5: Vegetation health rating system for riparian vegetation quadrats during the 2025 Program.

Score	Description
5	Excellent health, new germinants
4	Very good vegetation health/no change from previous monitoring
3	Good/improving vegetation health
2	Poor/declining vegetation health
1	Dead/no live vegetation

3.4 Statistical Analysis

3.4.1 Univariate Statistics

Univariate analysis is a statistical technique that is used for analysing a single parameter at a time. For the 2025 Program, one-way ANOVA (analysis of variance) was used to compare the statistical means of sediment parameters between discharge and control sites for historical data. Where values were below detection (the analytical reporting limit), a value equal to half the limit of reporting (LoR) was substituted. Data was subject to normality testing and transformed where required to reduce skewness. A confidence level of 95% (p-value of <0.05) was considered statistically significant for reporting purposes.

3.4.2 Multivariate Statistics

Multivariate analysis involves the statistical analysis of more than one parameter at a time. Principal components analysis (PCA) is an explanatory tool which was applied to the 2025 water and sediment data, as well as historical datasets. Where values were recorded as below detection, a value equal to half the limit of reporting was substituted. Select parameters were transformed to reduce skewness (ensuring the data was normally distributed) and collinear variables (those that have a linear relationship) were removed during pre-treatment of the data. The results of the PCA are shown as a plot, with sites that are similar located closer together. Vectors radiate from the centre of the plot, representing the influence of each parameter, with higher concentrations of parameters tending to occur near the end point of the vector. The percentage variance is used to explain the strength of the PCA; presented over the first two axes of the plot. A value of more than 60% is considered a useful interpretation of the data (Clarke and Warwick 2001).

Hierarchical classification was used to determine trends in the community structure of phytoplankton, diatoms, aquatic invertebrates and riparian vegetation, with square root transformed to reduce skewness. The Bray-Curtis index was used to calculate coefficient similarities between sites, with classification based on the group-average linking algorithm. The results are presented in the form of a dendrogram (link-tree), showing the percentage similarity between sites, based on community structure (Clarke and Warwick 2001).

4. Results and Discussion

4.1 Discharge Assessment

4.1.1 Hydrological Scenarios

The hydrological regime of the dewatering discharge was evaluated as part of the Discharge Assessment during the 2025 reporting period. Due to the below average rainfall during the report period, excess dewatering from the SDGM was discharged onto a dry lake bed. This created a shallow, localised pool (<20 cm in depth) that extended from the outfall onto the playa of Lake Carey (**Plate 4-1A, B**). The size and area of pooled water will vary according to discharge volumes, rainfall patterns and evaporation rates, as well as the lake bathymetry and prevailing winds. During the reporting period, this hydrological scenario was prevalent for most of the year, due to limited intensive rainfall events.

In contrast, during major flood events, the most recent of which occurred in 2024, the discharge water flows into surface water on the lake (**Plate 4-1C, D**), which are connected throughout the broader playa. On a regional scale the quantity of water discharged from SDGM during a flood event is considered insignificant, with no expected impacts to the hydrological function of Lake Carey (AECOM 2016; Dames and Moore 1996). In addition, there have been no cumulative impacts on the lake's hydrology despite active discharge to the lake from several other nearby mines (Stantec 2025a; Taukulis *et al.* 2014).

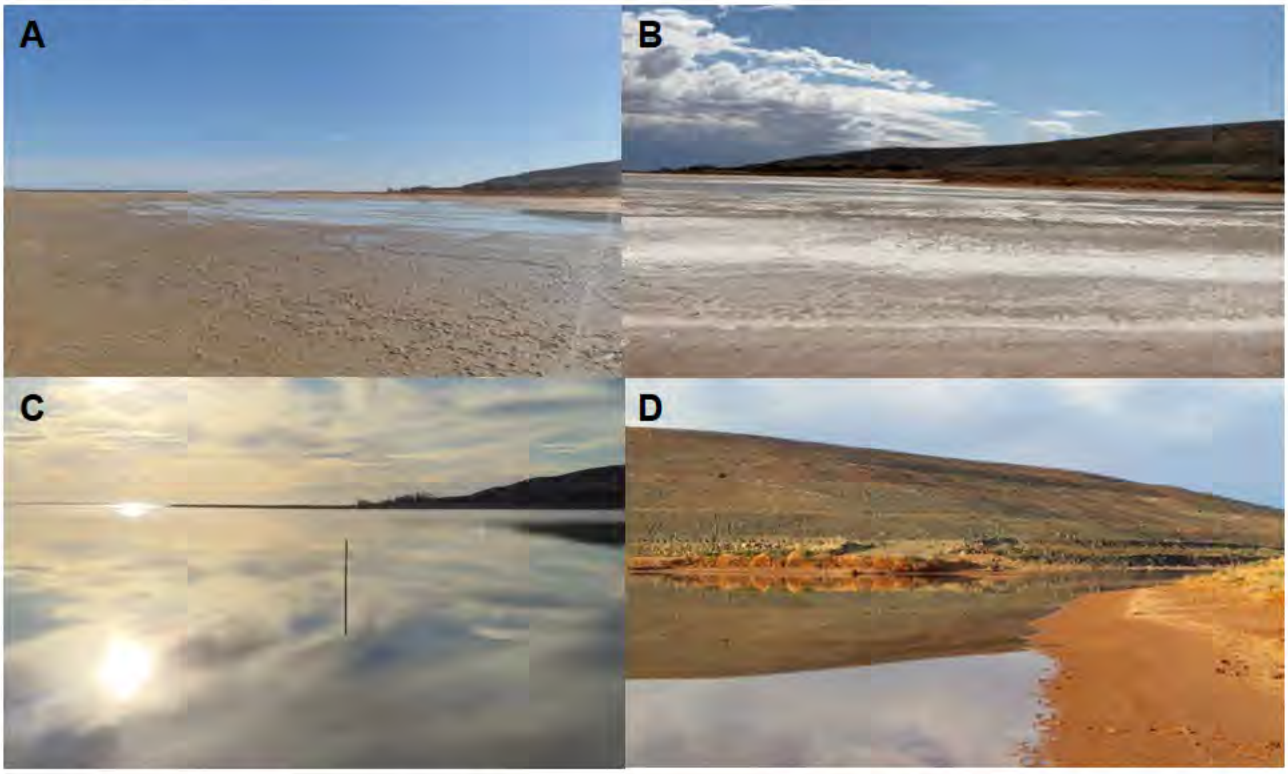


Plate 4-1: Conditions in the vicinity of the dewatering discharge outfall (SDDIS) during dry conditions (A-B) and flooded conditions (C-D).

4.1.2 Dewatering Discharge Volumes

SDGM are authorised to discharge a maximum of 5,000,000 t of water per annum to Lake Carey. During the 2025 reporting period, 720,738 m^3 of water (**Figure 4-1**) was discharged to the lake, equating to approximately 14% of the total licence limit. This volume is substantially less than 2024, where approximately 32% of the annual licence limit was discharged (1,614,065 m^3). This decrease can be attributed to the predominantly dry conditions experienced in 2025.From March 2025, there was a substantial reduction in monthly discharge volumes to Lake Carey (**Figure 4-1**). In addition, since dewatering discharge to the lake began in 1996, SDGM have remained well-below the annual licence limit (**Figure 4-2**).

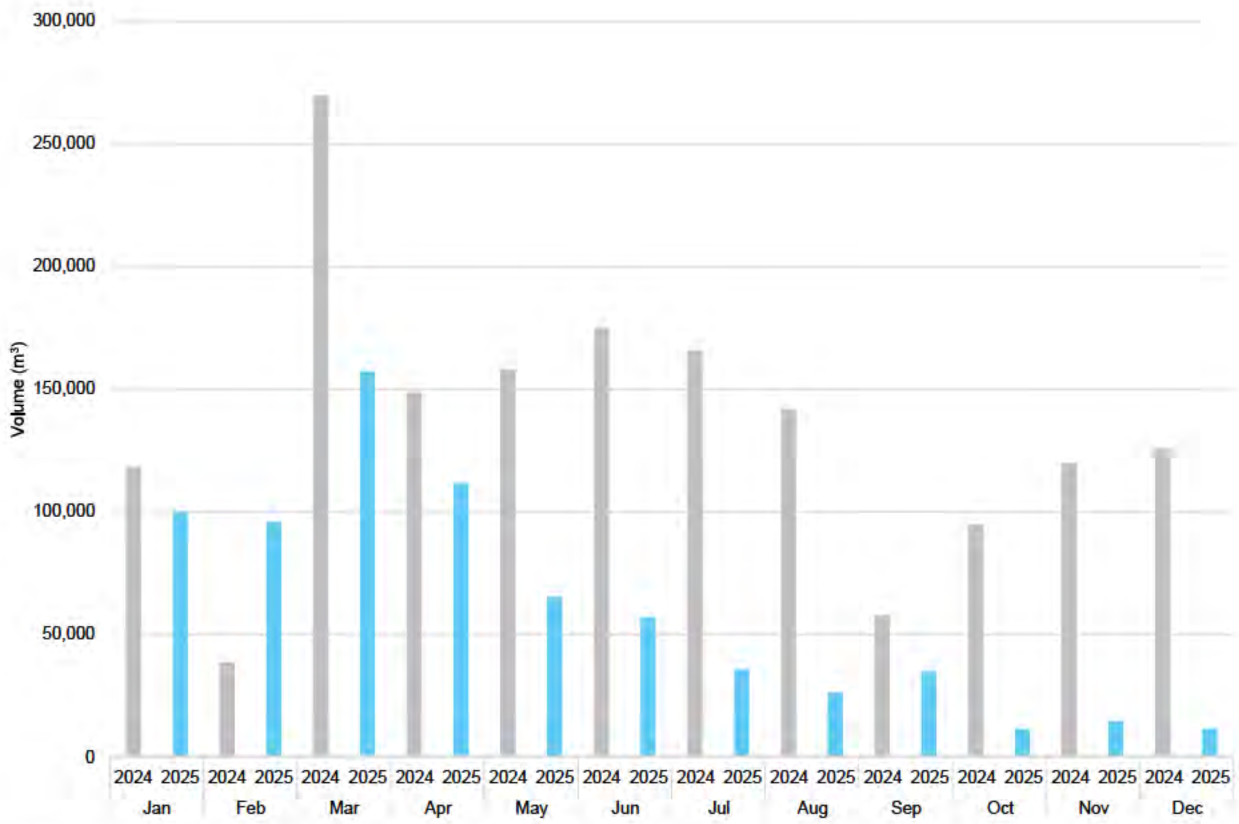


Figure 4-1: Monthly discharge volumes from the SDGM to Lake Carey during the 2025 reporting period compared to the 2024 reporting period.

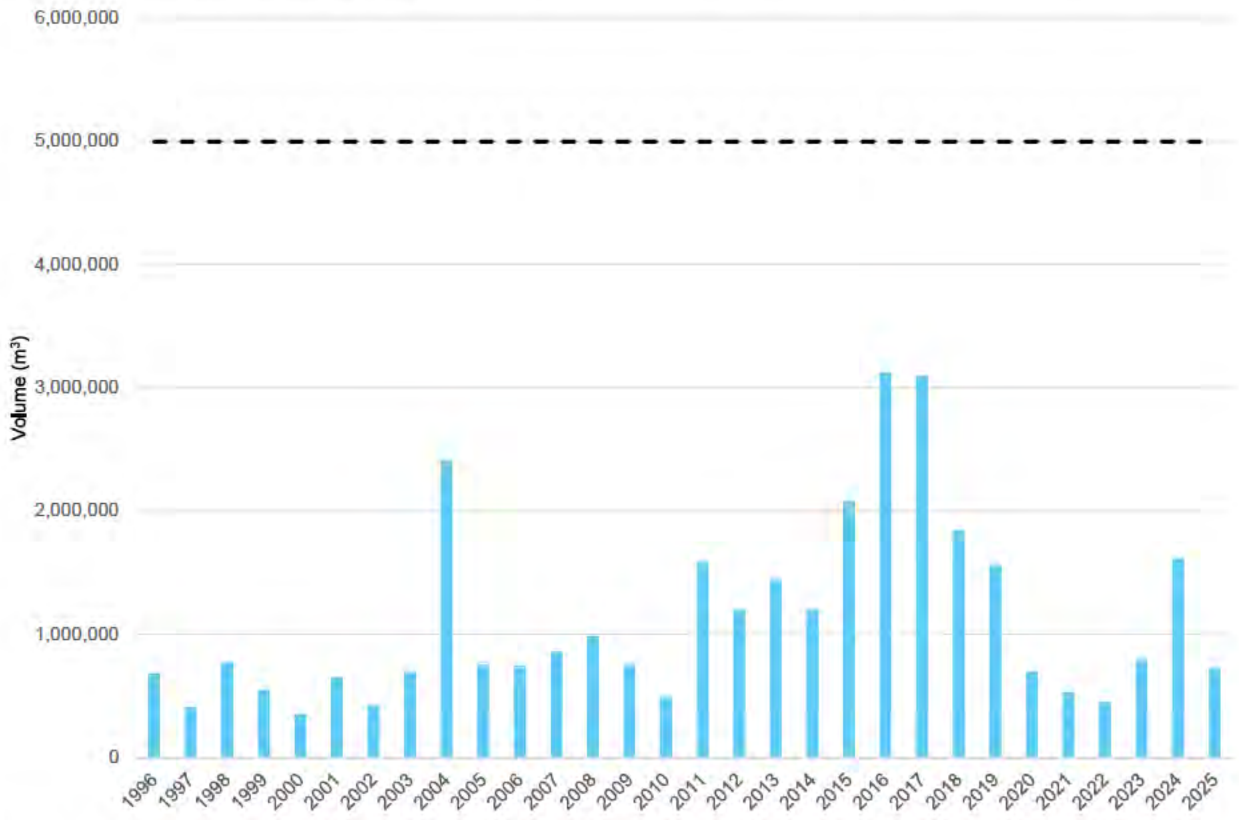


Figure 4-2: Annual discharge volumes (■) from SDGM to Lake Carey between 1996 and 2025, compared to the annual licence limit (- -).

4.1.3 Discharge Water Quality

AGAA conduct water quality monitoring at SDGM, with samples collected on a regular basis from the discharge outfall. During the 2025 reporting period, the frequency of water quality monitoring met the quarterly requirement detailed in L8579/2011/2 (**Appendix A**), with the data provided in **Table 4-1**. The pH of water at the discharge outfall during the 2025 reporting period ranged from 7.4 to 7.5, classified as neutral (Foged 1978), comparable to the previous reporting period (7.3 to 7.6). There were no exceedances of the Lake Carey CSR 80th percentile, however the pH value in August and November was below the 20th percentile (**Table 4-1**).

Salinity, measured as total dissolved solids (TDS), at the discharge outfall was classified as hypersaline (≥50,000 mg/L, Hammer 1986) ranging from 261,000 mg/L to 376,000 mg/L (**Table 4-1**), and exceeded the Lake Carey CSR 80th percentile (75,100 mg/L) by up to five times. This trend was also reflected in the elevated concentrations of all major ions, excluding calcium. Nitrite + Nitrate ranged from 9.17 mg/L in May to 19.4 mg/L in November, and was considered comparable to previous reporting periods in 2023 (9.25 mg/L to 11.6 mg/L) and 2024 (4.6 mg/L to 14.7 mg/L). There was no (ANZG 2018) trigger or Lake Carey CSR available for comparison to concentration of Nitrite + Nitrate.

The concentrations of metals and cyanide at the discharge outfall were low during the 2025 reporting period, with most parameters below analytical detection limits at all sampling events, including beryllium, chromium, cobalt, copper, iron mercury, selenium, and total and WAD cyanide (**Table 4-1**). The concentrations of boron, cadmium, lead, manganese, nickel strontium and zinc were variable during the reporting period, with lead and zinc exceeding the ANZG (2018) DGV for the protection of 80% of species in marine water (**Table 4-1**). The maximum concentration of lead occurred in February (0.369 mg/L), and exceeded the (ANZG 2018) DGV by more than 30 times (**Table 4-1**). Zinc concentrations increased during the reporting period, with the maximum recorded in November (1.45 mg/L), which exceeded the ANZG (2018) DGV by approximately 34 times. Concentrations of lead and zinc in 2025 were also elevated compared to 2024 (Stantec 2025a). Elevated metal concentrations, as well as variations over time, can be attributed to changes in the chemical composition of the discharge water, as well as biological and hydrogeochemical processes such as microbial activity and evapoconcentration (Gregory 2008).

Table 4-1: Dewatering discharge quality analysed from the discharge outfall by AGAA at SDGM during the 2025 reporting period, compared to the Lake Carey CSRs.

Parameter		Discharge Outfall				Lake Carey CSR			ANZG (2018) DGV
		Feb-25	May-25	Aug-25	Nov-25	20th%ile	80th%ile	n	
Basic & Nutrients	pH (unit)	7.5	7.5	7.3	7.4	7.5	8.1	104	-
	Total Dissolved Solids	271,000	261,000	332,000	376,000	16,800	75,100	104	-
	Electrical Conductivity (µS/cm)	227,000	212,000	260,000	223,000	23,820	90,120	103	-
	Nitrite + Nitrate	11.1	9.17	10.2	19.4	-	-	-	-
Cations & Anions	Sodium	93,200	87,300	111,000	113,000	4,864	22,440	103	-
	Magnesium	5,820	5,220	6,400	13,600	241	1,400	101	-
	Potassium	1,720	1,580	1,850	3,940	136	644	100	-
	Calcium	598	854	520	443	393	1,392	103	-
	Chloride	133,000	148,000	179,000	167,000	8,136	34,040	102	-
	Sulfate	14,800	18,100	20,700	40,000	2,348	6,678	100	-
	Bicarbonate	76	83	86	106	38	122.2	103	-
	Carbonate	<1	<1	<1	<1	-	-	-	-
	Total Alkalinity	76	83	86	106	35.6	88	59	-
Dissolved Metals & Trace Elements	Antimony	<0.05	<0.05	<0.05	0.06	-	-	-	-
	Arsenic	0.053	0.069	<0.05	0.078	-	-	-	-
	Beryllium	<0.05	<0.05	<0.05	<0.05	-	-	-	-
	Boron	3.47	<2.5	<2.5	3.75	-	-	-	-
	Cadmium	0.0248	0.0252	0.0178	<0.005	-	-	-	0.036
	Chromium	<0.05	<0.05	<0.05	<0.05	-	-	-	0.085
	Cobalt	<0.05	<0.05	<0.05	<0.05	-	-	-	0.15
	Copper	<0.05	<0.05	<0.05	<0.05	-	-	-	0.008
	Iron	<2.5	<2.5	<2.5	<2.5	-	-	-	-
	Lead	**0.369**	**0.286**	**0.282**	<0.05	-	-	-	0.012
	Manganese	1.88	1.59	2.11	0.941	-	-	-	-

Parameter		Discharge Outfall				Lake Carey CSR			ANZG (2018) DGV
		Feb-25	May-25	Aug-25	Nov-25	20^{th}%ile	80^{th}%ile	n	
	Mercury	<0.0005	<0.0005	<0.0005	<0.0005	-	-	-	0.001
	Nickel	<0.05	<0.05	<0.05	0.063	-	-	-	0.56
	Selenium	<0.5	<0.5	<0.5	<0.2	-	-	-	-
	Strontium	13.7	13.6	15.4	25.8	-	-	-	-
	Zinc	<0.25	**0.252**	**0.908**	**1.45**	-	-	-	0.043
Cyanide	Cyanide (Total)	<0.04	<0.04	<0.04	<0.04	-	-	-	-
	Cyanide (WAD)	<0.04	<0.04	<0.04	<0.04	-	-	-	0.5^

Note: All units in mg/L unless otherwise stated; red shading indicates value exceeded 80^{th} percentile of the Lake Carey CSRs, yellow shading indicates value is below the 20^{th} percentile of the Lake Carey CSRs and bold text denotes value exceeded the ANZG (2018) DGV; ^ indicates value from ICMC, International Cyanide Management Code.

4.1.4 Salt Balance Estimate

The depth of the natural salt crust on the surface of Lake Carey varies over time, although it rarely exceeds 0.03 cm (Outback Ecology and *actis* Environmental Services 2013). Input of additional salt from dewatering discharge can result in a thicker salt crust within the vicinity of the discharge outfall, along the discharge trench, and onto the playa.

The salt crust in the vicinity of the discharge outfall can be up to 15 cm thick, dependent on the quantity and flow of the discharge water, evaporation, rainfall and prevailing winds (Stantec 2021). Rainfall causes salts on the playa to dissolve and mobilise into surface water during inundation. For example, in 2017 and 2024, the salt crust completely dissipated following major flooding (Stantec 2018; 2025a); however, subsequently reformed as the lake dried out and dewatering discharged recommenced (**Figure 4-3**). Due to the prevailing dry conditions during the 2025 reporting period, the salt crust measured up to 3 cm (**Appendix D**).

Aerial imagery of Lake Carey (2010 to 2025), in the vicinity of the SDGM, shows that the extent of the salt crust generally covers between 1.2 km^2 and 9 km^2, with the maximum representing less than 2% of the total surface area of the lake. During the 2025 reporting period, the extent of salt crust attributed to the discharge was calculated as 1.4 km^2, based on Sentinel-Hub imagery from early October (Sinergise 2025) (**Figure 4-4**).

The average salinity (TDS) of the discharge water during the 2025 reporting period was approximately 310,000 mg/L (**Table 4-2**, **Figure 4-5**). Based on this and the total discharge volume, 218,023 t of salt was deposited onto Lake Carey in 2024, representing a decrease of 153,230 t in comparison to 2024 (371,253 t) (**Appendix F**). Since 2005, approximately 6,051,000 t of salt has been added to the lake from the discharge water associated with the SDGM. Although substantial, previous studies have shown that salts will likely be redistributed laterally on the playa and potentially vertically into subsurface aquifers (Outback Ecology and *actis* Environmental Services 2013).

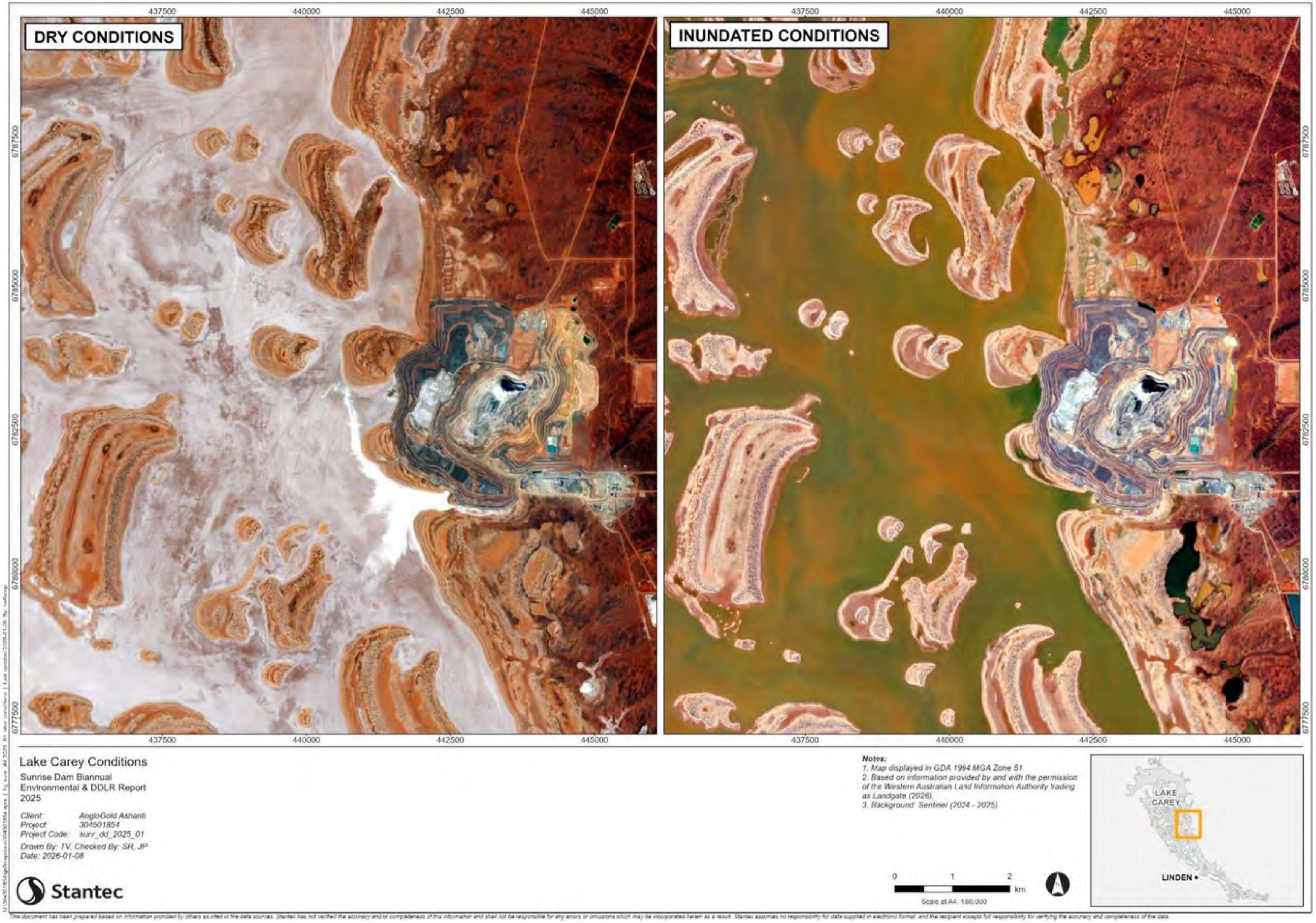


Figure 4-3: Salt crust formation on Lake Carey during dry conditions (left), and dissipation in flooded conditions (right).

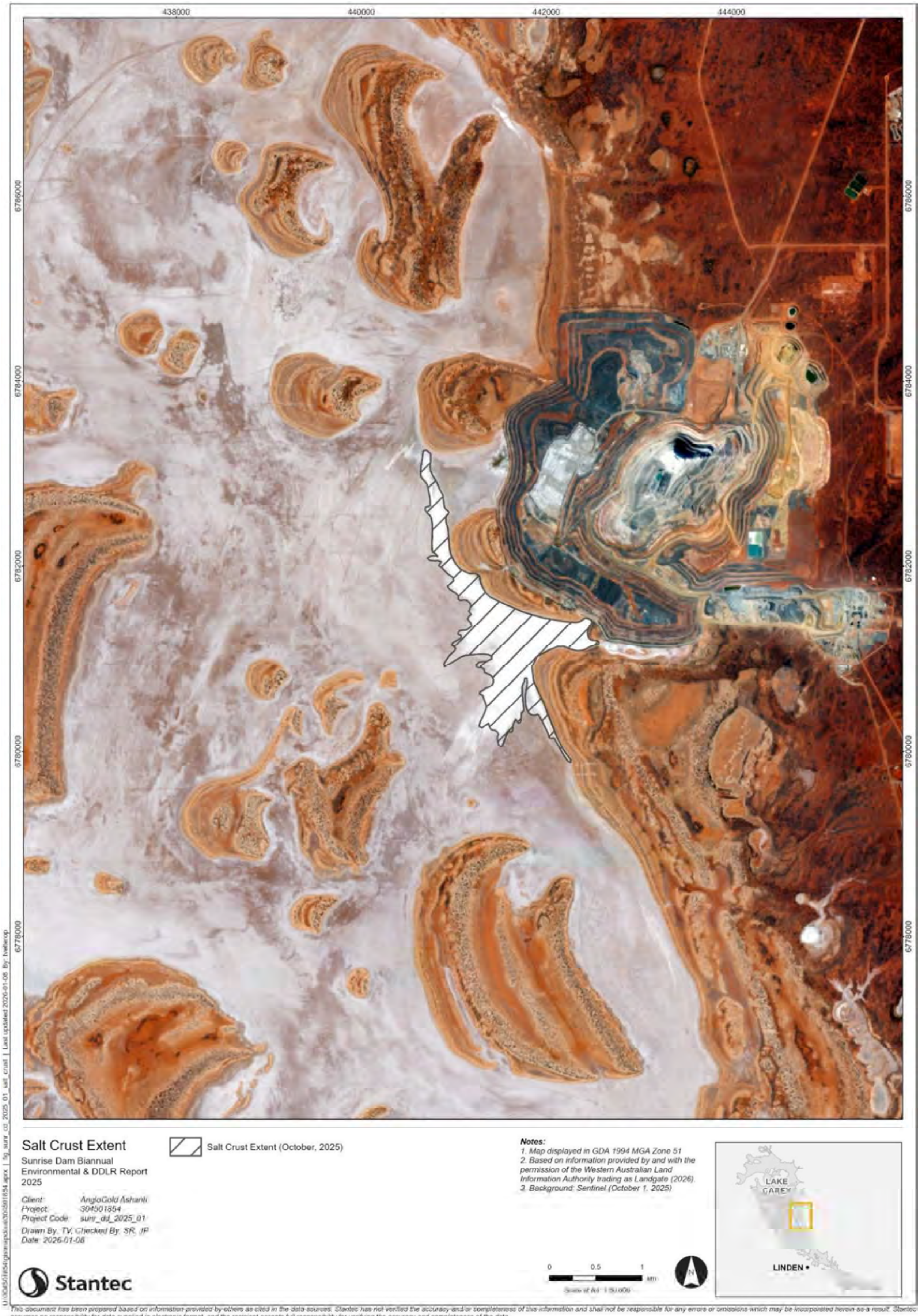


Figure 4-4: Extent of salt crust attributed to the SDGM discharge outfall on Lake Carey in 2025.

Table 4-2: Monthly estimated salt load discharge to Lake Carey during the 2025 reporting period.

Month	Discharge Volume (m^3)	TDS (mg/L)	Salt Load (t)
January*	99,802	310,000	30,939
February	95,943	271,000	26,001
March*	157,307	310,000	48,765
April*	111,587	310,000	34,592
May	65,317	261,000	17,048
June*	56,974	310,000	17,662
July*	35,575	310,000	11,028
August	26,085	332,000	8,660
September*	34,791	310,000	10,785
October*	11,191	310,000	3,469
November	14,591	376,000	5,486
December*	11,575	310,000	3,588
Average	60,062	310,000	18,169
Total	720,738	3,720,000	218,023

*Note: *indicates annual average has been used.*

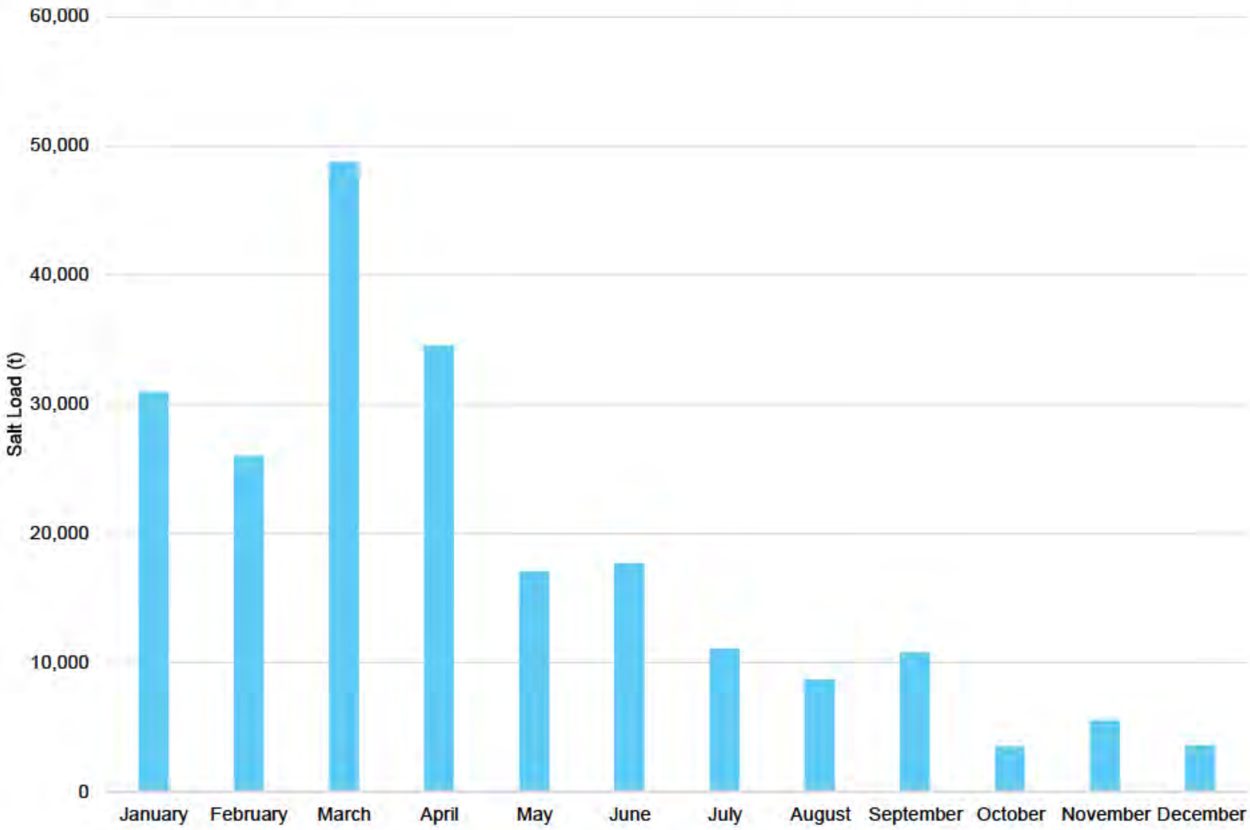


Figure 4-5: Monthly estimated salt load discharge to Lake Carey during the 2025 reporting period.

4.2 Ecological Assessment

4.2.1 Surface Water Quality

During the 2025 Program, the ecological assessment was undertaken in dry conditions, with surface water restricted to the discharge outfall (SDDIS) during both the June and September surveys. The pH of surface water at the discharge outfall (SDDIS) was comparable between surveys (7.5 in June and 7.4 in September) (**Table 4-3**), and below the Lake Carey 20th percentile CSRs (7.5), reflecting the characteristics of the dewatering discharge. This was classified as neutral (Foged 1978) and was consistent to previous assessments (**Figure 4-6A**), and considered characteristic of salt lakes in Western Australia (Smith *et al.* 2004).

Salinity (measured as total dissolved solids) of surface water at the discharge outfall (SDDIS) ranged from 261,000 mg/L in June to 300,000 mg/L in September (**Table 4-3**), classified as hypersaline (≥50,000 mg/L, (Hammer 1986), and exceeding the Lake Carey CSRs 80th percentile (75,100 mg/L). Elevated salinity (>200,00 mg/L) at the discharge outfall (SDDIS) has been a common trend over time during dry years (**Figure 4-6B**), and reflects the hypersaline groundwater that underlies salt lakes in the northern Goldfields (Johnson *et al.* 1999), as well as evapoconcentration during dry conditions (McComb and Lake 1990). In comparison, during major flood events, such as 2011, 2017 and 2024, where surface water substantially decreases throughout the lake to mesosaline (<30,000 mg/L, (Hammer 1986), supported by the PCA (**Figure 4-9**).

The majority of cations and anions also exceeded the Lake Carey CSRs 80th percentiles during the April and September surveys, with the exception of calcium and bicarbonate, reflecting the hypersaline conditions (**Table 4-3**) and comparable to temporal trends (Stantec 2023; 2024; 2025a). Cations followed Na>Mg>K>Ca, while anion composition was $Cl>SO_4>HCO_3$ (**Table 4-3**), consistent with previous dry assessments in 2022 and 2023 (Stantec 2023; 2024). The dominance of the major anions and cations is consistent with Australian inland waters (Hart and McKelvie 1986).

During the 2025 Program, total nitrogen (TN) in surface water at the discharge outfall (SDDIS) was comparable between the surveys (17.9 mg/L in June and 17.2 mg/L in September) (**Table 4-3**), and was well above the Lake Carey's CSRs 80th percentile (4.8 mg/L). This is comparable to previous assessments (**Figure 4-6C**), with TN also higher in recent years compared to years prior to 2021. TP concentrations ranged from 5.2 mg/L in June and 7.8 mg/L in September (**Table 4-3**) and were lower than TN, a pattern consistent with previous trends and Western Australian salt lakes more broadly (Gregory 2008; Smith *et al.* 2004). Average TP concentrations (6.48 mg/L) in the 2025 Program constituted a substantial increase from 2024, during which all sites were below 0.2 mg/L, attributed to the flood event (Stantec 2025a). However, concentrations were similar to the TP levels recorded in 2008 (4.6 mg/L) at SDDIS (**Figure 4-6D**) (Outback Ecology 2009).

Concentrations of dissolved metals and trace elements were below the level of analytical detection for most parameters, including aluminum, beryllium, chromium, cobalt, copper, iron, mercury, selenium and vanadium (**Table 4-3**). Cyanide was also below detection limits (<0.04 mg/L) at all sites in June and September, and below the trigger values of the International Cyanide Management Code for the gold mining industry (0.5 mg/L) (ICMI 2015). The concentrations of metals and trace elements were mostly below the Lake Carey CSRs 80th percentiles and/or the ANZG (2018) DGVs for 80% protection of species in marine water, with the following exceptions:

- Lead – concentrations in June (0.261 mg/L) and September (0.556 mg/L), more than 20x and 46x the ANZG (2018) DGV (0.012 mg/L), respectively; and
- Zinc – concentrations in June (0.35 mg/L) and September (1.08 mg/L), more than 8x and 25x the ANZG (2018) DGV (0.043 mg/L), respectively.

Elevated concentrations of lead and zinc have been frequently recorded since 2002 (**Figure 4-7C**, **Figure 4-8B**). This can be associated with the characteristics of the discharge water, with groundwater in the Yilgarn known to be highly mineralised and rich in metals (Ferguson 1999). While discharge water may pose a toxicity risk to aquatic biota (ANZG 2018), the natural characteristics of the lake environment (high salinity, clay sediment and neutral pH) suggests dissolved metals are unlikely to become bioavailable for uptake. In addition, the exposure period for aquatic biota is considered limited, with the discharge water typically proving inhospitable to organisms due to the hypersaline conditions present (Outback Ecology and *actis* Environmental Services 2013). Regardless, during major flood events (2011, 2017 and 2024) dilution typically causes a decrease in metal concentrations (**Figure 4-7**, **Figure 4-8**) (Outback Ecology 2011; Stantec 2018; 2025a), also demonstrated in the PCA (**Figure 4-10**), reducing potential toxicity.

Table 4-3: Water quality parameters recorded from surface water at Lake Carey in June and September during the 2025 Program.

Water Quality Parameters		June	Sept	Lake Carey CSRs			ANZG (2018) DGV
		SDDIS	SDDIS	20th%ile	80th%ile	# Records	
Basic	pH (unit)	7.5	7.4	7.5	8.1	104	-
	Total Dissolved Solids	261,000	300,000	16,800	75,100	104	-
	Electrical Conductivity (µS/cm)	211,000	240,000	23,820	90,120	103	-
Nutrients	Total Nitrogen	17.9	17.2	0.6	4.8	98	-
	Total Phosphorus	5.2	7.8	-	-	-	-
	Total Kjeldahl Nitrogen	2.9	9.4	0.6	2.1	83	-
	Nitrite + Nitrate	15	0.31	-	-	-	-
Cations and Anions	Sodium	84,100	98,900	4,864	22,440	103	-
	Calcium	701	725	393	1,392	103	-
	Magnesium	4,920	6,280	241	1,400	101	-
	Potassium	1,470	1,840	136	644	100	-
	Chloride	142,000	162,000	8,136	34,040	102	-
	Sulfate	18,200	21,300	2,348	6,678	100	-
	Bicarbonate	88	83	38	122.2	103	-
	Carbonate	<1	<1	-	-	-	-
	Hydroxide	<1	<1	-	-	-	-
	Total Alkalinity	88	83	35.6	88	59	-
	Ionic Balance (%)	2.94	1.14	-	-	-	-
Metals and Trace Elements	Aluminium	<0.50	<0.50	-	-	-	-
	Arsenic	0.058	0.063	-	-	-	-
	Barium	0.098	0.081	0.035	0.099	86	-
	Beryllium	<0.050	<0.050	-	-	-	-
	Cadmium	0.0204	0.0351	-	-	-	0.036
	Chromium	<0.050	<0.050	-	-	-	0.085
	Cobalt	<0.050	<0.050	-	-	-	0.15
	Copper	<0.050	<0.050	-	-	-	0.008
	Iron	<2.50	<2.50	-	-	-	-
	Lead	**0.261**	**0.556**	-	-	-	0.012
	Manganese	1.65	2.28	-	-	-	-
	Mercury	<0.0005	<0.0005	-	-	-	0.0014
	Nickel	0.058	0.058	-	-	-	0.56
	Selenium	<0.50	<0.50	-	-	-	-
	Strontium	13	14.7	-	-	-	-
	Vanadium	<0.50	<0.50	-	-	-	0.28
	Zinc	**0.35**	**1.08**	-	-	-	0.043
	Cyanide (WAD)	<0.040	<0.040	-	-	-	0.5^

Note: All units in mg/L unless otherwise stated; orange shading indicates value was below the 20th percentile of the Lake Carey CSRs; red shading indicates value exceeds 80th percentile of the Lake Carey CSRs; bold font indicates exceedance of ANZG (2018) DGVs for 80% protection of species in marine water; ^ indicates value from ICMC, International Cyanide Management Code.

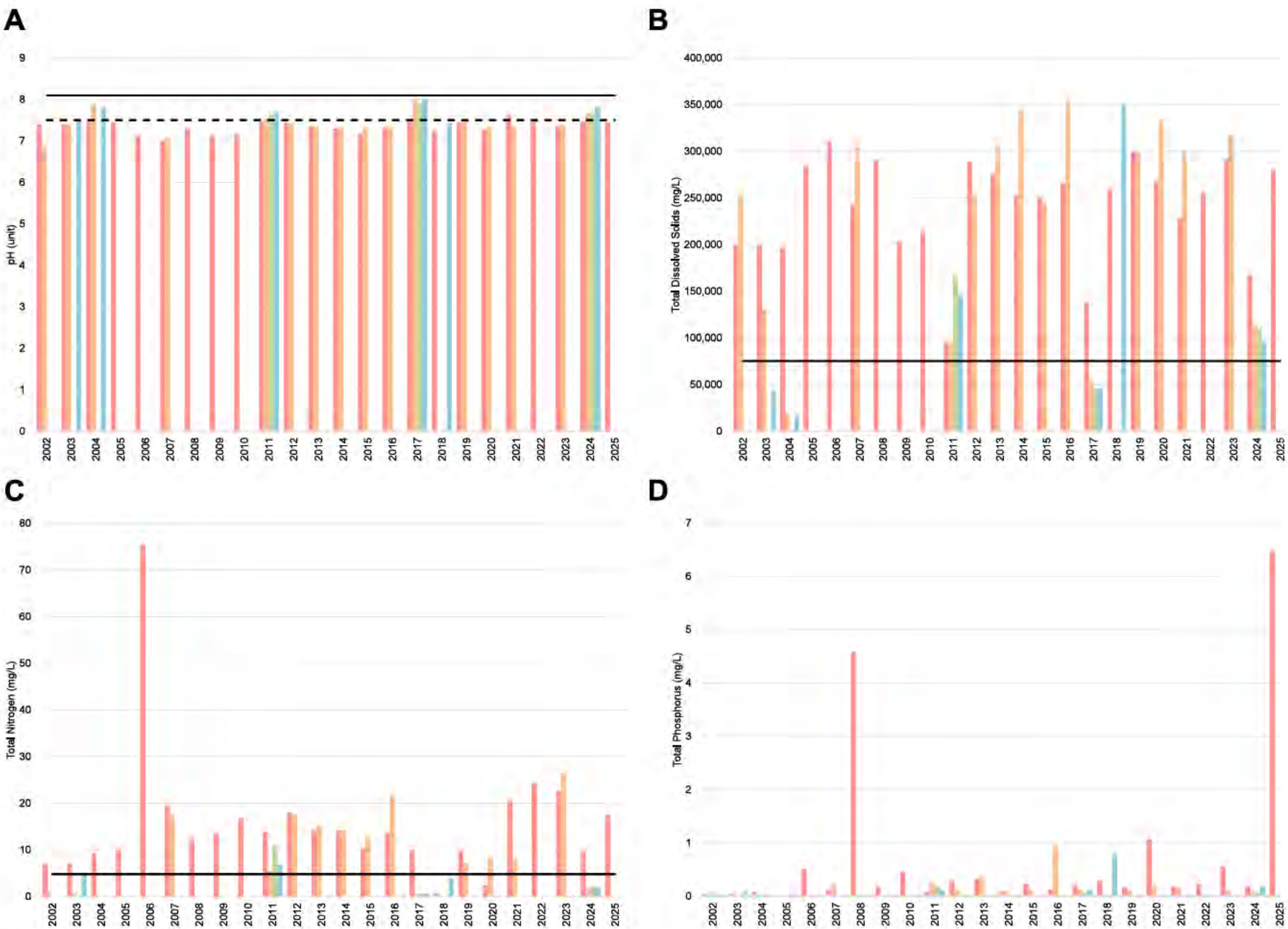


Figure 4-6: Annual average surface water quality parameters recorded at the discharge outfall ( ), discharge ( ), historic discharge ( ) and control ( ) sites over time, compared to the Lake Carey CSRs 20th percentile (- -) for pH and 80th percentile (—) where available; (A) pH, (B) total dissolved solids, (C) total nitrogen, and (D) total phosphorous.

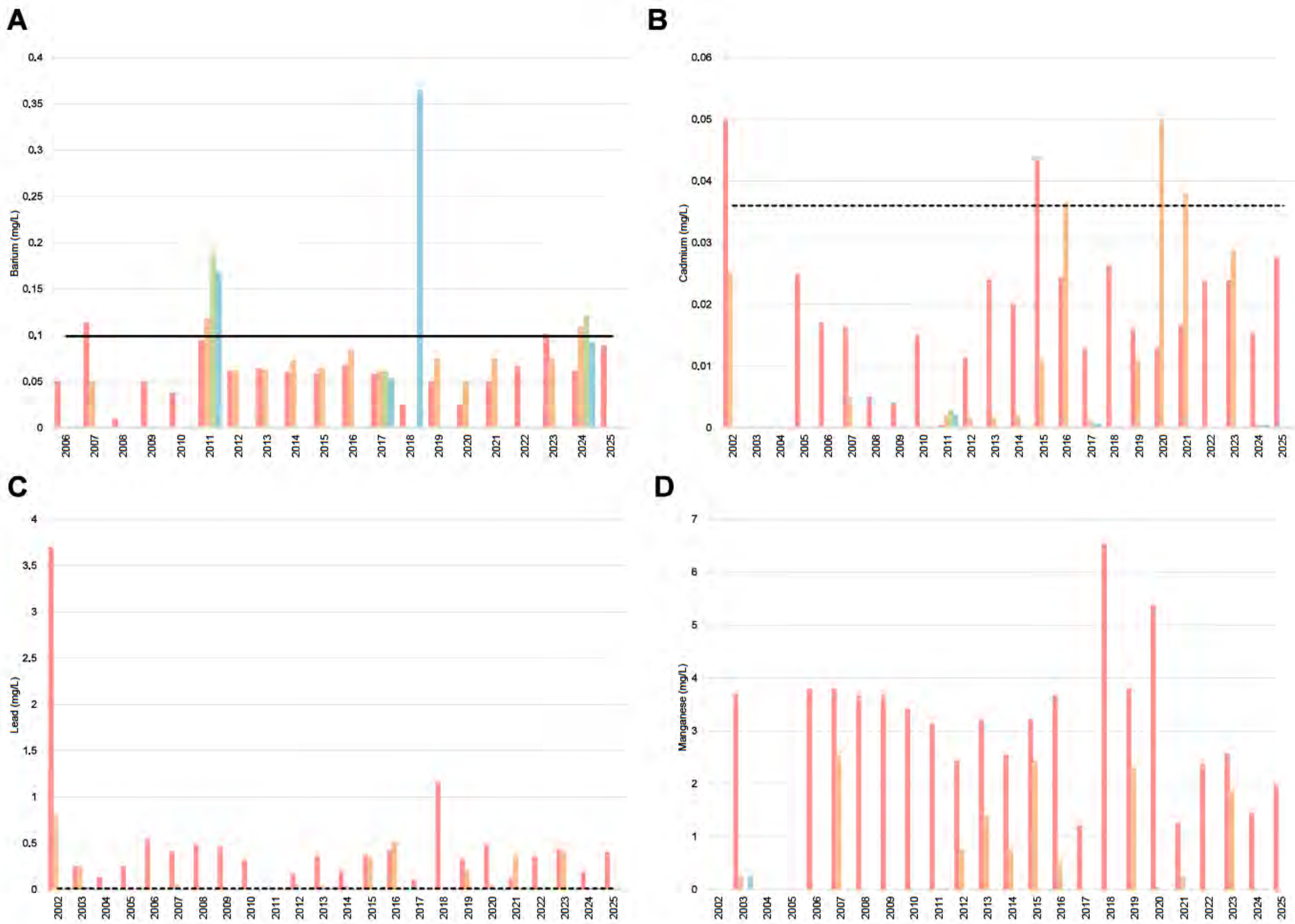
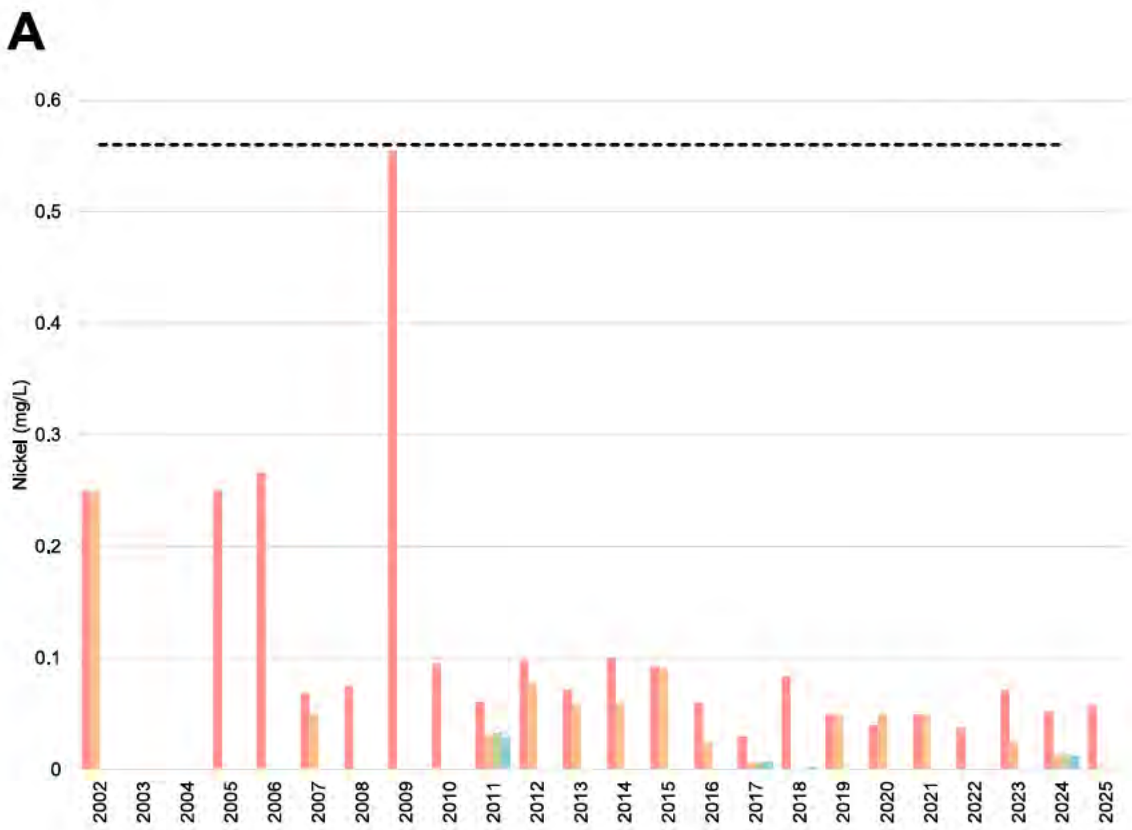


Figure 4-7: Annual average surface water quality parameters recorded at the discharge outfall (■), discharge (■), historic discharge (■) and control (■) sites over time, compared to the Lake Carey CSRs 80th percentile (—) and ANZG (2018) DGV for protection of 80% of species in marine water (- -), where available; (A) barium, (B) cadmium, (C) lead, and (D) manganese.



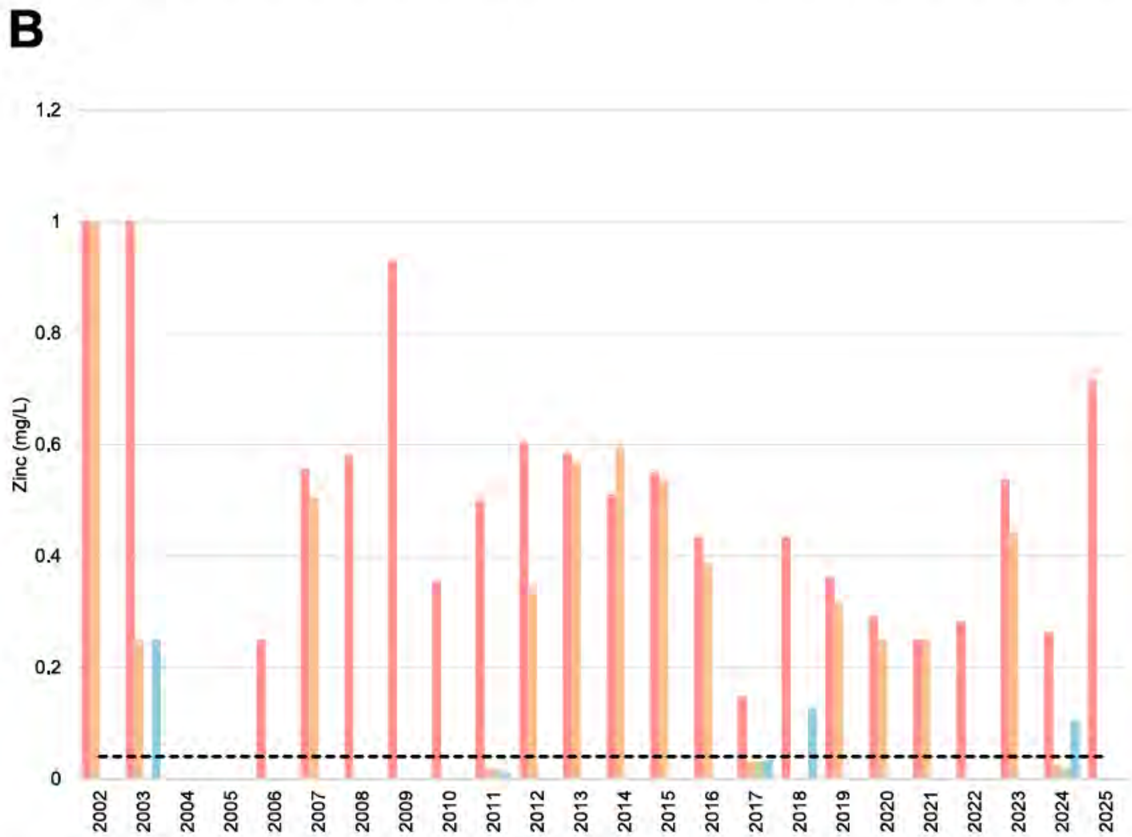


Figure 4-8: Annual average surface water quality parameters recorded at the discharge outfall (■), discharge (■), historic discharge (■) and control (■) sites over time, compared to the Waer Quality Australia DGV for the protection of 80% of species in marine water (- -); (A) nickel, and (B) zinc.

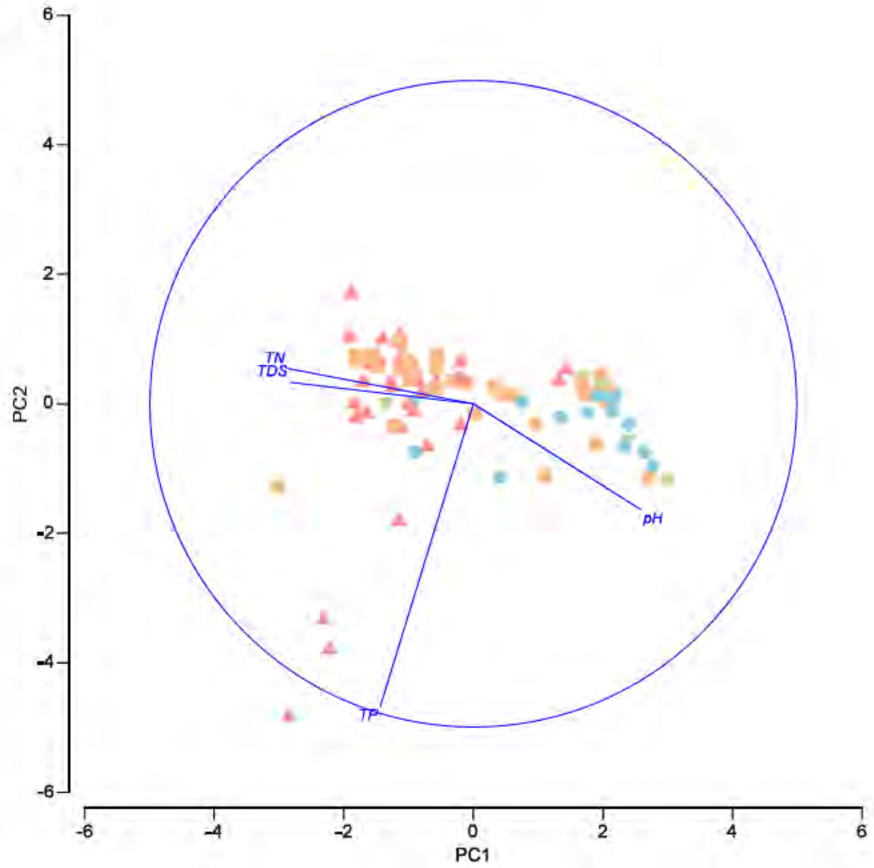


Figure 4-9: PCA of basic water quality at Lake Carey between 2007 and 2025, separated by site classification (discharge outfall, discharge, historic discharge, control). A total of 84.2% of variation in the data was explained by the first two axes.

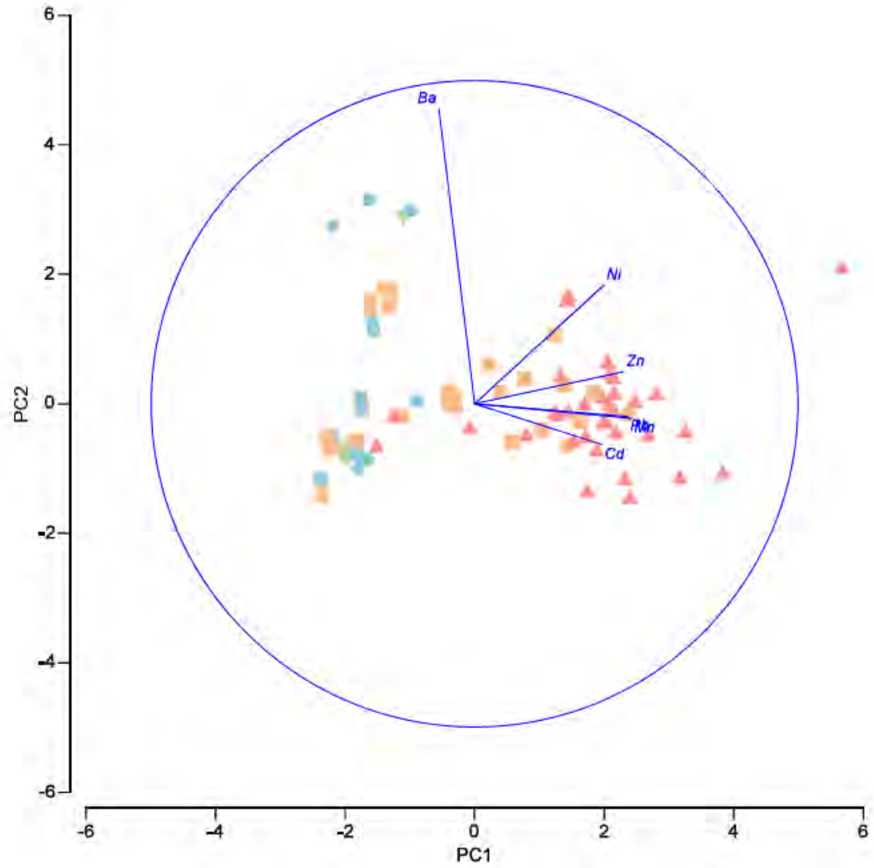


Figure 4-10: PCA of metals and trace elemnts in surface water at Lake Carey between 2007 and 2025, separated by site classification (discharge outfall, discharge, historic discharge, control). A total of 79.4% of variation in the data was explained by the first two axes.

4.2.2 Sediment Quality

During the 2025 Program, sediment pH was classified as moderately alkaline (Hazelton and Murphy 2007), ranging from 7.8 to 8.4 across both surveys (**Table 4-4**, **Table 4-5**). The pH of sediment was mostly below the Lake Carey CSR 80th percentile (8.2), with the exception of the discharge outfall SDDIS (8.3) and discharge site SDS2 (8.4) in June, evident in the PCA (**Figure 4-14**). The results of the 2025 Program were generally consistent with historical monitoring data, with sediment pH typically above 7.5 (**Figure 4-11A**). Recent exceptions included 2015 to 2018, where a declining trend was observed in pH (**Figure 4-11A**). Regardless, the one-way ANOVA results of sediment pH over time found there was no significant difference between discharge and control sites ($p>0.05$) (**Appendix G**). Changes in the hydroperiod, microbial activity, redox reactions, and fluctuations in the concentrations of carbonate and organic matter are typically responsible for variations in sediment pH over time (Commander 1999; Ponnamperuma 1972).

Sediment salinity (total soluble salts) ranged from 55,900 mg/kg (control site SDN2) to 114,000 mg/kg (discharge outfall SDDIS) in June (**Table 4-4**). In September, sediment salinity was marginally lower, ranging from 35,000 mg/kg (control site SND1) to 112,000 mg/kg (discharge site SDS1) (**Table 4-5**). Sediment salinity exceeded the Lake Carey CSR 80th percentile (101,600 mg/kg) at the discharge outfall (SDIS) and discharge sites SDS1 and SDS2, shown in the PCA (**Figure 4-14**), and consistent with temporal trends (**Figure 4-11B**). More broadly however, the salinity across the sites increased during the 2025 Program, following a decrease during the 2024 major flood event (**Figure 4-11B**). This trend was also evident after flooding in 2011 and 2017, with the influx of freshwater causing the salt crust to dissipate (Outback Ecology and *actis* Environmental Services 2013). However, the accumulation and or subsequent dispersal and distribution of salts on the surface of Lake Carey in response to flooding and drying, and dewatering discharge, remains a key knowledge gap (Outback Ecology and *actis* Environmental Services 2013).

In June, the concentration of ions reflected sediment salinity, and were typically consistent across discharge and control sites (**Table 4-4**, **Table 4-5**). The concentrations of anions and cations in the sediment during the 2025 Program mostly followed $Cl>SO_4>HCO_3$ and Na>Ca>Mg>K respectively (**Table 4-4**, **Table 4-5**), with the exception of cations at control site SDN2 in June (Na>Ca>K>Mg), and was consistent with previous surveys conducted during dry conditions (Stantec 2025a). This also aligns with the dominance of major anions and cations in Australian inland waters, although minor constituents, such as calcium and potassium are often interchangeable (Reddy and DeLaune 2008). There were several exceedances of the Lake Carey CSR 80th percentiles, reflecting increased salinities, with concentrations decreasing during the September survey (**Table 4-4**, **Table 4-5**).

During the 2025 Program, total nitrogen and total phosphorus concentrations ranged from 270 mg/kg to 1,190 mg/kg and 95 mg/kg to 239 mg/kg, respectively in June (**Table 4-4**), and 130 mg/kg to 660 mg/kg and 83 mg/kg to 162 mg/kg, respectively in September (**Table 4-5**). Total nitrogen exceeded the Lake Carey CSR 80th percentile at discharge site SDS1 (1,190 mg/kg) and control site SDN4 (800 mg/kg) in June and discharge site SDS2 (660 mg/kg) in September, whereas total phosphorus was elevated at control site SDN1 (239 mg/kg) and SDN4 (246 mg/kg) in June, which was evident in the PCA (**Figure 4-14**). The results of the 2025 Program were consistent with trends over time, with control sites characterised by significantly ($p<0.05$) higher total phosphorus compared to discharge sites (**Appendix G**), a trend demonstrated in the PCA (**Figure 4-16**).

The concentrations of several metals and trace elements (beryllium, cadmium, mercury, and selenium) were below analytical detection limits across most sites during the June and September surveys (**Table 4-4**, **Table 4-5**), largely consistent with historical results (Outback Ecology 2012a; Stantec 2018; 2025a). However, there were numerous exceedances of the ANZG (2018) DGV and/or Lake Carey CSR 80th percentiles, including:

- Aluminium – maximum of 12,600 mg/kg at control site SDN4 in June, more than 1.2x the 80th percentile;
- Arsenic – maximum of 36 mg/kg at discharge outfall SDDIS in June, 1.8x the ANZG (2018) DGV;
- Chromium – maximum of 126 mg/kg at control site SDN4 in June, more than 1.5x the ANZG (2018) DGV and marginally above the 80th percentile;
- Copper – maximum of 33 mg/kg at discharge outfall SDDIS in June, slightly exceeding the 80th percentile;
- Iron – maximum of 44,300 mg/kg at control site SDN4 in June, slightly exceeding the 80th percentile;
- Lead – maximum of 23 mg/kg at discharge sites SDS1 and SDS2 in June, more than 2.8x the 80th percentile;
- Manganese – maximum of 743 mg/kg at discharge outfall SDDIS in June, more than 2.4x the 80th percentile;

- Nickel – maximum of 40 mg/kg at control site SDN4 in June, 1.9x times the ANZG (2018) DGV and more than 1.3x the 80th percentile;
- Silicon – maximum of 23 mg/kg at control site SDN4 in June, slightly exceeding the 80th percentile; and
- Zinc – maximum of 66 mg/kg at discharge outfall SDDIS in June, more than 2.2x the 80th percentile.

The majority of exceedances occurred during the June survey, also demonstrated in the PCA (**Figure 4-15**). Lower concentrations of metals in September may be related to above average rainfall in August. The maximum concentrations of most metals were predominately recorded from the discharge outfall (SDDIS) or discharge sites (SDS1 and SDS4), likely attributed to the characteristics of the discharge water. In contrast, the control sites (SDN1, SDN2 and SDN4) exhibited higher levels of aluminium, chromium, iron and nickel. However, there were no exceedances of the ANZG (2018) GV-High trigger values in sediment, suggesting limited toxicity potential to aquatic biota.

Over time, the discharge outfall and discharge sites have been characterised by higher concentrations of metals, including cadmium, lead, manganese and zinc (**Figure 4-13A**, **B**, **D**), with average manganese concentrations significantly higher at discharge sites compared to control sites, supported by ANOVA testing (**Appendix G**). In contrast, aluminium, chromium, iron and vanadium have been significantly higher at control sites over time ($p<0.005$), also demonstrated in the PCA (**Figure 4-17**), and likely reflects natural mineralisation. Regardless, there are no clear trends to indicate that metals are accumulating in the sediment, with fluctuations known to occur at discharge sites and control sites over time (**Figure 4-12, Figure 4-13**).

Table 4-4: Sediment quality parameters recorded form Lake Carey in June during the 2025 Program.

	Sediment Quality Parameters	DO	D			HD	C			Lake Carey CSRs			ANZG (2018)	
		SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4	20th%tile	80th%tile	# Records	DGV	GV-High
Basic	pH (pH Unit)	8.3	8.2	8.4	8.2	8	8.1	8	7.8	7.5	8.2	485	-	-
	Total Soluble Salts	105,000	114,000	63,900	79,600	79,200	70,000	55,900	96,600	32,280	101,600	503	-	-
	Moisture Content (%)	37.5	36	28.9	23.3	22.4	26	29.6	24.1	13.12	24.88	482	-	
Cations and Anions	Sodium	44,500	41,800	31,300	26,200	18,100	25,400	17,800	29,600	8,422	35,600	308	-	-
	Calcium	8,640	8,270	7,320	6,450	5,400	6,740	5,810	6,410	3,790	6,040	307	-	-
	Magnesium	3,570	3,960	2,270	1,930	1,140	1,470	920	2,520	506	2,990	301	-	-
	Potassium	1,940	1,950	1,410	1,180	850	1,230	980	1,440	314	1,136	304	-	-
	Chloride	109,000	114,000	55,900	52,400	44,500	46,400	42,200	65,200	12,400	55,780	303	-	-
	Sulfate	34,100	33,900	26,700	24,000	19,200	23,800	20,200	26,700	12,200	24,600	297	-	-
	Bicarbonate	156	213	128	104	66	104	84	167	7	51	246	-	-
	Total Alkalinity	156	213	128	104	66	104	84	167	7	50	227	-	-
	Carbonate	5	5	5	5	5	5	5	5	-	-	-	-	-
Nutrients	Total Nitrogen	410	1,190	420	370	270	270	360	800	100	440	471	-	-
	Total Phosphorus	150	159	95	96	129	239	174	246	60	220	481	-	-
	Total Organic Carbon (%)	0.58	0.77	0.44	0.22	0.2	0.25	0.37	0.55	0.09	0.8	377	-	-
	Total Kjeldahl Nitrogen	400	1,190	420	370	270	270	360	800	100	400	366	-	-
	Nitrate	4.5	0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	-	-	-	-	-
	Nitrite	1.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
	Nitrite + Nitrate	6.4	0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	0.05	1.9	357	-	-
Metals and Trace Elements	Aluminium	5,170	4,840	4,190	3,280	3,900	8,200	9,110	12,600	3,480	10,600	252	-	-
	Arsenic	**36**	15	11	6	<5	<5	<5	6	-	-	-	20	70
	Barium	20	10	<10	10	<10	20	10	40	10	50	375	-	-
	Beryllium	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-
	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	2	10
	Chromium	45	48	45	60	40	63	65	126	50	120	392	80	370
	Cobalt	9	7	7	3	3	5	6	9	3	11	395	-	-
	Copper	33	16	16	9	12	16	19	25	7	29	391	65	270
	Iron	13,000	13,600	11,700	12,700	11,200	20,000	23,600	44,300	12,300	39,500	305	-	-
	Lead	19	23	23	15	<5	6	6	10	<5	8	396	50	220
	Manganese	743	596	552	83	92	153	228	250	70	306	384	-	-
	Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	0.15	1
	Nickel	**36**	**22**	21	13	11	19	**22**	**40**	9	29	377	21	52
	Selenium	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-	-	-
	Silicon	10	7	7	6	8	12	11	12	9	22	124	-	-
	Vanadium	21	27	26	28	25	42	50	74	36	103	384	-	-
	Zinc	66	33	33	18	11	20	22	34	7	29	396	200	410

Note: All units in mg/kg unless otherwise stated; grey text indicates >25% records below the level of analytical detection; red shading indicates value exceeded 80th percentile of the Lake Carey CSRs and bold text denotes value exceeded the ANZG (2018) DGV.

Table 4-5: Sediment quality parameters recorded from Lake Carey in September during the 2025 Program.

Sediment Quality Parameters		DO	D			HD	C			Lake Carey CSRs			ANZG (2018)	
		SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4	20th%tile	80th%tile	# Records	DGV	GV-High
Basic	pH (pH Unit)	8.2	7.9	8.2	8	7.8	8	7.9	7.8	7.5	8.2	485	-	-
	Total Soluble Salts	92,300	102,000	112,000	82,700	64,400	35,000	58,900	84,000	32,280	101,600	503	-	-
	Moisture Content (%)	22.4	28.5	29.1	20.1	16.2	20.8	22.9	27.2	13.12	24.88	482	-	
Cations and Anions	Sodium	33,800	38,500	47,800	25,400	17,900	10,300	17,700	37,500	8,422	35,600	308	-	-
	Calcium	6,350	6,590	7,650	5,840	5,380	5,030	5,580	7,050	3,790	6,040	307	-	-
	Magnesium	2,360	3,040	2,850	1,400	1,530	570	960	2,330	506	2,990	301	-	-
	Potassium	1,210	1,460	1,700	840	780	390	760	1,600	314	1,136	304	-	-
	Chloride	60,600	70,800	86,900	44,100	34,900	17,600	32,400	62,200	12,400	55,780	303	-	-
	Sulfate	24,600	28,700	29,600	20,400	19,100	16,300	19,300	26,700	12,200	24,600	297	-	-
	Bicarbonate	78	43	111	55	19	27	121	53	7	51	246	-	-
	Total Alkalinity	78	43	111	55	19	27	121	53	7	50	227	-	-
	Carbonate	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-	-	-
Nutrients	Total Nitrogen	270	270	660	230	130	100	160	360	100	440	471	-	-
	Total Phosphorus	83	162	117	93	140	113	124	144	60	220	481	-	-
	Total Organic Carbon (%)	0.21	0.23	0.55	0.16	0.1	0.09	0.19	0.34	0.09	0.8	377	-	-
	Total Kjeldahl Nitrogen	270	270	660	230	130	100	160	360	100	400	366	-	-
	Nitrate	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	-	-	-	-	-
	Nitrite	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-
	Nitrite + Nitrate	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	0.05	1.9	357	-	-
Metals and Trace Elements	Aluminium	6,010	7,420	3,720	3,650	7,300	5,110	6,580	5,370	3,480	10,600	252	-	-
	Arsenic	<5	8	8	16	<5	<5	<5	<5	-	-	-	20	70
	Barium	10	20	<10	20	20	<10	10	<10	10	50	375	-	-
	Beryllium	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-
	Cadmium	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	2	10
	Chromium	69	99	39	61	78	33	53	42	50	120	392	80	370
	Cobalt	4	8	6	4	5	3	4	4	3	11	395	-	-
	Copper	13	24	11	18	18	9	14	11	7	29	391	65	270
	Iron	18,200	20,200	8,910	14,900	22,000	11,300	17,200	14,700	12,300	39,500	305	-	-
	Lead	8	21	15	12	<5	<5	<5	<5	<5	8	398	50	220
	Manganese	135	167	67	226	365	83	75	188	70	306	384	-	-
	Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	0.15	1
	Nickel	15	29	18	19	20	10	15	12	9	29	377	21	52
	Selenium	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-	-	-
	Silicon	4	8	6	7	14	4	7	23	9	22	124	-	-
	Vanadium	37	61	21	29	46	24	36	28	36	103	384	-	-
	Zinc	16	38	31	33	19	11	14	12	7	29	396	200	410

Note: All units in mg/kg unless otherwise stated; grey text indicates >25% records below the level of analytical detection; red shading indicates value exceeded 80th percentile of the Lake Carey CSRs and bold text denotes value exceeded the ANZG (2018) DGV.

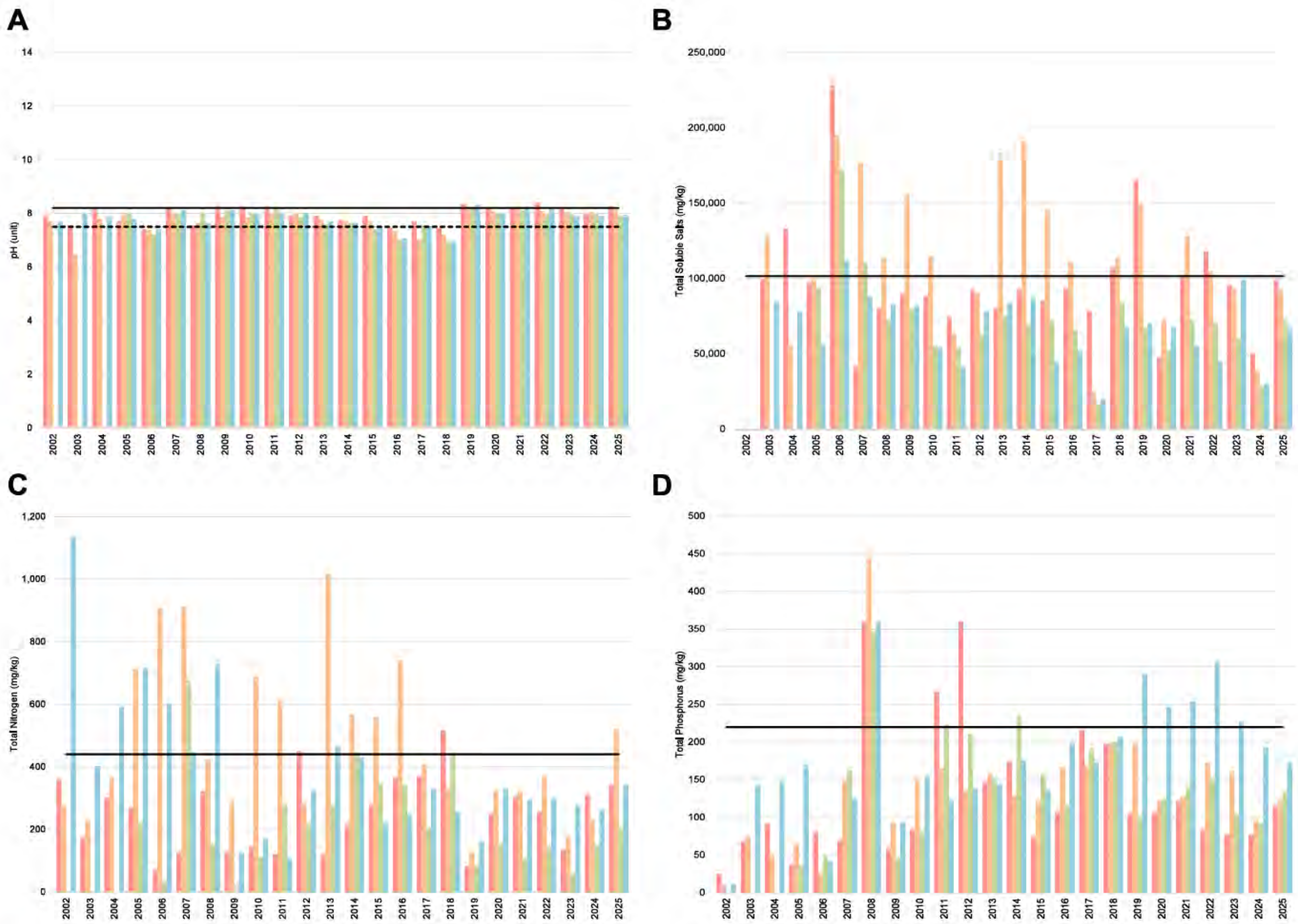


Figure 4-11: Annual average sediment quality parameters recorded at discharge outfall (■), discharge (■), historic discharge (■) and control (■) sites over time, compared to the 20th (- -) and 80th percentiles (—) of the Lake Carey CSRs; (A) pH, (B) total soluble salts, (C) total nitrogen, and (D) total phosphorus.

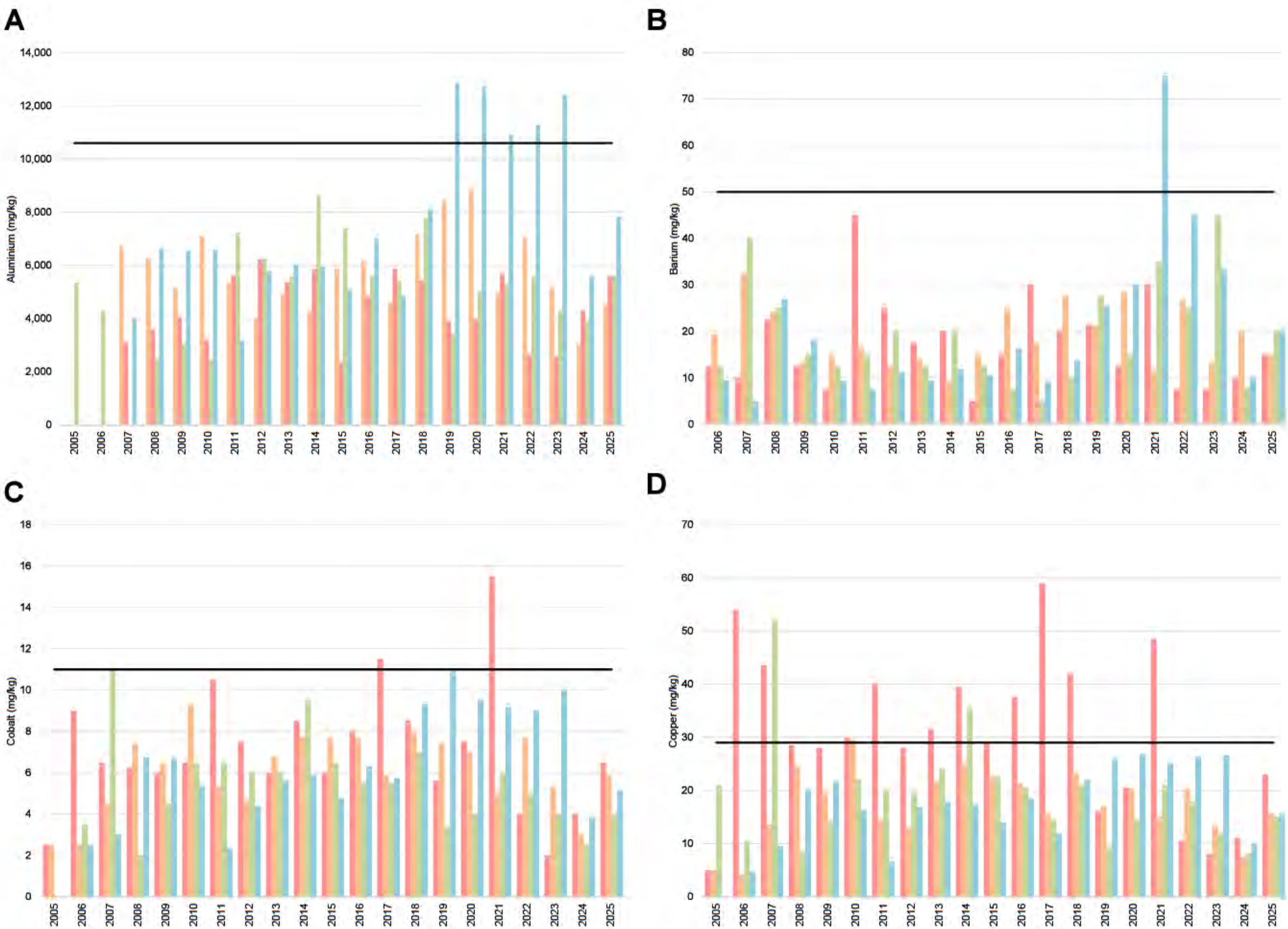


Figure 4-12: Annual average sediment concentrations for (A) aluminium, (B) barium, (C) cobalt, (D) copper, recorded at discharge outfall (■), discharge (■), historic discharge (■) and control (■) sites over time, compared to the 80th percentiles (—) of the Lake Carey CSR.

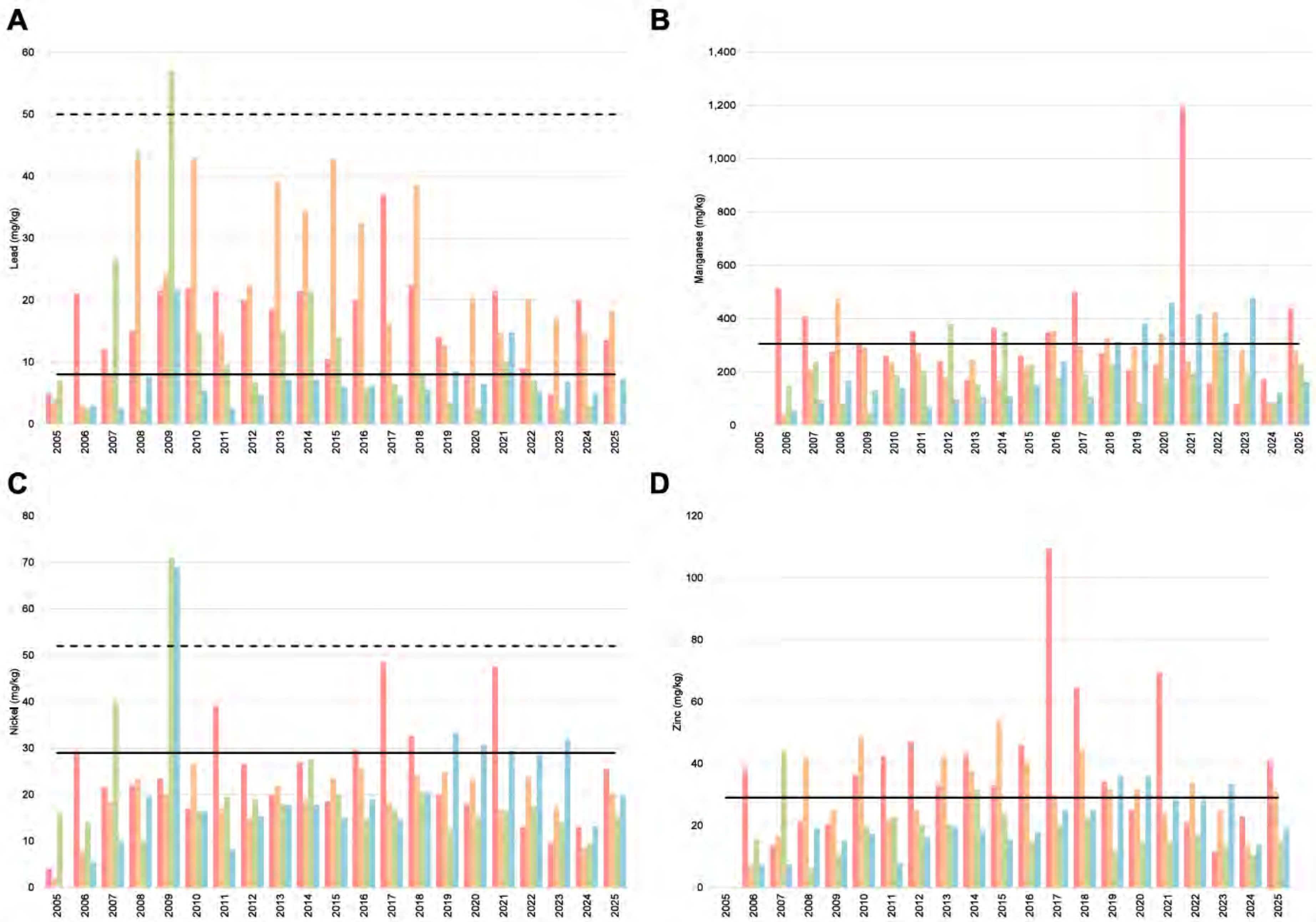


Figure 4-13: Annual average sediment concentrations for (A) lead, (B) manganese, (C) nickel, and (D) zinc, recorded at discharge outfall (■), discharge (■), historic discharge (■) and control (■) sites over time, compared to the 80th percentiles (—) of the Lake Carey CSRs and the (ANZG 2018) DGV (- -.).

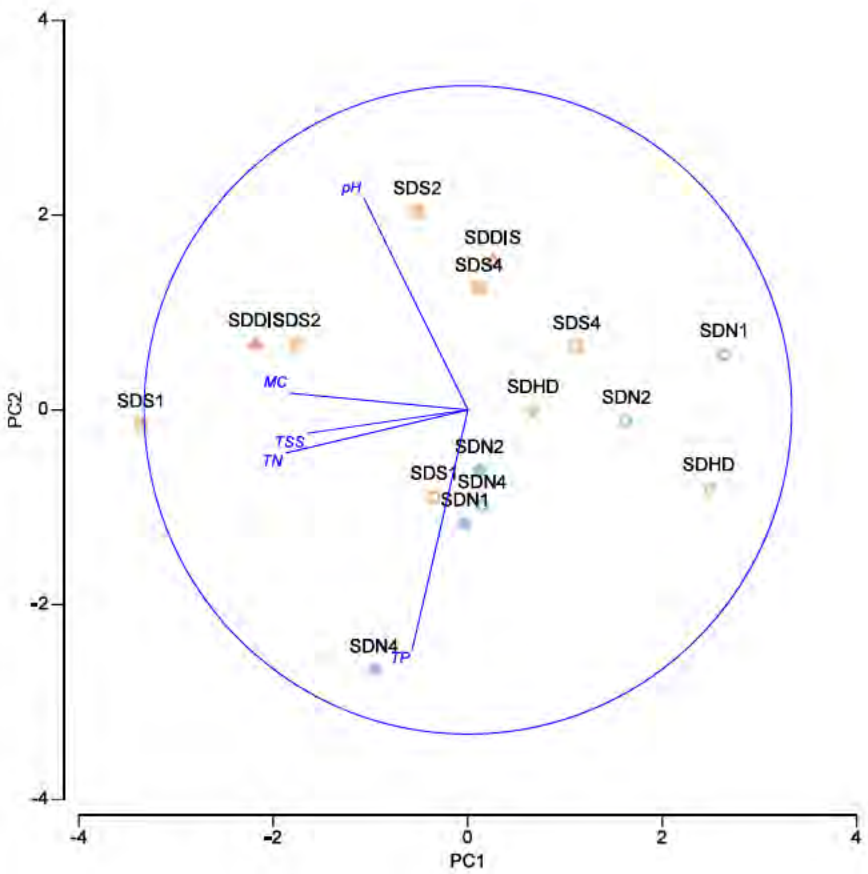


Figure 4-14: PCA of basic sediment quality parameters from Lake Carey during the 2025 Program, separated by June (solid fill) and September (outline only). A total of 78.7% of variation in the data was explained by the first two axes. (discharge outfall , discharge, historic discharge, control).

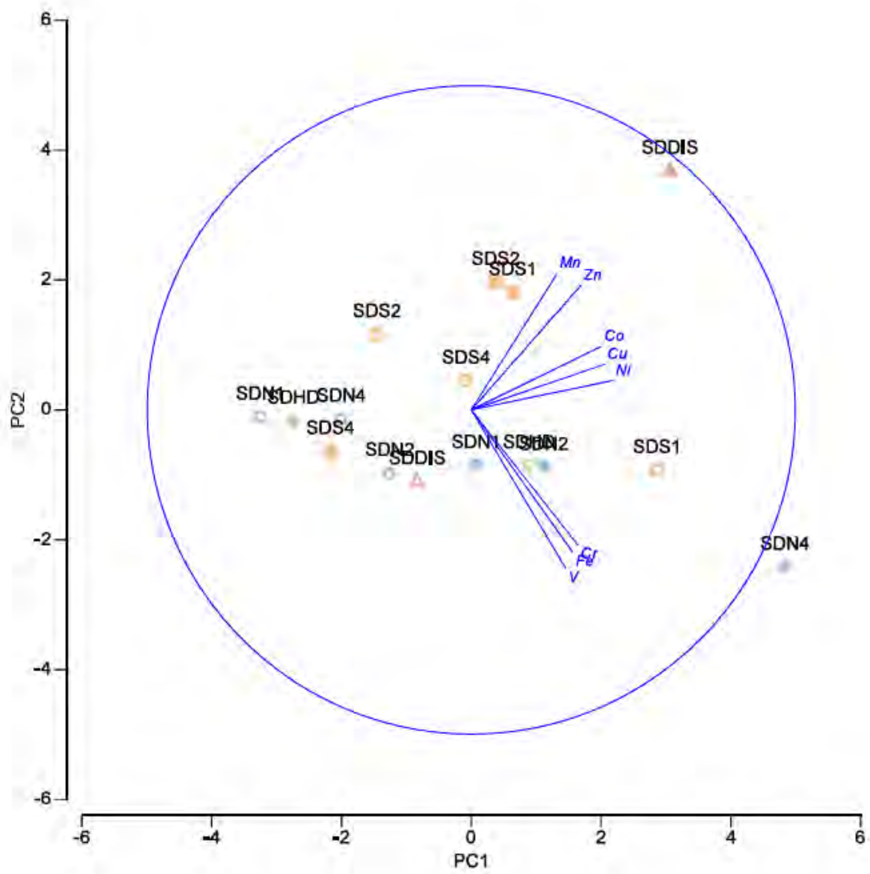


Figure 4-15: PCA of metal concentrations from Lake Carey during the 2025 Program, separated by June (solid fill) and September (outline only). A total of 90.5% of variation in the data was explained by the first two axes (discharge outfall, discharge, historic discharge, control).

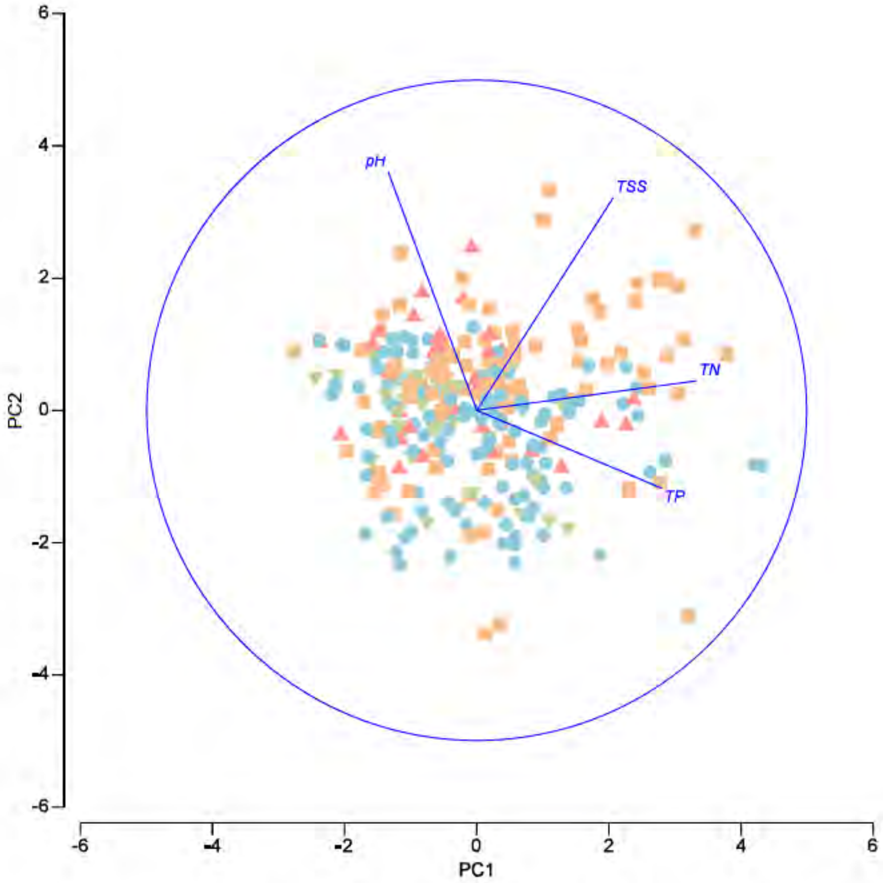


Figure 4-16: PCA of basic sediment quality at Lake Carey between 2007 and 2025, separated by site classification (▲ discharge outfall, ■ discharge, ▼ historic discharge, ● control). A total of 67.9% of variation in the data was explained by the first two axes.

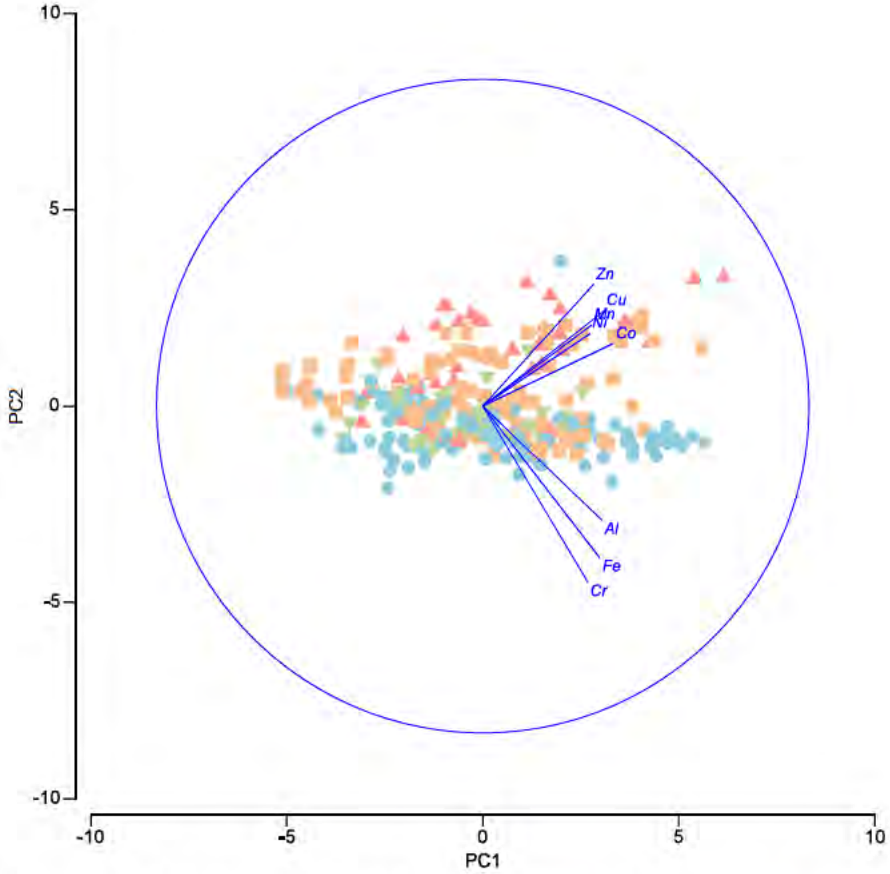


Figure 4-17: PCA of sediment metal concentrations at Lake Carey between 2007 and 2025, separated by site classification (▲ discharge outfall, ■ discharge, ▼ historic discharge, ● control). A total of 85.9% of variation in the data was explained by the first two axes.

4.2.3 Diatoms

During the 2025 Program, a total of nine diatom taxa were identified from the sediments of Lake Carey, with diversity comparable between June (nine taxa) and September (seven taxa) surveys (**Table 4-6**). The most speciose genera were *Navicula* (three taxa), which together with *Hantzschia* and *Amphora* representatives were widespread in both surveys (**Figure 4-18**). These genera are associated with common salt lake diatom taxa, considered indicative of salt lakes throughout Western Australia (Campagna 2007; Taukulis 2007).

Control site SDN1 was the most diverse site in June 2025, with eight taxa recorded, and was also comparatively diverse in September 2025 (five taxa), along with discharge site SDS1 (five taxa) (**Figure 4-19**). These sites had elevated phosphorous concentrations in the lake sediments, a key nutrient known to promote diatom growth and development (Battarbee *et al.* 2001). In contrast, diatoms were absent from two sites including discharge site SDS2 (June 2025) and discharge outfall SDDIS (September 2025). The latter also had low productivity in June 2025, with only five frustules of *Luticola mutica* recorded (**Table 4-6**). Historically, in dry conditions, the discharge outfall has a characteristically depauperate diatom population, attributed to the elevated salinity of the discharge water (Stantec 2021). In addition, the few diatoms that have been recorded from this site over time typically belong to the *Luticola* or *Hantzschia* genera, associated with eroded sediments (John 2000).

The most abundant taxon in both surveys was *Navicula* sp. aff. *incertata*, followed by *Hantzschia* sp. aff. *baltica* and *Navicula* sp. aff. *salinicola*. *Navicula* sp. aff. *incertata* and *Hantzschia* sp. aff. *baltica* were also the most widespread diatoms and were recorded from most sites in both surveys of the 2025 Program (**Figure 4-20**). In the June 2025 survey, *Navicella pusilla* and *Amphora coffeaeformis* were also relatively common (**Figure 4-20**). All of these diatom species are common saline taxa, known to persist in surface water salinities above 100,000 mg/L in lakes and rivers throughout Western Australia (Taukulis 2007).

The sites that supported the most diatoms (maximum 100 frustules) during the 2025 Program comprised the historical discharge site SDHD, and control sites SDN1 and SDN2 in June, and discharge sites SDS1, SDS2 and control site SDN1 in September (**Table 4-6**). These sites also supported similar dominant taxa, contributing to more than 40% similarity in composition (**Figure 4-21**), dominated by *Navicula* sp. aff. *incertata* and *Hantzschia* sp. aff. *baltica*. The latter is also commonly associated with exposed lake sediments (John 2000). In addition, under dry conditions, the microtopography of lake sediments can be an influential factor on the distribution of diatoms; specifically mineral composition and particle size are key factors that contribute to spatial heterogeneity (Krejci and Lowe 1986).

Since 2002, a total of 54 diatom taxa have been recorded from the Lake Carey sediments, in the vicinity of the SDGM (**Appendix H**). The control sites have been the most diverse over time, with 44 taxa recorded, with less taxa ,33 and 29 species, identified from the historical discharge and discharge sites respectively. In comparison, the discharge outfall (SDDIS) recorded only 21 species during the same period (**Table 4-7**). During major flood events, such as 2011, 2017 and most recently in 2024, diatom productivity substantially increased in the lake, in response to inundation, which leads to reduced salinity and increased nutrients in surface waters (Outback Ecology and *actis* Environmental Services 2013). In 2025 the lake re-entered the drying phase, corresponding to reduced diatom diversity and abundance, trends which have been observed after previous floods (Stantec 2018). However, diatom productivity in 2025 was still higher in comparison to the preceding dry years between 2020 and 2023 (Stantec 2022; 2023). While flooding temporarily mitigates the influence of the discharge, under dry conditions, hypersaline conditions prevail, adversely affecting diatoms in the sediments (Stantec 2021).

Table 4-6: Diversity of diatom taxa recorded from Lake Carey during the 2025 Program.

Diatom Taxa	Jun-25								Sep-25							
	DO	D			HD	C			DO	D			HD	C		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
Amphora coffeaeformis					37	10	4					1	13	11		
Hantzschia sp. aff. *baltica*		7		17	60	17	32			18	18		7	6	2	2
Luticola mutica	5					2										
Navicella pusilla				2		5	5			3	9			6		7
Navicula sp. aff. *incertata*		32		11	3	35	59	1		29	57	9	1	69		11
Navicula sp. aff. *salinicola*		5		2		28				47	16	2	1	8		
Nitzschia ovalis						2				3						
Pinnularia divergens						1										
Diversity	1	3	0	4	3	8	4	1	0	5	4	3	4	5	1	4
Abundance	5	44	0	32	100	100	100	1	0	100	100	12	22	100	2	20

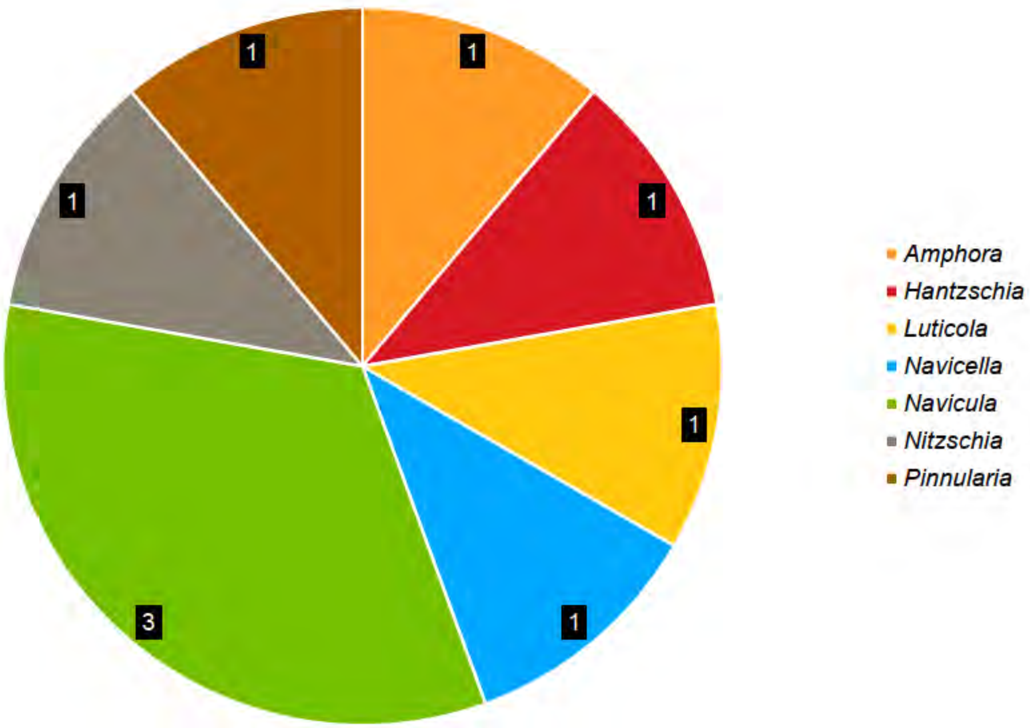


Figure 4-18: Diatom taxa per genus recorded at Lake Carey during the 2025 Program.

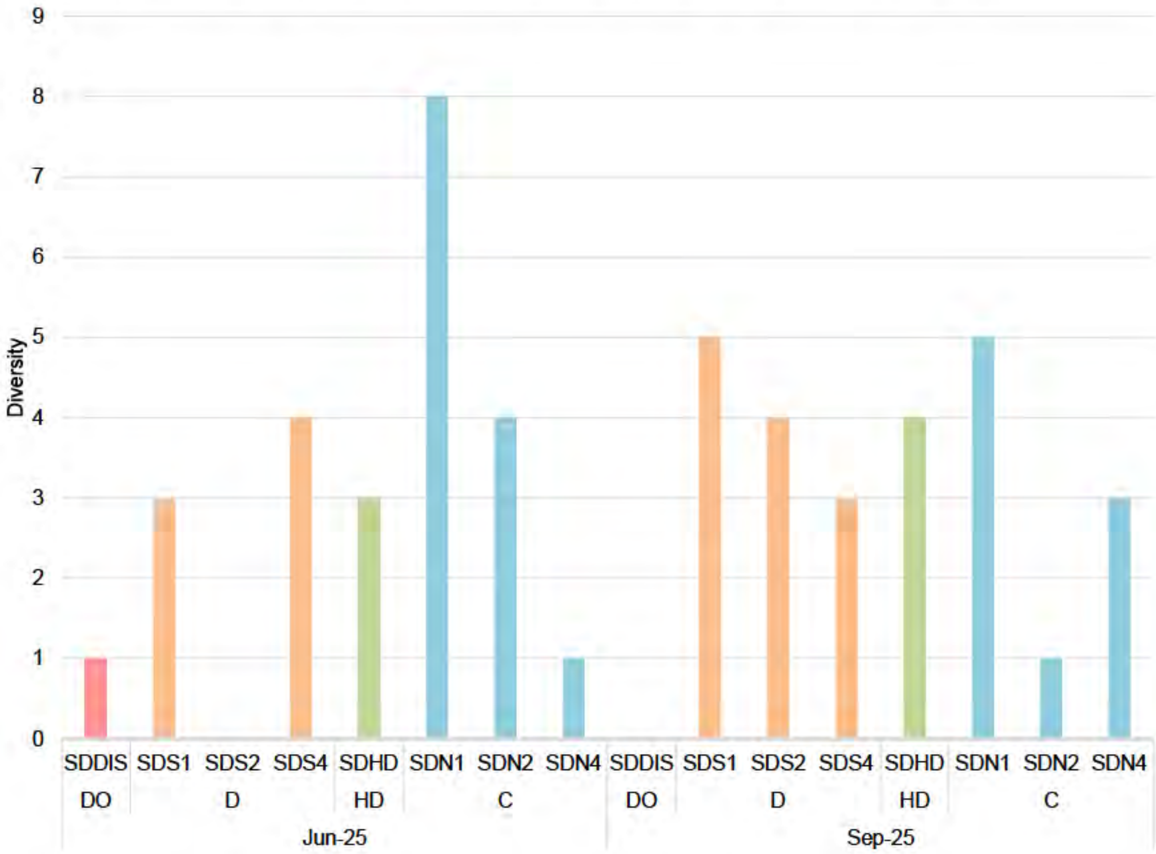


Figure 4-19: Diatom diversity by site recorded from Lake Carey during the 2025 Program.

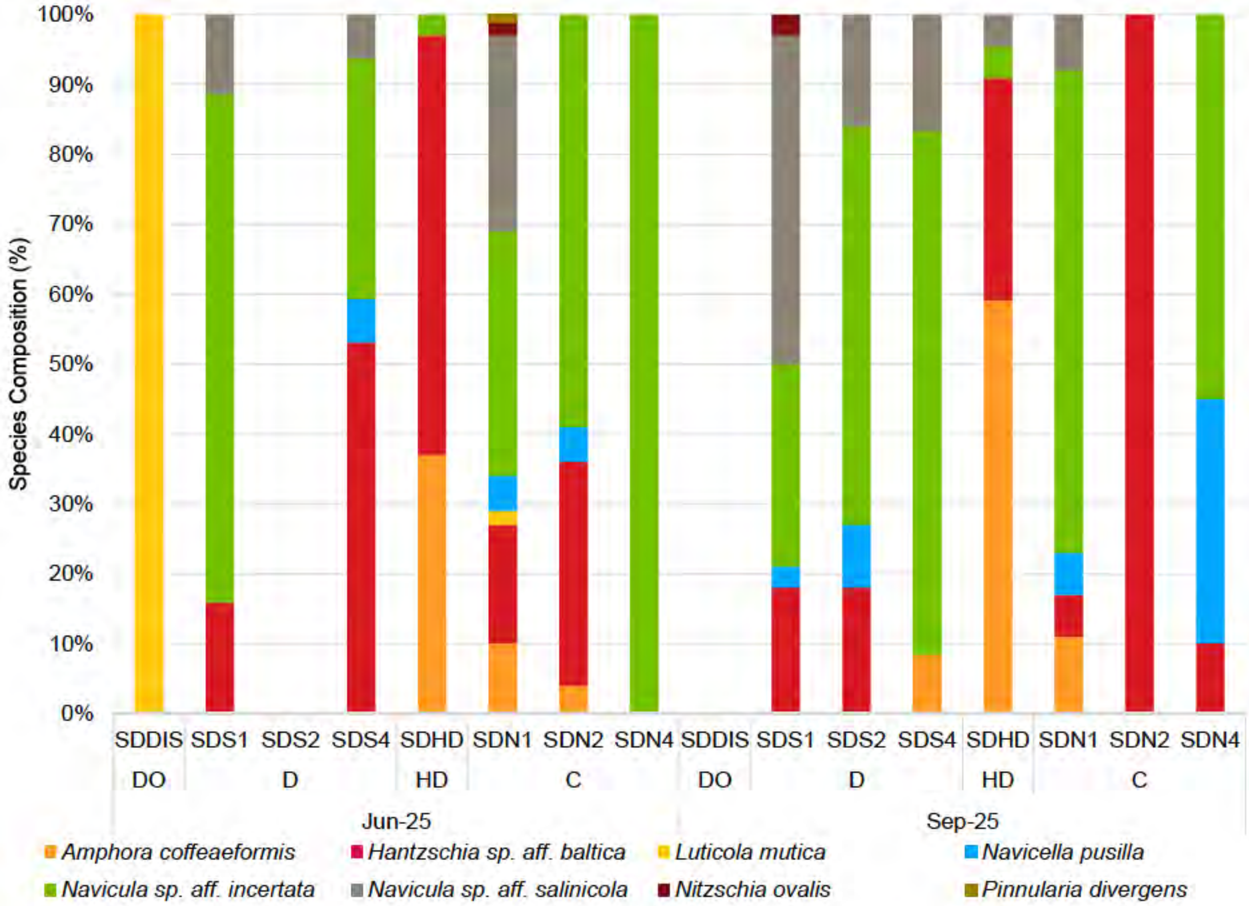


Figure 4-20 :Composition of the diatom taxa at Lake Carey during the 2025 Program.

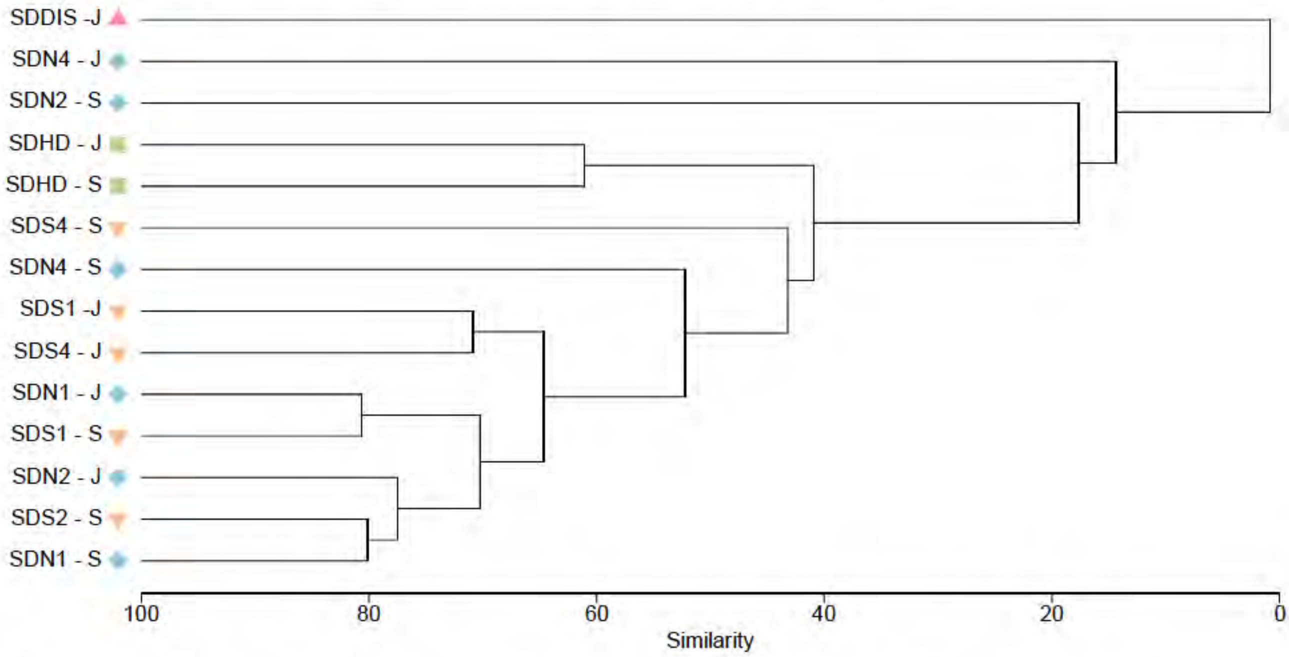


Figure 4-21: Dendrogram of diatom community structure at Lake Carey during the 2025 Program.

Table 4-7: Diatom species recorded from the discharge outfall since 2002.

Diatom Taxa	Discharge Outfall																							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Amphora coffeaeformis	●		●					●	●	●	●	●	●		●	●	●						●	
Amphora sp. aff. Luciae																							●	
Caloneis bacillum													●											
Entomoneis paludosa	●																							
Hantzschia amphioxys							●	●			●		●	●	●							●		
Hantzschia sp. aff. *baltica*			●		●			●		●	●	●	●	●	●	●	●	●		●	●		●	
Luticola mutica							●	●	●	●	●	●	●		●	●	●				●	●	●	●
Navicella pusilla	●		●		●						●					●								
Navicula cryptocephala											●												●	
Navicula elegans									●															
Navicula ergadensis				●																				
Navicula sp. aff. *incertata*	●		●	●				●	●	●	●	●	●	●	●	●	●				●		●	
Navicula sp. aff. *incertata* var.1																●								
Navicula sp. aff. *salinicola*										●			●		●	●							●	
Navicula tenelloides								●																
Nitzschia ovalis			●					●		●	●				●	●	●						●	
Nitzschia pellucida													●											
Nitzschia punctata	●		●		●																			
Nitzschia punctata forma *minor*																							●	
Pinnularia borealis						●	●						●	●										
Pinnularia sp. aff. *borealis*					●																			
Annual Diversity	5	0	6	2	4	1	3	7	4	6	8	4	9	4	7	8	5	1	0	0	3	2	9	1
Classification Diversity	21																							

Table 4-8: Diatom species recorded from the discharge sites since 2002.

Diatom Taxa	Discharge																							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Amphora coffeaeformis		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●
Amphora holsatica																●								
Amphora sp. aff *luciae*																							●	
Entomoneis paludosa					●												●						●	
Entomeis tenuistriata																●							●	
Hantzschia amphioxys									●			●									●	●	●	
Hantzschia sp. aff. *baltica*		●	●		●	●	●	●	●	●	●	●		●	●	●	●	●	●				●	●
Luticola mutica				●	●	●	●			●		●		●							●			
Navicella pusilla			●	●	●	●		●		●	●	●	●			●	●		●		●		●	●
Navicula cryptocephala			●																					
Navicula elegans					●		●					●												
Navicula recens																●								
Navicula sp. aff. *duerrenbergiana*																●								
Navicula sp. aff. *incertata*			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●
Navicula sp. aff. *incertata* var.1																●								
Navicula sp. aff. *salinicola*				●	●			●	●	●	●		●	●	●	●	●						●	●
Nitzschia frustulum				●																				
Nitzschia microcephala																							●	
Nitzschia nana																							●	
Nitzschia ovalis															●	●	●		●					●
Nitzschia palea																							●	
Nitzschia pellucida												●												
Nitzschia punctata				●	●	●	●	●		●				●										
Nitzschia punctata forma *minor*																							●	
Nitzschia sp. aff. *archibaldii*																●								
Nitzschia sp. A (LC2002)	●																							
Pinnularia borealis							●							●										
Pinnularia sp. aff. *viridis*																●								
Proschkinia sp. aff. *complanata*																●								
Annual Diversity	1	2	5	7	9	6	7	6	5	7	5	8	4	7	5	14	7	3	5	0	4	2	13	6
Classification Diversity	29																							

Table 4-9: Diatom species recorded from the historical discharge site since 2005.

Diatom Taxa	Historical Discharge																				
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Amphora coffeaeformis		●	●	●		●	●	●	●	●	●	●	●	●	●				●	●	●
Amphora holsatica																				●	
Amphora sp aff. luciae																				●	
Cocconeis placentula													●								
Entomoneis paludosa		●											●							●	
Entomeis tenuistriata																				●	
Hantzschia amphioxys									●	●	●	●		●						●	
Hantzschia sp. aff. *baltica*		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●		●	●
Hantzschia virgata													●								
Luticola cohnii														●							
Luticola mutica					●	●	●					●	●		●						
Navicella pusilla	●	●	●				●	●					●	●						●	
Navicula cincta																				●	
Navicula cryptocephala													●								
Navicula elegans			●						●		●										
Navicula sp. aff. *duerrenbergiana*													●								
Navicula sp. aff. *incertata*		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●
Navicula sp. aff. *incertata* var.1													●								
Navicula sp. aff. *salinicola*	●		●				●	●	●	●		●	●							●	●
Navicula tenelloides	●																				
Navicula tripunctata																				●	●
Nitzschia aff. palea																				●	
Nitzschia closterium																				●	
Nitzschia fontifuga													●								
Nitzschia frustulum							●														
Nitzschia ovalis							●					●									
Nitzschia palea													●								
Nitzschia pellucida									●		●	●								●	
Nitzschia punctata	●	●	●					●	●												
Nitzschia punctata forma *minor*													●							●	
Nitzschia sp. aff. *archibaldii*													●								
Pinnularia divergens																				●	
Pleurosigma salinarum																				●	
Annual Diversity	4	6	7	3	3	4	8	6	8	5	6	8	16	6	4	2	0	1	1	18	5
Classification Diversity	33																				

Table 4-10: Diatom species recorded from the control sites since 2002.

Diatom Taxa	Control																							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Amphora coffeaeformis	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Amphora sp. aff. *luciae*																							•	
Caloneis bacillum													•		•									
Cocconeis placentula																•	•							
Craticula cuspidata					•							•	•	•										
Cyclotella meneghiniana		•		•																				
Entomoneis paludosa			•								•	•			•								•	
Entomeis sp. aff. *paludosa*																•								
Entomeis tenuistriata																							•	
Hantzschia amphioxys				•	•		•	•	•			•	•		•		•			•	•	•	•	
Hantzschia sp. aff. *baltica*	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Hantzschia sp. aff. *virgata*																•								
Hantzschia virgata					•																		•	
Luticola cohnii													•		•									
Luticola mutica				•	•		•	•	•	•	•	•	•		•	•		•			•			•
Luticola nivalis								•	•				•		•			•						
Luticola sp. aff. *kotschyi*												•					•							
Navicella pusilla	•		•	•	•	•				•	•	•	•		•	•	•	•	•		•		•	
Navicula cryptocephala			•					•		•														
Navicula elegans			•	•	•	•			•		•	•	•	•			•							
Navicula ergadensis				•	•																			
Navicula sp. aff. *cryptotenella*											•													
Navicula sp. aff. *duerrenbergiana*																•								
Navicula sp. aff. *incertata*	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•
Navicula sp. aff. *salinicola*				•		•		•	•	•	•	•	•	•	•	•	•						•	•
Navicula sp. A (LC2005)													•				•							
Navicula tenelloides												•	•											
Navicula tripunctata																								•
Nitzschia closterium																							•	
Nitzschia epithemoides																							•	
Nitzschia fontifuga																•								
Nitzschia ovalis	•		•												•	•							•	
Nitzschia palea										•						•								
Nitzschia pellucida				•								•		•										
Nitzschia punctata	•		•	•	•	•	•							•				•	•		•			
Nitzschia punctata forma *minor*																•	•			•				
Nitzschia sp. aff. *agnita*																•								
Nitzschia sp. aff. *archibaldii*																•							•	
Nitzschia sp. aff. *rostellata*																•								
Nitzschia sp. B (LC2004)			•																					
Pinnularia sp. A (LC2006)					•																			
Pinnularia sp. aff. *borealis*																				•				
Pinnularia divergens																								•

Diatom Taxa	Control																							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Pleurosigma elongatum																●								
Annual Diversity	6	3	10	11	12	7	6	8	8	8	9	13	14	8	12	18	11	6	6	6	4	3	14	7
Classification Diversity	44																							

4.2.4 Resting Stages

During the 2025 Program, the resting stages of three crustacean groups, representing four taxa were recorded from the sediment of Lake Carey (**Table 4-11**,**Table 4-12**). All four taxa were recorded during the June and September surveys. The resting stages comprised eggs of ostracods (seed shrimp; red and white varieties), *Parartemia* (brine shrimp) and cladocerans (water flea). These groups are well-documented from inland waterbodies throughout the Goldfields region and are known to form a key component of the aquatic invertebrate assemblage of salt lakes during flooded conditions (Timms 2014; Timms *et al.* 2006).

Ostracod eggs were the most abundant and diverse group during the 2025 Program, with more than 6,000 and 1,000 eggs per 100 g of sediment recorded in the June and September surveys, respectively (**Table 4-11**,**Table 4-12**). They Ostracods were represented by two taxa; red and white varieties, with the latter the most abundant and widespread, being found at every site in both surveys. Ostracods are known to tolerate high salinity and are a dominant crustacean group at Lake Carey (De Deckker 1981; 1983; Halse 2002). Based on the results of the 2024 major flood, these taxa are likely to be either *Patcypris outback* or *Repandocypris austinensis*. The former is common to Lake Carey and occurs more broadly throughout the Goldfields (Halse and Martens 2019; Outback Ecology and *actis* Environmental Services 2013), persisting in salinities over 120,000 mg/L (Outback Ecology and *actis* Environmental Services 2013).

Eggs belonging to the brine shrimp *Parartermia*, occurred in comparatively low abundance, with a total of 726 eggs per 100 g of sieved sediment recorded (**Table 4-11**,**Table 4-12**). *Parartemia* sp. was widespread in 2025, identified at all sites during the June survey, and at four out of the eight sites in September. This species is likely to belong to *Parartemia bicorna*, which while currently only known from Lake Carey, is widespread and abundant in the lake when flooded and can tolerate salinities in excess of 100,000 mg/L (Timms *et al.* 2009). Cladoceran eggs were also recorded in low numbers (<250 eggs per 100 g of sieved sediment), although only from two sites during the June (discharge site SDS4 and control site SDN2) and September (control sites SDN2 and SDN4) surveys, respectively (**Table 4-11**,**Table 4-12**). These eggs likely represent *Moina baylyi*, common throughout inland waters including Lake Carey, and able to withstand salinities over 50,000 mg/L (Outback Ecology and *actis* Environmental Services 2013).

During the 2025 Program resting stage diversity was comparable between discharge and control sites (four taxa, each). However, resting stage abundance was substantially greater at the discharge sites, with more than 5,000 and 9,000 eggs per 100 g of sieved sediment recorded in the June and September surveys, respectively. In particular, discharge site SDS4 in June and September had the highest number of eggs (>3,400 and 7,100 eggs per 100 g of sieved sediment, respectively). Comparatively high numbers of resting stages (>1,000 eggs per 100 g of sieved sediment) were also recorded at control site SDN4, located within a small embayment. These trends are consistent with historical results in dry conditions (**Table 4-13**,**Table 4-14**), and most likely reflected the natural drainage patterns of the lake. Factors such as geomorphology, wind direction and water movement are known to influence the distribution of resting stages (Brendonck and De Meester 2003; Thiéry 1997; Vanickova *et al.* 2011), which often accumulate in embayments or depressions on large playas.

Since 2002, a total of 12 resting stage taxa have been recorded from the sediment of Lake Carey, in the vicinity of the SDGM (**Table 4-13**,**Table 4-14**), including 12 taxa from discharge sites, ten taxa from control sites, six taxa from the discharge outfall, and five taxa from the historical discharge site. The majority of these taxa belong to aquatic invertebrates, comprising eight crustaceans, with ostracod and *Parartemia* sp. eggs being the most common resting stages over time. The remaining crustaceans; cladocerans, spinicaudates (clam shrimp) and *Branchinella* (fairy shrimp), have been recorded intermittently. They typically have a preference for lower salinities (Outback Ecology and *actis* Environmental Services 2013; Timms *et al.* 2006), and are therefore usually recorded in association with, or following a major flood event. At least three taxa representing the propagules of macrophyte taxa have also been identified from the lake sediment; *Ruppia* and charophytes (stoneworts). Although rare, taxa from both groups are known to tolerate elevated salinities (Garcia 1999; Porter 2007), with the former recorded during the 2024 flood event. Therefore, despite the influence of the discharge water, major flooding is sufficient to allow for the replenishment of the egg and seed bank in the sediment, maintaining ecological diversity and function within the lake.

Table 4-11: Resting stage diversity and abundance at Lake Carey during the June survey of the 2025 Program.

Taxa	DO	D			HD	C		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
Crustacea								
Anostraca								
Parartemia sp.	152	25	104	76	77	22	18	53
Cladocera								
Cladocera sp.	0	0	0	51	0	0	37	0
Ostracoda								
red variety	0	50	174	127	0	66	55	333
white variety	639	210	452	3,152	230	176	536	788
Abundance	791	285	731	3,406	307	264	647	1,174
Diversity	2	3	3	4	2	3	4	3

Table 4-12: Resting stage diversity and abundance at Lake Carey during the September survey of the 2025 Program.

Taxa	DO	D			HD	C		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
Crustacea								
Anostraca								
Parartemia sp.	0	39	0	68	0	0	51	41
Cladocera								
Cladocera sp.	0	0	0	0	0	0	103	41
Ostracoda								
red variety	0	39	87	428	0	21	0	0
white variety	470	623	781	6,670	248	125	359	984
Abundance	470	701	868	7,166	248	146	513	1,066
Diversity	1	3	2	3	1	2	3	3

Table 4-13: Annual and total diversity of resting stages recorded at discharge outfall and discharge sites at Lake Carey in the vicinity of SDGM, between 2002 and 2025.

Resting Stage Taxa	Discharge Outfall																							
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Invertebrates																								
Spinicaudata																								
Spinicaudata sp.																								
Cladocera																								
Daphniidae																							●	
Cladocera sp.			●				●								●									
Copepoda																								
Copepoda sp.																●								
Anostraca																								
Branchinella sp.																								
Parartemia sp.		●	●			●	●	●	●			●				●	●	●	●	●	●	●	●	●
Ostracoda																								
Red variety				●					●									●						
White variety									●			●			●	●		●			●			●
Macrophytes																								
Charophyceae																								
Charales sp.																								
Lamprothamnium sp.																								
Nitella sp.																								
Ruppiaceae																								
Ruppia sp.																								
Annual Diversity	0	1	2	1	0	1	2	1	3	0	0	2	0	0	2	3	1	3	1	1	2	1	2	2
Classification Diversity	6																							
Total Diversity	12																							

Resting Stage Taxa	Discharge																					
	2002	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Invertebrates																						
Spinicaudata																						
Spinicaudata sp.			●																			
Cladocera																						
Daphniidae																					●	
Cladocera sp.	●		●								●	●	●	●	●							●
Copepoda																						
Copepoda sp.											●			●								
Anostraca																						
Branchinella sp.													●								●	
Parartemia sp.	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ostracoda																						
Red variety			●	●	●		●				●			●	●	●			●	●	●	●
White variety			●	●	●		●		●	●	●	●	●	●	●	●			●	●	●	●
Macrophytes																						
Charophyceae																						
Charales sp.	●		●													●						
Lamprothamnium sp.																			●			
Nitella sp.																					●	
Ruppiaceae																						
Ruppia sp.										●												
Annual Diversity	3	1	6	3	3	1	3	1	2	3	5	3	4	5	4	4	1	1	4	3	6	4
Classification Diversity	12																					

Table 4-14: Annual and total diversity of resting stages recorded at historical discharge and control sites at Lake Carey in the vicinity of SDGM, between 2002 and 2025.

Resting Stage Taxa	Historical Discharge																				Control																					
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2002	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Invertebrates																																										
Spinicaudata																																										
Spinicaudata sp.																							●																			
Cladocera																																										
Daphniidae																																									●	
Cladocera sp.													●									●		●									●									●
Copepoda																																										
Copepoda sp.									●																									●								
Anostraca																																										
Branchinella sp.																											●				●											
Parartemia sp.	●	●	●	●	●	●		●	●		●						●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				●	●	●	●
Ostracoda																																										
Red variety	●	●			●								●								●	●	●	●	●	●								●	●	●			●		●	●
White variety		●					●	●		●	●	●	●	●			●		●	●			●		●	●	●		●	●		●	●	●	●	●			●	●	●	●
Macrophytes																																										
Charophyceae																																										
Charales sp.																															●											
Lamprothamnium sp.																																										
Nitella sp.																																										
Ruppiaceae																																										
Ruppia sp.																														●												
Annual Diversity	2	3	1	1	2	1	1	2	2	1	2	1	3	1	0	0	2	0	1	2	2	3	4	3	3	3	3	1	2	3	3	2	3	4	3	2	0	0	3	2	4	4
Classification Diversity	5																				10																					
Total Diversity	10																																									

4.2.5 Riparian Vegetation

4.2.5.1 Diversity & Abundance

A total of 43 plant taxa from 12 families were identified from the riparian zone of Lake Carey during the 2025 Program (**Table 4-15**). Chenopodiaceae was the most specious family, with 17 confirmed species recorded (19 taxa in total[1]), and the remaining families consisting of between one (Amaranthaceae, Fabaceae, Goodeniaceae, Malvaceae, Montiaceae, Polygonaceae, Solanaceae, Zygophyllaceae) and six taxa (Poaceae) (**Figure 4-22**). The family Chenopodiaceae is generally dominant in arid environments along the margins of salt lakes in the Goldfields (Beard 1990). The most diverse genera included *Tecticornia* (seven confirmed taxa), *Atriplex* (two confirmed taxa, two unconfirmed taxa) and *Maireana* (five taxa) (**Figure 4-23**), consistent with the riparian zone of salt lakes throughout the region (Barrett 2006).

At the discharge sites (SDS1, SDS2 and SDS4) site diversity ranged from seven to 13 taxa across the June and September surveys (**Figure 4-24**), while the historical discharge site ranged from 14 to 15 taxa. In comparison, site diversity was typically higher at the discharge outfall (SDDIS) (19 to 23 taxa) and control sites (15 to 22 taxa) (**Figure 4-24**). This trend has also been evident over time, with the discharge sites having lower diversity of species than the discharge outfall, historical discharge and control sites (**Figure 4-26**).

Dominant taxa throughout the 2025 Program included *Tecticornia calyptrata*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia pruinosa* identified at 12 sites each, including the discharge outfall, discharge, historical discharge and control sites (**Table 4-15**). The *Tecticornia* genus is known to tolerate elevated soil salinity (Datson 2002; Shepard *et al.* 2004), with these taxa growing on a variety of sandy to clay soils (WAH 2025). *Eragrostis pergracilis* (grass) was also widespread (12 sites) and occurred in high abundance at discharge sites, and is found throughout the state on alluvial and saline soils (WAH 2025). All taxa have been commonly recorded from the riparian zone of Lake Carey in the vicinity of the SDGM since 2019 (Stantec 2020; 2021; 2022; 2023; 2024; 2025a).

Based on hierarchical classification, the riparian vegetation assemblage across the discharge-outfall, discharge, historical discharge and control sites were broadly similar (**Figure 4-25**), with the majority of sites sharing more than 30% similarly in community composition. Higher similarity (>50%) was observed amongst the discharge sites and between the discharge outfall SDDIS and control site SDN4 (**Figure 4-25**). However, there are several key environmental factors that influence the riparian zone and species zonation, including geomorphology, elevation, distance to groundwater and soil properties (Barrett 2006; WAH 2025). For example, the discharge sites are located on low-lying clayey dunes, while the discharge-outfall and control sites occur on higher sandy dune systems.

One species of significance was recorded during the 2025 Program; *Tecticornia mellarium*, listed as Priority 3 (P3), was recorded at one discharge site (SDS1) and two control sites (SDN1 and SDN4) (**Table 4-15**). This is consistent with the previous assessment (Stantec 2025a), suggesting the continued presence and persistence of this species within the riparian zone of Lake Carey in the vicinity of the SDGM. Despite being considered a poorly known taxon (WAH 2023), it is known more broadly from the riparian zone of Lake Carey and its islands, as well as other salt lakes in the Goldfields region, including Lake Lefroy and Lake Dundas (WAH 2025).

Since 2019, a total of 88 species have been recorded from the riparian zone of Lake Carey, in the vicinity of the SDGM (**Appendix K**), with diversity peaking during the 2025 Program (43 taxa). However, a comparison of the sites indicates that the discharge sites typically support a lower species diversity (two to 20 taxa) than the discharge outfall (10 to 41 taxa), historical discharge (seven to 29 taxa) and control sites (eight to 37 taxa) (**Figure 4-26**). In addition, while the discharge appears to be impacting on the riparian vegetation communities at discharge sites, substantial increases in diversity were recorded in 2024 and 2025 (**Figure 4-26**). This is likely in response to above average rainfall and the major flood event in 2024, a key factor influencing community structure within the riparian zone (Barrett 2006), suggesting that following the cessation of dewatering discharge, riparian vegetation will recover at discharge sites.

[1] Includes taxa that were not able to be taxonomically resolved due to a lack of fruits, flowers, or other diagnostic features.

Table 4-15: Diversity and abundance of riparian flora taxa recorded during the 2025 Program.

Riparian Vegetation Taxa	June-2025								September-2025							
	DO	D			HD	C			DO	D			HD	C		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
Aizoaceae																
?Gunniopsis sp.	7						1									
Gunniopsis septifraga													1			
Amaranthaceae																
Ptilotus sp.	1								3							
Asteraceae																
Asteridea chaetopoda		9								10						
Calocephalus sp.																2
Minuria cunninghamii														1		
**Sonchus oleraceus*	11								6							
Trichanthodium skirrophorum									1							13
Chenopodiaceae																
Atriplex ?bunburyana							1								1	
Atriplex ?vesicaria						2	4							1		
Atriplex codonocarpa					1	1	2						1	3	4	
Atriplex vesicaria	2	1			3		1	4	2	1			4		4	2
Maireana appressa	3								2							
Maireana erioclada					2	1	1	1					2	2	3	
Maireana glomerifolia					1		0						1			
Maireana tomentosa subsp. *tomentosa*	2	3	1	1		2	3	1	2	4		1		2		
Maireana amoena						1								1	2	
Salsola australis	4				50	18	50	1	4				7	10	7	1
Sclerolaena fimbriolata	26			11	3		7	26	22			13	2		7	22
Sclerolaena eurotioides								1	1							1
Tecticornia calyptrata	1		2	1	9	6	4	15	1		2	1	9	4	4	12
Tecticornia mellarium		10				1		2		11				1		4
Tecticornia peltata				1								1				
Tecticornia pergranulata subsp. *pergranulata*								4								4
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	1	6	6	36	4	7	0	3	1	6	5	28	4	4	0	9
Tecticornia undulata	2	2		2	1	2		1	2	3		4	1	1		2
Tecticornia pruinosa		17	3	25	2	5	1	9		15	4	16	2	4	1	9
Fabaceae																
Swainsona purpurea	16							25	15							20
Frankeniaceae	7	52	10	15	20	9	17	12	6	52	15	11	20	8	13	12
Frankenia cinerea			10	15		9		1		45	15	11		8		4
Frankenia pauciflora	7	52			20			1	6	52			20			1
Frankenia pauciflora var. *pauciflora*							17								13	
Frankenia setosa								12								12
Goodeniaceae																
Coopernookia strophiolata	3		3	6			23		4		1	5			16	
Malvaceae																
Lawrencia densiflora																1

Riparian Vegetation Taxa	June-2025								September-2025							
	DO	D			HD	C			DO	D			HD	C		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
Montiaceae																
Calandrinia sp.						0										
Poaceae																
Aristida contorta																1
Enneapogon caerulescens	12							5	4							3
Eragrostis dielsii	21				1	2	2		15				1	2	2	
Eragrostis pergracilis	55	100	100	95	13		4	50	35	47	59	70	8		4	38
Eragrostis setifolia	18								12							
Eragrostis falcata																15
Solanaceae																
Solanum nummularium							1	1	1						1	
Zygophyllaceae																
Roepera eichleri		4					3	1	13	3				0	2	
Diversity	**19**	**11**	**8**	**11**	**14**	**15**	**20**	**21**	**22**	**12**	**7**	**11**	**15**	**16**	**17**	**22**
Abundance	**199**	**256**	**135**	**208**	**130**	**66**	**142**	**176**	**158**	**249**	**101**	**161**	**83**	**52**	**84**	**188**

*Note: * indicates taxa is alien to Western Australia; Tecticornia sp. Dennys Crossing is Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552).*

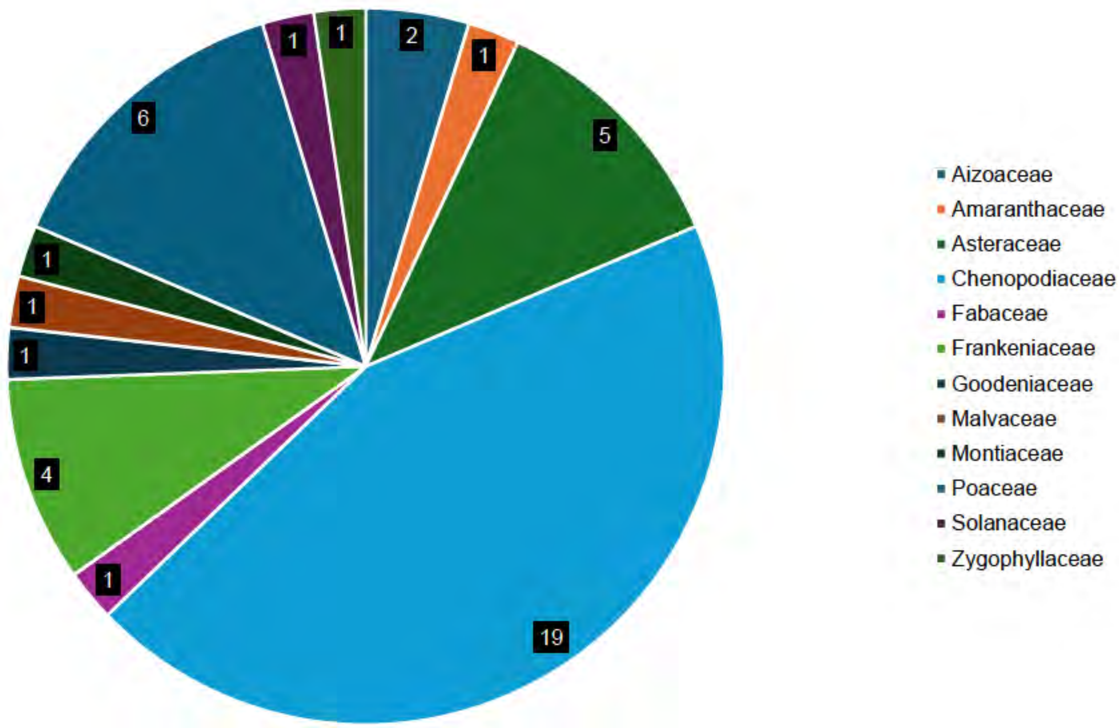


Figure 4-22: Diversity of riparian flora taxa per family recorded during the 2025 Program.

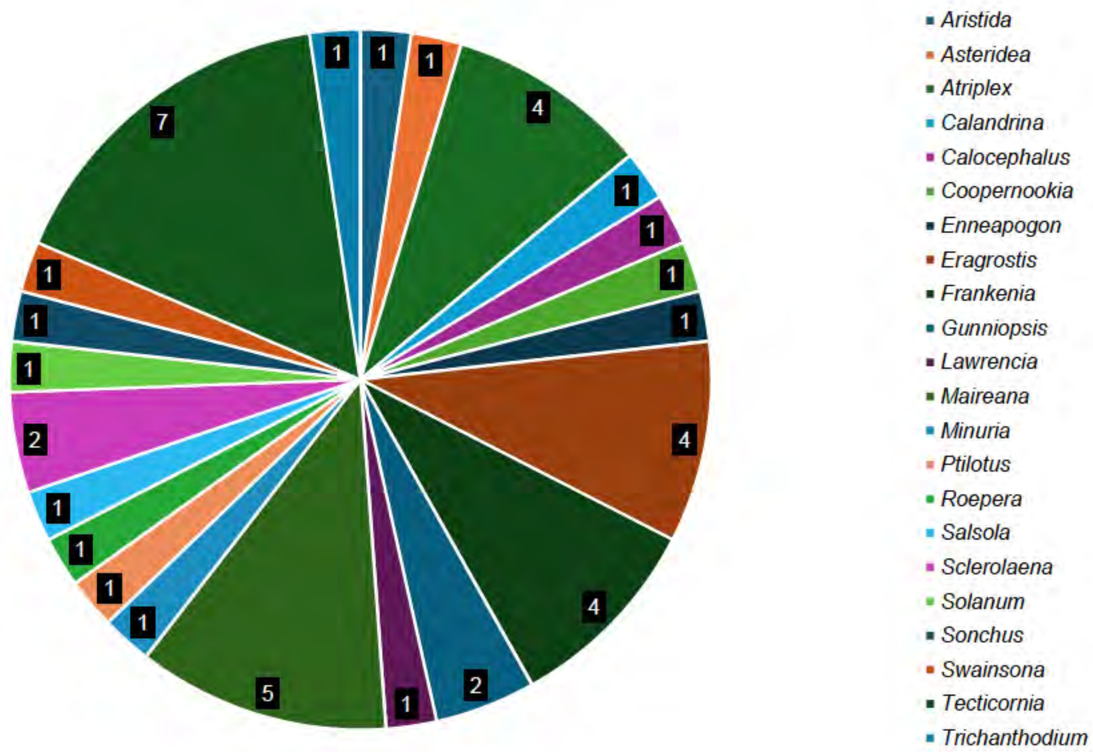


Figure 4-23: Diversity of riparian flora genera recorded during the 2025 Program.

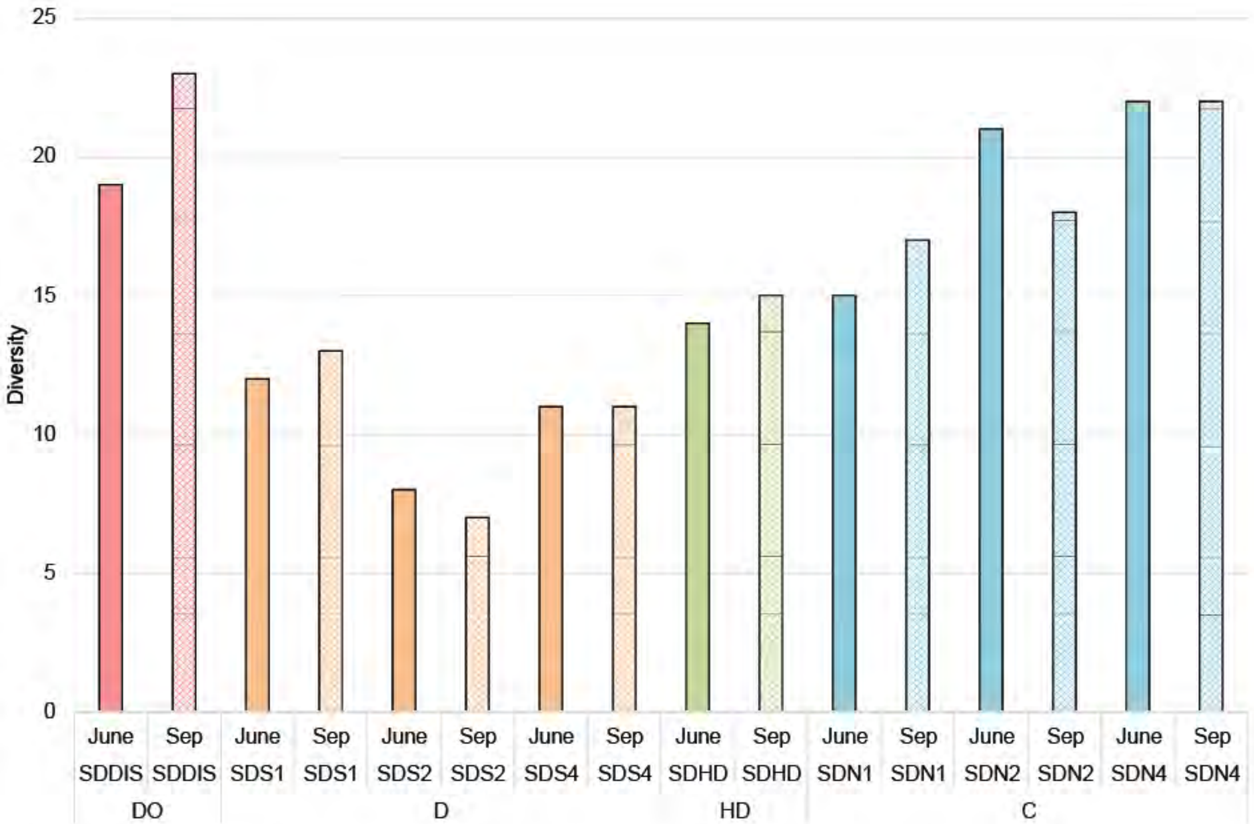


Figure 4-24: Diversity of riparian vegetation taxa per site recorded during the 2025 Program.

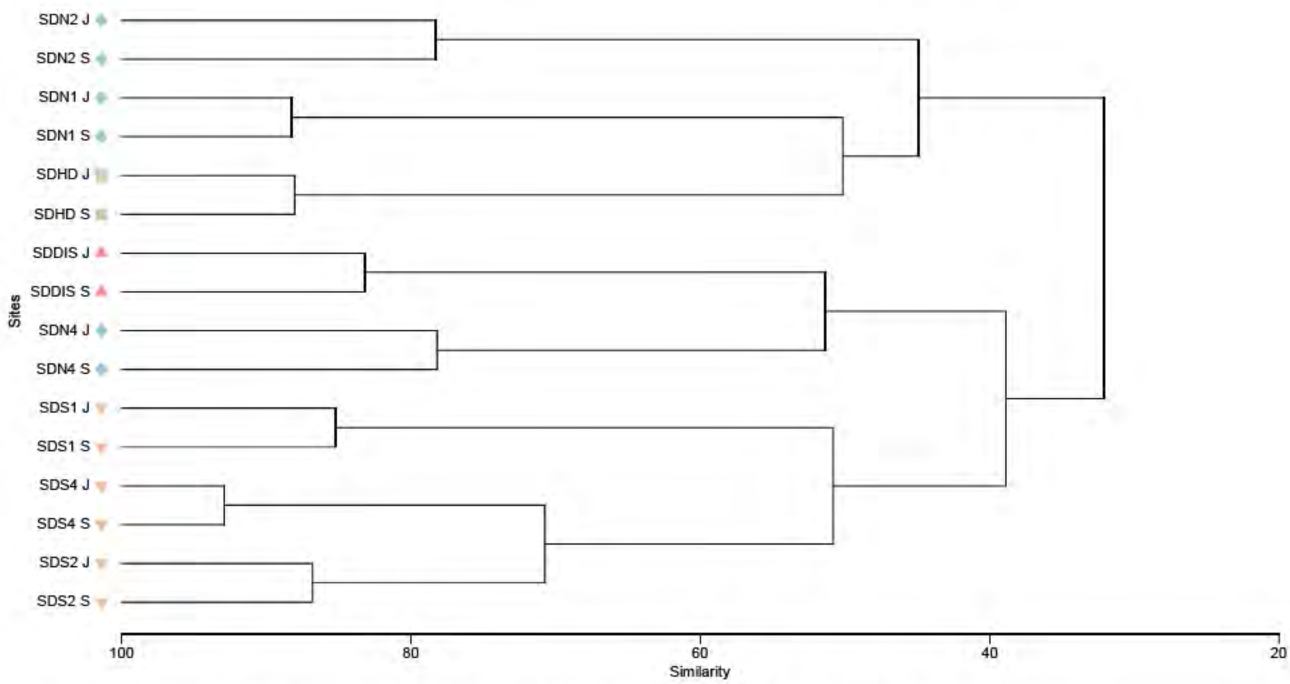


Figure 4-25: Dendrogram of riparian vegetation at Lake Carey during the 2025 Program.

Table 4-16: Records of *Tecticornia mellarium* (P1) since 2019.

Year	Discharge Outfall	Discharge			Historical Discharge	Control		
	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
2019		•				•		•
2020		•				•		•
2021		•						•
2022								•
2023								•
2024		•				•		•
2025		•				•		•

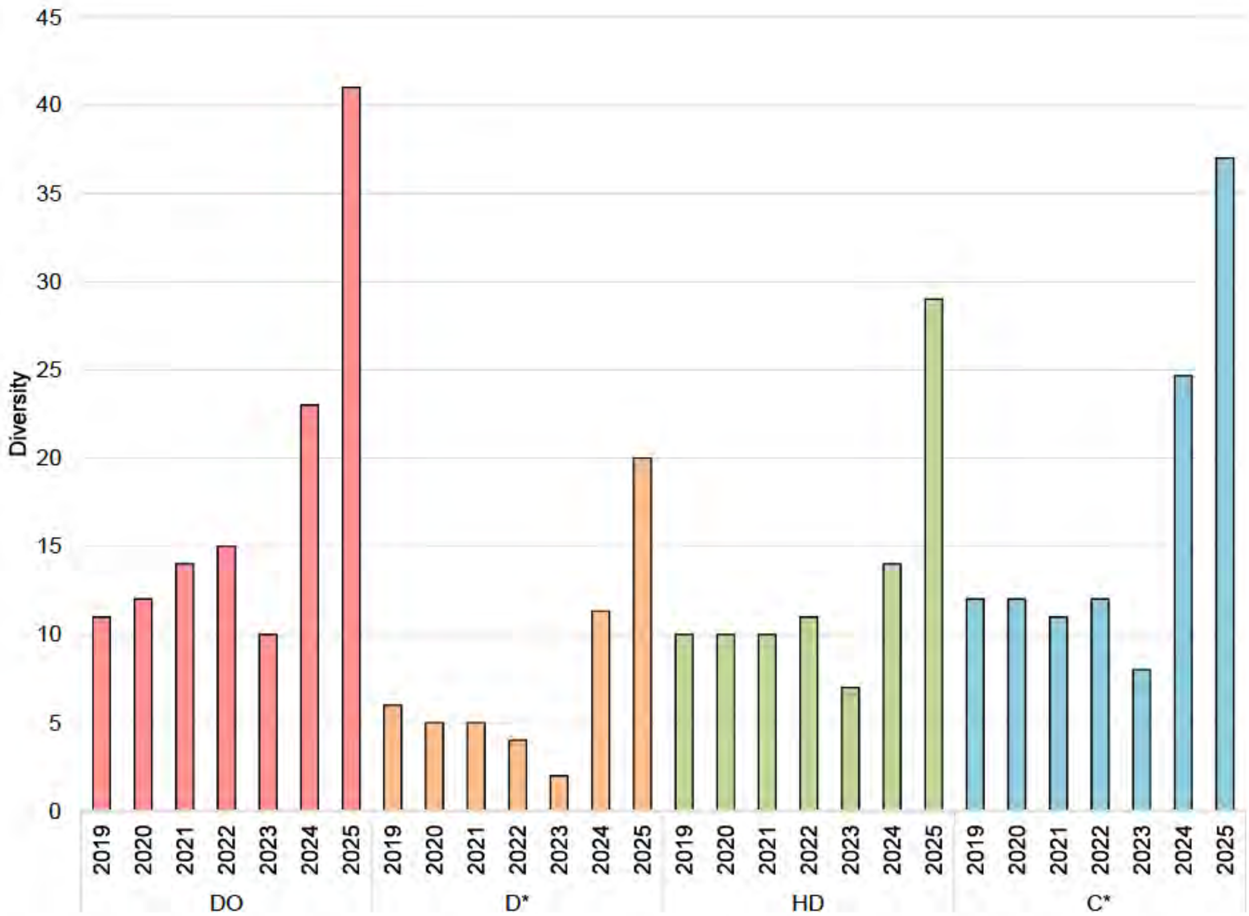


Figure 4-26: Diversity of riparian vegetation taxa per year recorded from discharge outfall, discharge, historical discharge and control sites since 2019 (* indicates average diversity).

4.2.5.2 Cover & Density

Plant cover, measured as total percentage cover per quadrat, was variable during the 2025 Program: Discharge sites ranged from 5% (SDS4) to 20% (SDS1) in the June survey, decreasing to between 2% (SDS2) and 4% (SDS1) in the September survey (**Figure 4-27**). At the discharge outfall, cover ranged from 9% in June to 4% in September. At the historical discharge site plant cover decreased from 14% in June to 10% in September, while at the control sites plant cover ranged from 7% (SDN4) to 11% (SDN1) in June and from 6% (SDN4) to 11% (SDN1) in September. Changes in plant cover across the sites may be related to soil properties (Barrett 2006; Datson 2002) such as salinity and moisture content, and elevation. For example, the discharge sites SDS1 and SDS2 showed the greatest decline in cover between surveys, and may be associated with the return to dry conditions following major flooding in 2024, with a corresponding increase in soil salinity (**Table 4-17**).

Plant density was variable between the June and September surveys, with a decline evident at all sites. However, the most substantial decrease occurred at the discharge sites SDS1 and SDS2, from 87 plants/3m^2 to 47 plants/3m^2, and 61 plants/3m^2 to 15 plants/3m^2, respectively (**Figure 4-28**). The remainder of the sites indicated only a marginal reduction in density and were typically between 1 to 15 plants/3m^2 (**Figure 4-28**). This suggests that the low-lying riparian zone at the discharge sites may be more susceptible to changing conditions, with these sites also more exposed to windblown salts and salt deposition, associated with discharge to Lake Carey.

Between 2019 and 2023, a decreasing trend in plant cover and density within the riparian zone had been observed across all sites (**Figure 4-29**, **Figure 4-30**), likely to be attributed to the prolonged dry conditions present at Lake Carey over this period. However, the results of 2024 and 2025 Programs demonstrate that recovery of the riparian vegetation can occur, following sufficient rainfall, which lead to recruitment of new plants, and growth and development of existing vegetation (Barrett 2006). This is another key factor known to influence plant community structure. Environmental factors, including soil properties, elevation and rainfall therefore likely have a stronger influence on the riparian zone of Lake Carey than any impacts associated with the dewatering discharge.

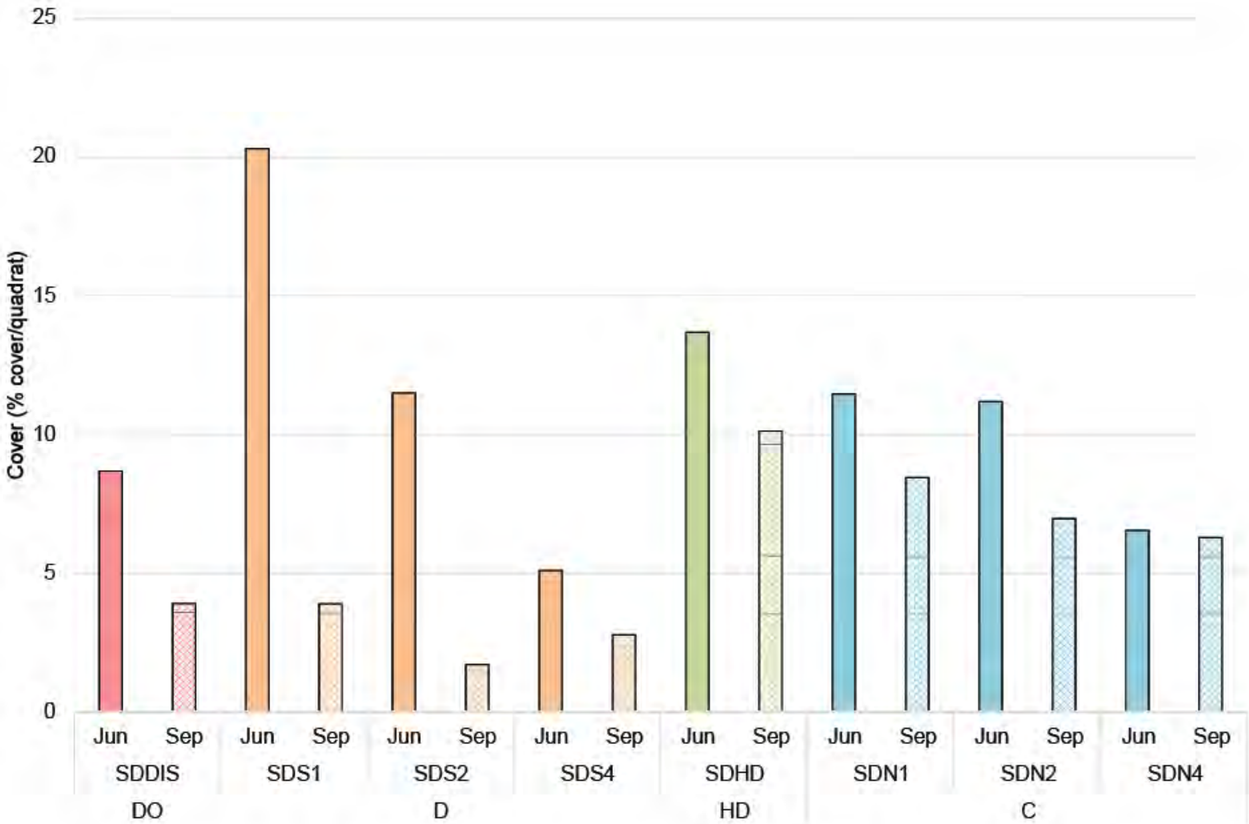


Figure 4-27: Plant cover (%) per quadrat in the riparian zone of Lake Carey during the 2025 program.

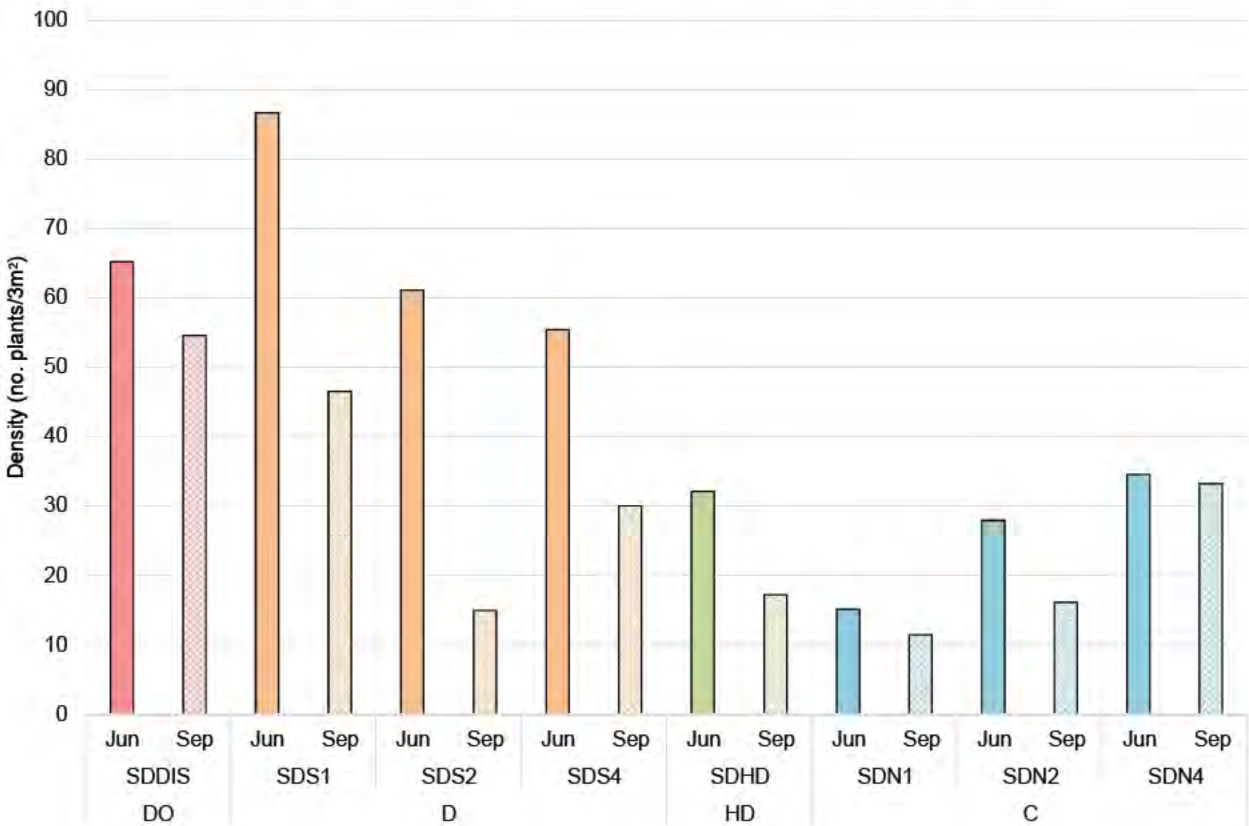


Figure 4-28: Plant density (plants/3m2) per quadrat in the riparian zone of Lake Carey during the 2025 program.

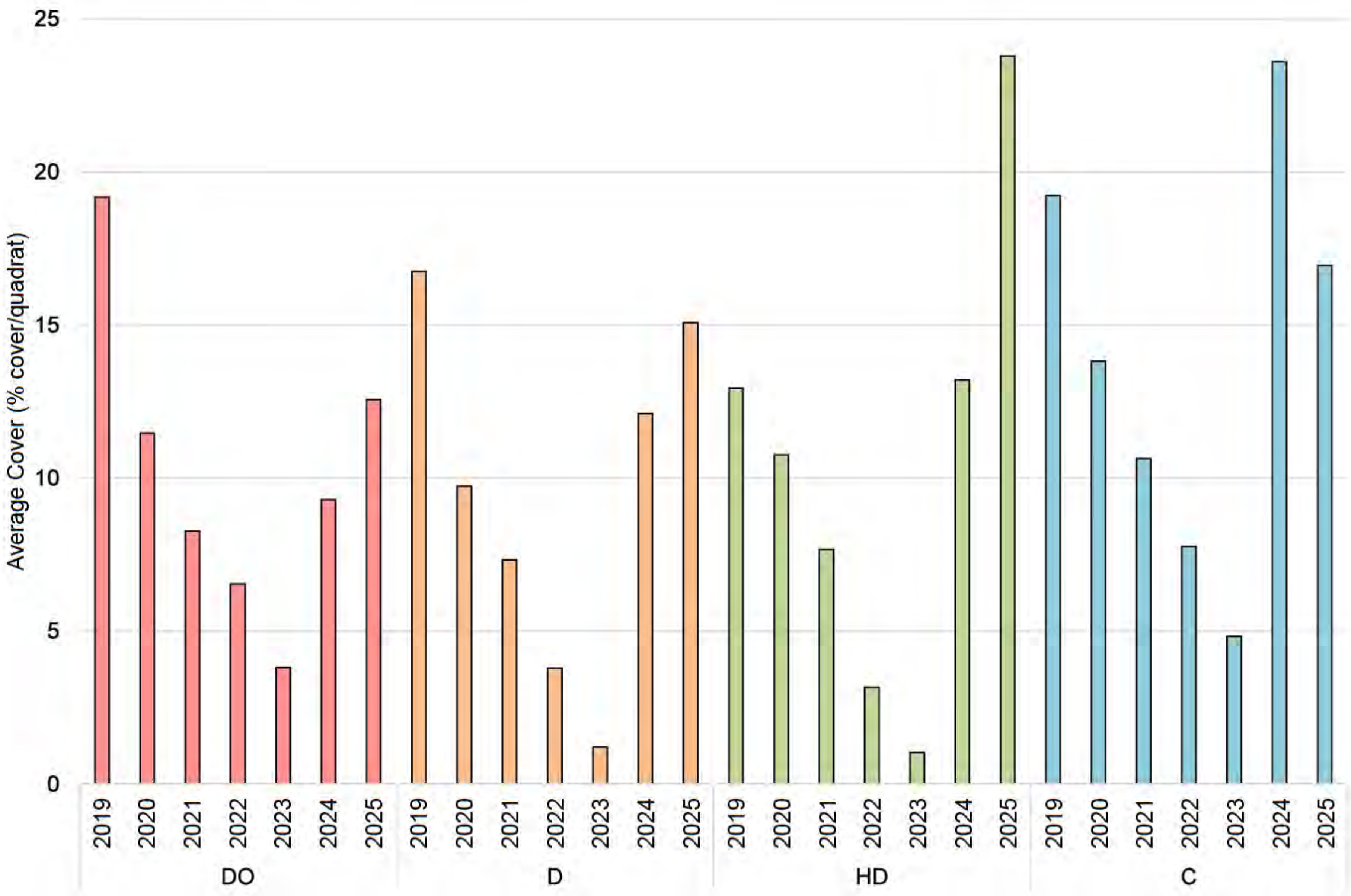


Figure 4-29: Plant cover (%) per quadrat in the riparian zone of Lake Carey recorded since 2019.

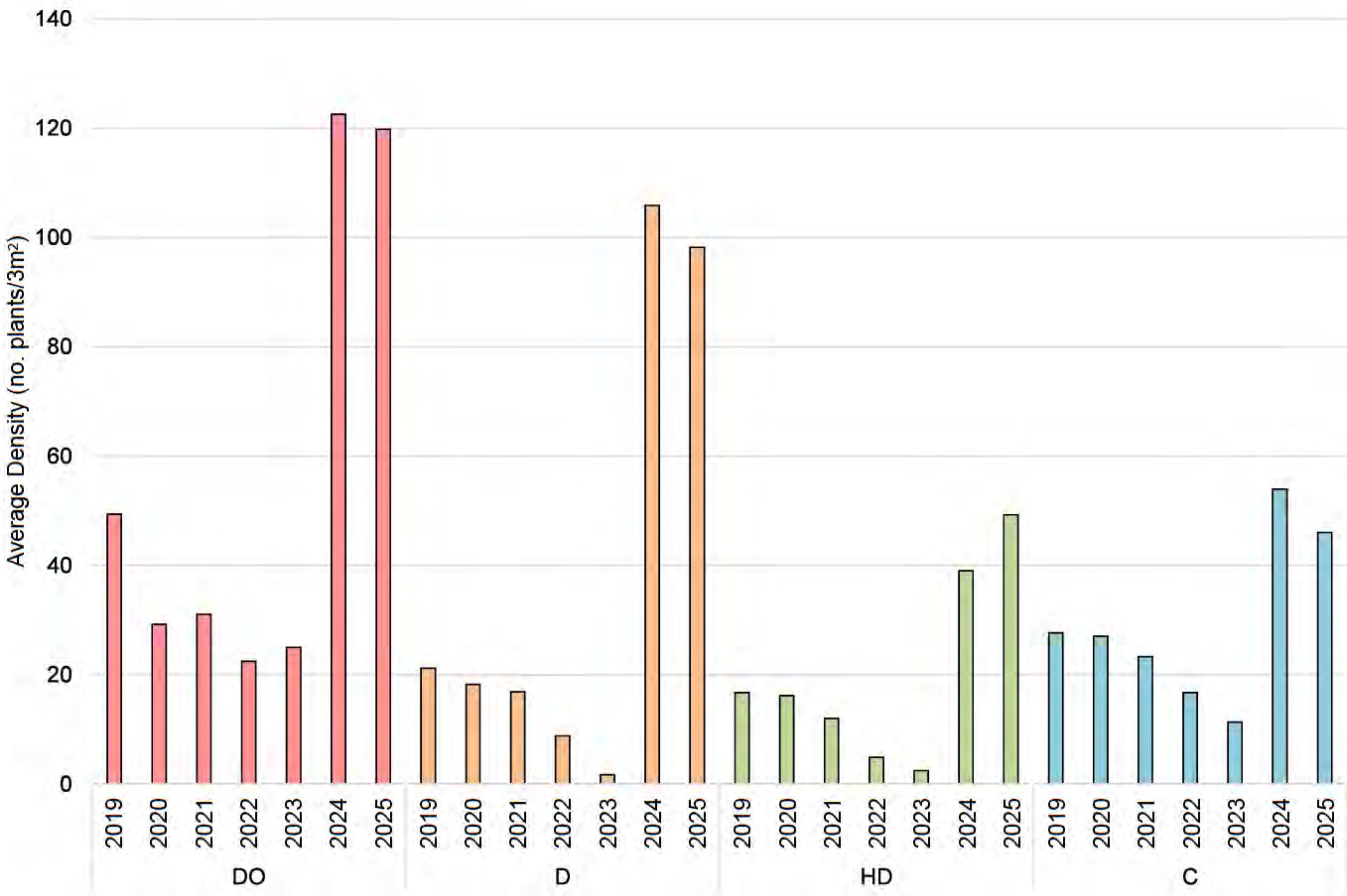


Figure 4-30: Plant density (plants/3m2) per quadrat in the riparian zone of Lake Carey recorded since 2019.

4.2.5.3 Plant Health

During the 2025 Program, plant health, based on Keighery (1994), at the control sites ranged from 2.3 to 3.0 in June, and between 2.3 to 2.8 in September (**Figure 4-31**). Average plant health also decreased at the discharge outfall and discharge sites between the June and September surveys, ranging from 2.4 to 2.6 and 2.2 to 2.6, respectively, and was marginally lower than control sites. Overtime, plant health has been variable at the discharge outfall, discharge, historical discharge and control sites (**Figure 4-32**). This likely reflects climate (rainfall and evaporation) patterns, which is an important factor influencing the plant health in the riparian zone of salt lakes (Barrett 2006; Datson 2002).

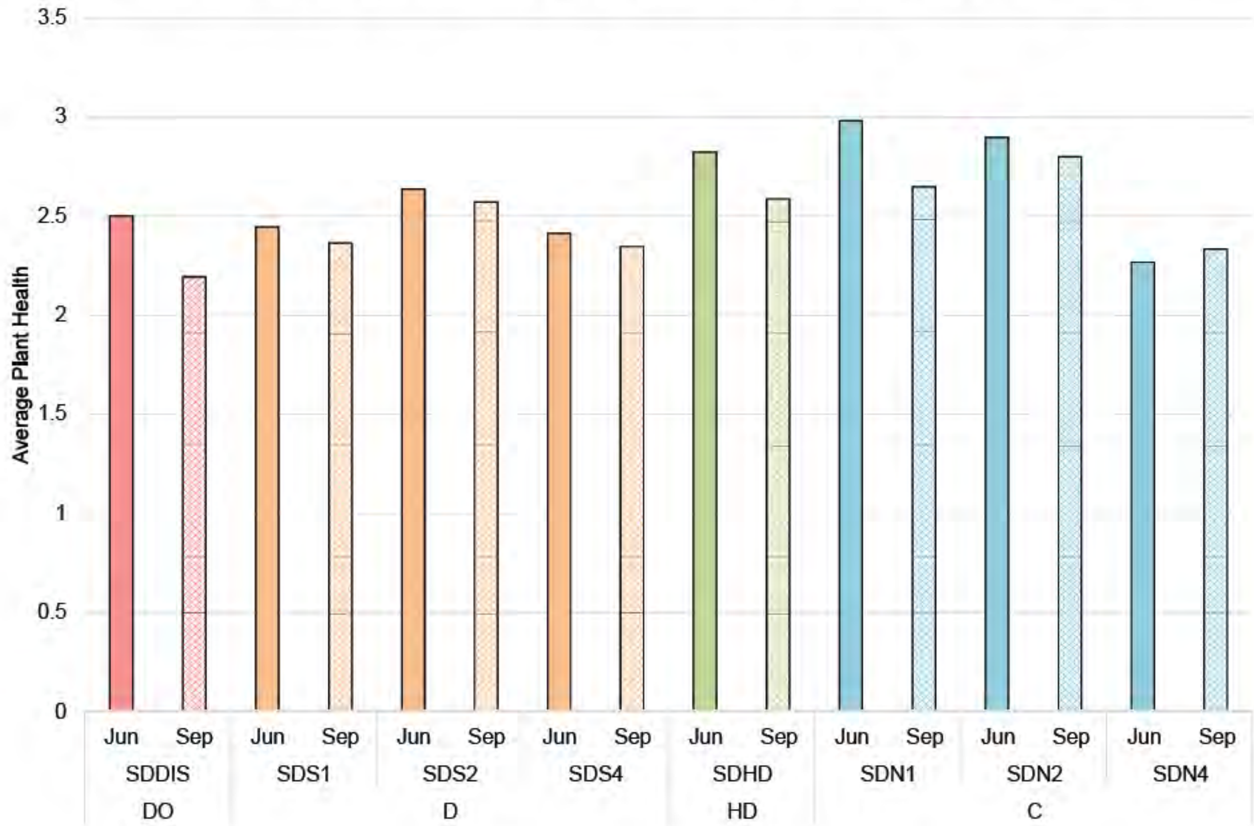


Figure 4-31: Average plant health per quadrat in the riparian zone of Lake Carey recorded during the 2025 Program.

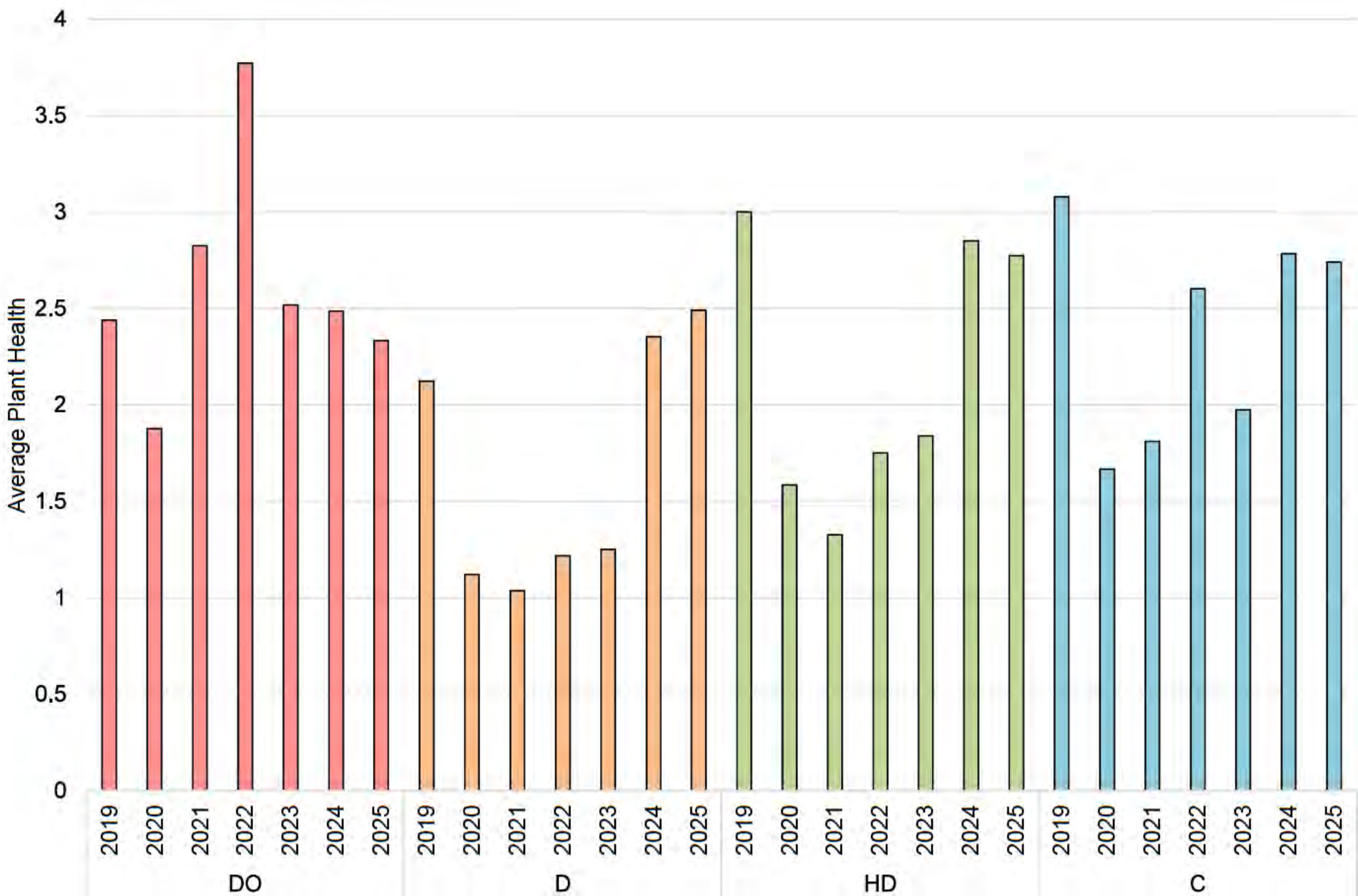


Figure 4-32: Average health of plants per quadrat in the riparian zone for Lake Carey recorded since 2019.

Table 4-17: Average soil quality within the riparian zone of Lake Carey during the 2025 Program.

Site and Location			Soil Parameter					
			pH (unit)		TSS (mg/kg)		MC (%)	
			June	Sept	June	Sept	June	Sept
DO	SDDIS	0 m	8.8	8.2	48,800	74,100	16.6	24.2
		30 m	7.8	8.1	8,230	7,650	7.8	17.6
D	SDS1	0 m	8.5	6.9	16,500	11,200	19.5	23.4
		30 m	8.3	7.1	13,800	50,700	17.9	20.4
	SDS2	0 m	8.4	7.1	18,500	26,300	21.2	23.5
		30 m	8.6	7.6	50,000	34,100	24.4	25.5
	SDS4	0 m	8.2	7.2	51,500	61,800	23	26.2
		30 m	8.6	7.3	56,100	41,600	25.8	21.6
HD	SDHD	0 m	8.3	8.0	8,260	8,330	15.8	15.7
		30 m	8.4	7.8	7,990	8,130	16	9.6
C	SDN1	0 m	8.8	7.9	8,190	8,600	17.2	16.7
		30 m	8.3	7.9	31,300	106,000	16.7	19.8
	SDN2	0 m	8.9	7.9	8,230	9,110	16.7	18.3
		30 m	8.0	7.7	8,260	8,330	11.7	11.9
	SDN4	0 m	8.8	8.3	60,400	86,100	18	23.2
		30 m	8.3	7.8	8,020	7,580	7.6	6.6

5. Summary

5.1 Discharge Assessment

A summary of the Discharge Assessment is provided in **Table 5-1**, based on the data and information provided to Stantec by AGAA. During the 2025 reporting period, water was discharged to the lake during predominantly dry conditions. The discharge water created a shallow pool, extending from the outfall and onto the playa of Lake Carey. With below average rainfall received in 2025, this hydrological scenario was prevalent for most of the 2025 reporting period.

A total volume of 720,738 m^3 of water was discharged to the lake by AGAA during the 2025 reporting period, which equated to approximately 14% of the annual licence limit (5,000,000 m^3). This was a substantial decrease from the previous year (1,614,065 m^3), attributed to the predominantly dry conditions experienced in 2025. AGAA has remained within the annual licence since it was introduced in 2011. The salt crust, attributed to the dewatering discharge that extends from the outfall point, covered an area of 1.4 km^2 in October 2025. Aerial imagery of Lake Carey since 2010 indicated the typical extent of the salt crust during dry conditions varies from between 1.2 km^2 to 9 km^2. The latter represents less than 2% of the lake's total surface area.

An estimated 218,023 t of salt was deposited onto Lake Carey from discharge during the 2025 reporting period; a substantial decrease from 2024 (371,253 t), corresponding to reduced discharge volumes in 2025. The discharge water was characterised as neutral and hypersaline (>250,000 mg/L). Concentrations of lead and zinc exceeded the (ANZG 2018) DGVs for the protection of 80% of species in marine water.

Table 5-1: Summary of Discharge Assessment for the 2025 Program.

Discharge Assessment	Key Findings
Hydrological Scenario	• Predominantly dry lake conditions • Shallow, localised pool extending from discharge outfall onto the playa
Discharge Volume	• 720,738 m^3, representing 14% of licence limit (5,000,000 m^3)
Salt Balance Estimate	• Salt crust extent of 1.4 km^2 under dry conditions • 218,023 t of salt deposited to lake
Discharge Water Quality	• Neutral pH • Hypersaline conditions (>250,000 mg/L) • Lead and zinc exceeded the ANZG (2018) DGV for 80% protection species marine water

Note: Discharge volumes are based on an estimate using available flow meter data.

5.2 Ecological Assessment

A summary of the Ecological Assessment is provided in **Table 5-2**, based on the results of the field surveys completed by Stantec in June and September during the 2025 Program. Surface water was limited to within the vicinity of the discharge outfall, and was characterised as neutral, hypersaline (>250,000 mg/L), and dominated by sodium chloride. Nutrients were comparable between surveys, and below the Lake Carey CSRs 80th percentiles, and most metals were below analytical detection limits. However, lead and zinc exceeded the ANZG (2018) trigger values for the protection of 80% species in marine waters.

Sediment quality typically showed elevated concentrations of salts, nutrients and metals compared to 2024, following the return to dry conditions. Salinity and total nitrogen at the discharge outfall and discharge sites exceeded the Lake Carey CSR 80th percentiles, whereas total phosphorous was elevated at control sites. Numerous metal exceedances were also identified, arsenic, copper, lead, manganese, nickel, and zinc, mostly at the discharge outfall and discharge sites, with arsenic and nickel also exceeding the ANZG (2018) trigger values.

A total of nine diatom taxa were recorded during the 2025 Program, with nine and seven taxa in the June and September surveys respectively. Diversity and abundance were highest at control site SDN1 and discharge site SDS1 during both surveys, likely due to elevated nutrients in the lake sediments. Over time, 54 diatom taxa have been identified from the lake, dominated by common saline species such as *Amphora coffeaeformis*, *Hantzschia* sp. aff. *baltica*, *Luticola mutica* and *Navicula* sp. aff. *incertata*, consistent with this reporting period. The discharge outfall has also exhibited lower diversity historically, in comparison to the historical discharge and control sites. Overall, diatom diversity and abundance was lower compared to the 2024 flood event, linked to the return to dry conditions.

The eggs of four crustacean taxa were recorded from the lake sediment during the 2025 Program, with all four taxa recorded during the June and September surveys. The discharge sites had a higher abundance than the other sites, likely due to the geomorphology of the lake, with lower elevation naturally accumulating resting stages. Twelve crustacean taxa have been identified over time, dominated by salt tolerant ostracods and *Parartemia* sp. (brine shrimp), reflecting the aquatic invertebrate assemblage during flooded conditions. The propagules of two macrophyte taxa comprising charophytes and *Ruppia* sp., have also been recorded, with the former recorded during the 2024 major flood event.

Riparian vegetation was characterised by halophytic Chenopodiaceae (*Tecticornia* spp.) and Poaceae (*Eragrostis pergracilis*) families during the 2025 Program, with 43 taxa recorded (and 89 taxa identified over time). The Priority 3 (poorly known) taxon *Tecticornia mellarium* was also identified, currently known from Lake Carey and several other salt lakes in the Goldfields. Plant cover and density decreased between the June and September surveys, with changes most evident at the discharge sites. This was attributed to site geomorphology, with these low-lying sites potentially subject to the accumulation of windblown salts from the discharge. As the lake has entered the drying phase in this reporting period, soil salinity has subsequently increased.

Table 5-2: Summary of the ecological assessment for the 2025 Program.

Ecological Assessment	Key Findings	Dominant Taxa	Total Taxa	Significant Taxa
Surface Water Quality	• Associated with discharge water on the playa • Neutral pH • Hypersaline conditions (>250,000 mg/L), dominated by sodium and chloride • Nutrient concentrations comparable between surveys • Pb and Zn exceeded the ANZG (2018) DGVs	• N/A	• N/A	• N/A
Sediment Quality	• Moderately alkaline • Salinity and major ions exceeded the Lake Carey CSR 80th percentile (101,600 mg/kg) at the discharge outfall and discharge sites • Variable nutrients, total phosphorous higher at control sites • As, Cu, Pb, Mn, Ni, and Zn exceeded the the Lake Carey CSR 80th percentiles, mostly at discharge outfall and discharge sites • As and Ni also exceeded the ANZG (2018) DGV	• N/A	• N/A	• N/A
Diatoms	• Composition consistent with previous years, comprising common, salt-tolerant taxa • High diversity and abundance at control site SDN1 and discharge site SDS1 due to elevated total phosphorous • Consistently low diversity and abundance at the discharge outfall due to elevated salinity	• *Navicula* sp. aff. *incertata* • *Hantzschia* sp. aff. *baltica* • *Navicula* sp. aff. *salinicola*	• 9	• None
Resting Stages	• Composition consistent with previous years, comprising resident crustacean eggs • Discharge sites with higher abundance due to lake geomorphology • Composition consistent with other salt lakes	• Ostracods • *Parartemia*	• 4	• N/A
Riparian Vegetation	• Dominated by Chenopodiaceae, consistent with other salt lakes • Cover and diversity decreased between surveys • Low-lying discharge sites most susceptible to changes associated with rainfall and soil properties (salinity)	• *Tecticornia calyptrata* • *Tecticornia* sp. Dennys Crossing • *Tecticornia pruinosa* • *Eragrostis pergracilis*	• 43	• *Tecticornia mellarium* (P3)

6. Recommendations

The following recommendations are provided for consideration by AGAA, following completion of the 2025 Program:

- Salinity and metal concentrations in the discharge water should continue to be monitored, providing a comparison of spatial and temporal changes, in relation to aquatic biota and riparian vegetation.
- The surface extent of the discharge water, and associated salt crust, should be assessed annually using high resolution aerial imagery, to determine spatial and temporal changes (this can include accessing freely available imagery online).
- Biannual monitoring in dry and flooded conditions should continue, to increase understanding of ecological changes relating to the dewatering discharge.
- Continue involved in the LCCMG, to undertake regional lake monitoring in dry and flooded conditions and assess potential cumulative impacts (if any) on ecology, associated with dewatering discharge.

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Appendices

Appendix A DWER EP Act Licence (L8579/2011/2)

Government of Western Australia
Department of Water and Environmental Regulation

Licence

Licence number	L8579/2011/2
Licence holder	AngloGold Ashanti Australia Limited
ACN	008 737 424
Registered business address	Level 10, 140 St Georges Terrace PERTH WA 6000
DWER file number	APP-0028495
Licence Duration	21/07/2014 to 20/07/2029
Date of issue	10/07/2014
Date of amendment	13/10/2025
Premises details	Sunrise Dam Gold Mine Via Bindah Road LAVERTON WA 6440 Mining tenements M39/1116 and L38/176 As defined in Schedule 1

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	Assessed production / design capacity
Category 05: Processing or beneficiation of metallic or non-metallic ore	5 500 000 tonnes per year
Category 06: Mine dewatering	5 000 000 tonnes per year
Category 52: Electric power generation	48 mega watt
Category 54: Sewage facility	250 m^3 per day
Category 57: Used tyre storage (general)	1 000 tyres
Category 64: Class II putrescible landfill site	10 000 tonnes per year

This licence is granted to the Licence Holder, subject to the attached conditions, on 13 October 2025, by:

SENIOR MANAGER, RESOURCE INDUSTRIES
STATEWIDE DELIVERY (ENVIRONMENTAL REGULATION)
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Licence History

The licences and works approvals issued for the Premises for the 5 licences prior to issue of this Licence are:

Reference number	Date	Summary of changes
L6824/1996/7	17/02/2003	Licence re-issue
L6824/1996/8	07/02/2004	Licence re-issue
L6824/1996/9	07/02/2005	Licence re-issue
W4454/2008/1	06/10/2008	Approval for the expansion of CTD TSF
L6824/1996/10	06/02/2009	Licence re-issue
L8579/2011/1	26/07/2011	New licence after previous licence ceased to exist
W5227/2013/1	10/09/2012	Approval for sewage facility evaporation ponds
W5486/2013/1	14/10/2013	Approval for stage 9 of CTD TSF
W5564/2013/1	27/01/2014	Approval for construction of stormwater and drainage channel
W5578/2014/1	03/03/2014	Approval for the expansion of CTD TSF
L8579/2011/2	10/07/2014	Licence re-issue and conversion to new format
L8579/2011/2	10/09/2015	Amendment to increase capacity of categories 5 and 52 and authorise construction of additional gas generators.
L8579/2011/2	29/04/2016	Department initiated amendment in accordance with section 59(1)(k) of the *Environmental Protection Act 1986* to amend the duration of the licence date month year.
L8579/2011/2	27/02/2017	Amendment to increase capacity of category 52 and authorise construction of 3 additional gas generators. Change to premises boundary and some administrative changes.
L8579/2011/2	12/09/2017	Amendment Notice 1 - on 6 July 2017 the Licence Holder requested to the Stage 11 perimeter embankment raise between 07m and 2.5m to the CTD TSF (Centrally Thickened Discharge Tailings Storage Facility).
L8579/2011/2	13/09/2018	Amendment Notice 2 - on 21 March 2018 the Licence Holder requested to construct and operate a new sewage evaporation pond. There are currently 7 evaporation ponds utilised at the Premises. Five of these ponds are lined, two are unlined and are only used when the lined

Reference number	Date	Summary of changes
		ponds are at capacity. Also increase the capacity sewage plant throughput from 190 m^3 per day to 250 m^3 per day.
L8579/2011/2	24/10/2018	Amendment notice 3 - on 21 June 2018 the Licence Holder requested an amendment to increase the category 5 production rate of the existing processing plant by 1 Mtpa to 5.5Mtpa. No changes to the infrastructure are planned nor changes to the existing tailings discharge method and rates.
L8579/2011/2	12/05/2023	Licence amendment to consolidate previous amendment notices, to increase the throughput for Category 64 and to make a number of minor/administrative changes to licence conditions.
L8579/2011/2	5/06/2025	Licence amendment to include the construction, commissioning and operation of a membrane bioreactor wastewater treatment facility and associated infrastructure.
L8579/2011/2	13/10/2025	Licence amendment to add the construction and operation of Stages 12A and 12B of the CTD TSF.

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

1. The Licence Holder must:
(a) construct and install the infrastructure;
(b) in accordance with the design and construction / installation requirements; and
(c) at the location as set out in Table 1.

Table 1: Design and construction / infrastructure requirements

Infrastructure	Design and construction / installation requirements	Infrastructure location
Membrane Bioreactor Wastewater Treatment Plant (MBR) concrete pad	Impervious concrete construction, free of cracks and other defects	Schedule 2, Figure 7.
MBR	To be constructed according to the design and specifications in Schedule 2, Figure 8.	
Wastewater pipelines	• equipped with telemetry systems and flow meters along pipelines to allow the detection of leaks and failures; • equipped with automatic cut-outs in the event of a pipe failure; or • provided with secondary containment sufficient to contain any spill for a period equal to the time between inspections.	Schedule 2, Figure 10.
Centrally Thickened Discharge Tailings Storage Facility (CTD TSF) Stage 12A embankment raise to elevations between 409-414 mRL	• The upstream batter of the embankment raise will be 1V: 2H whereas the downstream batter will be 1V:3H. • Low-permeability fill is to be used as the primarily construction material for the embankment construction works. • Gravel sheeting is to be used to provide the wearing course to support all weather vehicular access. • Coarse, durable waste rock to be used for Stormwater Storage Pond spillway modification. • Prior to placement of fill, the embankment footprint is to be tyned, watered, and proof compacted. • The moisture conditioned fill material is to be placed in horizontal layers not exceeding 300 mm	Schedule 1, Figure 1, labelled as CDT.

Infrastructure	Design and construction / installation requirements	Infrastructure location
	thickness and compacted to a minimum density ratio of 95% Standard Maximum Dry Density.	
CTD TSF Stage 12B embankment raise to elevations between 410-415 mRL	• The upstream batter of the embankment raise will be 1V: 2H whereas the downstream batter will be 1V:3H. • Low-permeability fill is to be used as the primarily construction material for the embankment construction works. • Gravel sheeting is to be used to provide the wearing course to support all weather vehicular access. • Coarse, durable waste rock to be used for Stormwater Storage Pond spillway modification. • Prior to placement of fill, the embankment footprint is to be tyned, watered, and proof compacted. • The moisture conditioned fill material is to be placed in horizontal layers not exceeding 300 mm thickness and compacted to a minimum density ratio of 95% Standard Maximum Dry Density.	Schedule 1, Figure 1, labelled as CDT.

2. The licence holder must within 60 calendar days of an item of infrastructure or equipment required by condition 1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.

3. The Environmental Compliance Report required by condition 2, must include as a minimum the following:

(a) certification by a suitably qualified civil or mechanical or structural engineer that the items of infrastructure or component(s) thereof, as specified in condition 1, have been constructed in accordance with the relevant requirements specified in condition 1;

(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1; and

(c) be signed by a person authorised to represent the licence holder and contains the printed name and position of that person.

Environmental commissioning phase

4. The licence holder may only commence environmental commissioning of an item of infrastructure listed in condition 5 once the Environmental Compliance Report has been submitted for that item of infrastructure in accordance with condition 2 of this works approval.

5. Any environmental commissioning activities undertaken for an item of infrastructure specified in Table 2 may only be carried out:

(a) in accordance with the corresponding commissioning requirements; and

(b) for the corresponding authorised commissioning duration.

Table 2: Environmental commissioning requirements

Infrastructure	Commissioning requirements	Commissioning period
MBR treatment plant and associated infrastructure.	• operate to treat a wastewater inflow of up to 250 m^3 per day; • no untreated or treated wastewater is to be discharged into the environment; and • all treated wastewater is to be piped to the existing Tank 350-TNK-09 (Schedule 1, Figure 1).	For a period not exceeding 120 calendar days.

Environmental commissioning report

6. The licence holder must submit to the CEO an Environmental Commissioning Report within 30 calendar days of the completion date of environmental commissioning for each item of infrastructure specified in Table 2.

7. The licence holder must ensure the Environmental Commissioning Report required by condition 6 includes the following:

(a) a summary of the environmental commissioning activities undertaken, including timeframes and amount of wastewater processed;

(b) a summary of the environmental performance of each item of infrastructure or equipment as installed;

(c) a review of the licence holder's performance and compliance against conditions 1 – 5 of this licence; and

(d) where they have not been met, measures proposed to meet design specifications and conditions 1 – 5 of this licence, together with timeframes for implementing the proposed measures.

General

8. The Licence Holder shall immediately recover, or remove and dispose of spills of environmentally hazardous materials which occur outside an engineered containment system.

9. The Licence Holder shall ensure that where wastes produced on the Premises are not taken off-site for lawful use or disposal, they are managed in accordance with the requirements in Table 3.

Table 3: Management of waste

Waste type	Management strategy	Requirements
Clean fill[3] Type 1 inert waste[3] Putrescible waste[3] Contaminated solid waste	Receipt, handling and disposal of waste by landfilling	<u>All waste types</u> Disposal of waste by landfilling shall only take place within the landfill area 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. No waste shall be temporarily stored or landfilled within 35 metres from the boundary of the Premises. Must meet the acceptance criteria for a Class II[3] landfill
Inert waste Type 2 (tyres and rubber)	Storage	Not more than 1000 tyres shall be stored at the premises at any one time; Used tyre stacks shall not exceed 100 m^2 in area and 4 metres in height; Used tyres must be stacked on their side walls or if stored on their treads, area baled with a securing device made from a non-combustible material;
Raw sewage	Biological and physical treatment	Septic tank / sewage evaporation pond system to be used during periods of maintenance or breakdown of the MBR treatment plant for treatment of sewage up to 250 m^3 per day
	MBR treatment plant	Up to 250 m^3 per day All treated wastewater from the MBR to be piped to Tank 350-TNK-09 (Schedule 1, Figure 1).
Tailings	Thickening and containment in TSF	Disposal of waste shall only take place within the TSF labelled CTD as shown on the Premises map in Schedule 1.

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*.

Note 3: Defined in the Landfill Definitions.

10. The Licence Holder shall ensure that cover is applied and maintained on landfilled wastes in accordance with Table 4 and that sufficient stockpiles of cover are maintained on site at all times.

Table 4: Cover requirements

Waste type	Cover requirements
Putrescible wastes and Inert Wastes Type 2	To be covered fortnightly with sufficient quantities of Type 1 inert waste, clean fill or other appropriate cover material to prevent the spread of fire and harbouring of disease vectors
Inert waste type 1	No cover required

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

12. The Licence Holder shall ensure that all pipelines containing environmentally hazardous substances are either:
(a) equipped with telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures;
(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 inspections.

13. The Licence Holder shall ensure that any saline dewatering effluent shall only be discharged in the following manner:
(a) used for dust suppression in a manner that minimises damage to surrounding vegetation; or
(b) discharged to Lake Carey in accordance with the conditions in section 2 of this Licence.

14. The Licence Holder shall ensure that tailings, decant water and effluent are only discharged into containment cells or ponds with the relevant infrastructure requirements and at the locations specified in Table 5.

Table 5: Containment infrastructure

Storage vessel or compound	Material	Requirements
WWTP evaporation ponds one, two, three, six, seven and eight	Primary treated sewage	Clay lined or equivalent
WWTP over-flow ponds four and five	Over-flow of primary treated sewage from evaporation ponds	None specified
Process Water Pond	CTD TSF return water, treated water from the MBR treatment plant, borefield and mine dewater	Lined with at least 0.5 m of clay with a permeability of $<10^{-9}$ m/s or equivalent
Water storage ponds/ dewatering ponds	Mine dewater	None specified
CTD TSF	Tailings	• Discharge to Stage 12A and 12B is not to be commenced until the report in Condition 2 has been provided. • Lined with clay to achieve a permeability of at least $<10^{-7}$ m/s or equivalent.

15. The Licence Holder shall manage all containment infrastructure in Table 5 such that a minimum top of embankment freeboard of 300 mm or a 1 in 100 year/72 hour storm event (whichever is greater) is maintained.

16. The Licence Holder shall manage TSFs such that:

(a) a seepage collection and recovery system is provided and used to capture seepage from the TSF;

(b) seepage is returned to the TSF or re-used in process; and

(c) the stormwater storage pond on the TSF is managed so as to provide capacity for a 1 in 100 year, 72 hour rainfall event.

17. The Licence Holder shall:

(a) undertake inspections as detailed in Table 6;

(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;

(c) maintain a digital or written log of all inspections undertaken;

(d) twice daily inspections to be undertaken within a 24 hour period up to 16 hours apart; and

(e) daily inspections to be undertaken within a 24 hour period.

Table 6: Inspection of infrastructure

Scope of inspection	Type of inspection	Frequency of inspection
Tailings pipelines	Visual integrity	Twice daily
Return water lines	Visual integrity	Twice daily
Embankment freeboard	Visual to confirm required freeboard capacity is available	Daily
Tailings deposition	Visual assessment of beaching	Daily
Decant pond and stormwater storage pond	Visual assessment of pond size and position	Daily
Water storage ponds/ dewatering ponds	Visual assessment of freeboard	Daily
MBR treatment plant	Visual integrity	Daily

18. The Licence Holder must not depart from the specifications in Column 1 and 2 for the infrastructure in each row of Table 7 except:

(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment; and in accordance with all other conditions in this Licence.

Table 7: Works specifications

Column 1	Column 2
Infrastructure	**Specifications (Design and Construction)**
Sewage evaporation pond eight	HDPE lined to a permeability of 10^{-9} m/s or less. Integrity of liner to be tested at completion of construction. Pond will have storage capacity of 10,400 m^3 allowing capacity to store a 1 in 100 year, 72 hour rainfall event. Located to the southwest of existing ponds as depicted in Figure 2 of the Licence.

Emissions

19. The Licence Holder shall ensure that where waste is emitted to air from the emission points in Table 8 it is done so in accordance with the conditions of this Licence.

Table 8: Emission points to air

Emission point reference	Emission Point	Emission point height (m)	Source, including any abatement
A Station – 9 engines Generator #1 Generator #2 Generator #3 Generator #4 Generator #5 Generator #6 Generator #7 Generator #8 Generator #9	Diesel engine exhaust - stack	10	Cummins KTA50 G3
B Station – 9 engines Generator #10 Generator #11 Generator #12 Generator #13 Generator #14 Generator #15 Generator #16 Generator #17 Generator #18	Gas engine exhaust stack	10	MWM TCG2020 V16K

Emission point reference	Emission Point	Emission point height (m)	Source, including any abatement
C Station – 2 engines Generator #22 Generator #23	Diesel engine exhaust – stack	10	TBD620 V16 G3 (x2)
C Station – 4 engines Generator #21 Generator #24 Generator #25 Generator #26	Gas engine exhaust – stack	10	MWM TCG2020 V16K
C Station - 2 engines Generator #19 Generator #20	Gas engine exhaust - stack	13	Cat CG260 - 16
D Station – 3 engines Generator #27 Generator #28 Generator #29	Gas engine exhaust – stack	13	Cat CG260 - 16
Carbon Regen Kiln	Carbon regeneration kiln stack	19	Carbon regeneration kiln
Gold room	Gold furnace stack	8	Gold furnace

20. The Licence Holder shall ensure that where waste is emitted to surface water from the emission points in Table 9 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 9: Emission points to surface water

Emission point reference	Description	Source including abatement
Lake Carey discharge site	Mine dewater discharge from the open pit and underground workings	Mine dewater

Monitoring

21. The Licence Holder shall ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;

(b) all surface water sampling is conducted in accordance with AS/NZS 5667.4, AS/NZS 5667.6 or AS/NZS 5667.9 as relevant;

(c) all groundwater sampling is conducted in accordance with AS/NZS 5667.11; and

(d) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured.

22. 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) annual monitoring is undertaken at least 9 months apart.

23. 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 and the requirements of the Licence.

24. 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.

25. The Licence Holder shall undertake the monitoring in Table 10 according to the specifications in that table.

Table 10: Monitoring of point source emissions to surface water

Emission point reference	Parameter	Units	Frequency
Water from the mine dewatering program discharged to Lake Carey	Volume	tonnes	Monthly
	pH	-	Quarterly
	Total dissolved solids (TDS), sodium, potassium, calcium, magnesium, chloride, carbonate, bicarbonate, sulfate, nitrate, iron, manganese, strontium	mg/L	

26. The Licence Holder shall undertake the monitoring in Table 11 according to the specifications in that table.

Table 11: Process monitoring

Process description	Parameter	Units	Frequency	Method
Tailings deposition	Volumes of tailings deposited into the TSF	m^3	Monthly	None specified
	Volumes of water recovered from the TSF	m^3	Monthly	
	Volumes of seepage recovered	m^3	Monthly	

27. The Licence Holder shall undertake the monitoring in Table 12 according to the specifications in that table.

Table 12: Monitoring of ambient groundwater quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
CTD Monitoring bores: CTDMB2, CTDMB2A, CTDMB3, CTDMB7, CTDMB11A-B, CTDMB13, CTDMB16, CTDMB24A-B, CTDMB29A-B, CTDMB30A-B, CTDMB31A-C, CTDMB32A-C, CTDMB33A-C, CTDMB34A-C, CTDMB35A-C, CTDMB36A-C, CTDMB37A-C, CTDMB38A-C, CTDMB39A-C, CTDMB40A-C, CTDMB41A-C	pH	-	Spot sample	Annually
	SWL	m(AHD)		
	TDS, WAD-CN, sodium, potassium, calcium, magnesium, arsenic, chromium, copper, lead, manganese, nickel, selenium, boron.	mg/L		

28. The Licence Holder shall undertake an annual dewatering discharge report to show that mine dewatering discharges to the receiving environment are not having any adverse environmental impact. The assessment shall include:

(a) a site description (aerial photographs etc), including plan showing dewatering discharge point(s);

(b) topographical and meteorological data;

(c) hydrology – catchment, rainfall and evaporation, runoff etc;

(d) significance of waterbody/watercourse with respect to flora and fauna;

(e) waterbody/watercourse levels as a result of rainfall events (with respect to the seasonality of the waterbody/watercourse);

(f) dewater discharge (volume and quality) as compared to runoff into the waterbody/watercourse and water quality (salt and metals) of the receiving waters;

(g) the area of the waterbody/watercourse likely to be affected by the dewater discharge and effects on waterbody/watercourse levels resulting from the discharge;

(h) the potential for water to flow along/out of the receiving waterbody/ watercourse;

(i) if dewatering occurs to a creek system (permanent or ephemeral), it will also be necessary to consider the consequences of the alteration of the receiving environment, especially with respect to the impacts on vegetation and existing ecosystems;

(j) water balance estimates – including dewater and non-dewater scenarios (with and without consideration of runoff events);

(k) chemistry of the waterbody/watercourse – including dewater and non-dewater scenarios (with and without consideration of runoff events);

(l) a comparison between each year's monitoring data and that of all available data from previous years since mining commenced; and

(m) findings (including trends), conclusions and recommendations.

29. The Licence Holder shall undertake an annual assessment of vegetation within the zone of influence of the CTD TSF. The assessment shall:

(a) photograph and record the presence and condition of key vegetation features within the zone of influence;

(b) compare the results of the assessment against previous years assessments and identify whether any deterioration in the presence and/or quality of vegetation has taken place; and

(c) be undertaken by a person suitably qualified in vegetation identification and sampling

Information

Records

30. 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 30 (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.

31. The Licence Holder must submit to the CEO 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.

32. 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.

Reporting

33. The Licence Holder shall submit to the CEO an Annual Environmental Report within 60 calendar days after the end of the annual period. The report shall contain the information listed in Table 13 in the format or form specified in that table.

Table 13: Annual Environmental Report

Condition or table (if relevant)	Parameter	Format or form
-	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
-	Operating hours for diesel generators	As a percentage of the total operating time for all generators
Table 10	Volume, pH, TDS, sodium, potassium, calcium, magnesium, chloride, carbonate, bicarbonate, sulfate, nitrate, iron, manganese, strontium	None specified
Table 11	Process monitoring	None specified
Table 12	Ambient groundwater monitoring	None specified
Condition 28	Annual dewatering discharge report	None specified
Condition 29	Annual vegetation assessment report	None specified
Condition 31	Compliance (Annual Audit Compliance Report - AACR)	A copy of AACR template is available on Department's website
Condition 32	Complaints summary	None specified

34. The Licence Holder shall ensure that the Annual Environmental Report also contains:
- (a) an assessment of the information contained within the report against previous monitoring results and Licence limits and/or targets; and
- (b) a list of any original monitoring reports submitted to the Licence Holder from third parties for the annual period and make these reports available on request.

35. The Licence Holder shall submit a compliance document to the CEO, following the construction of the sewage evaporation pond works as specified in Table 7 and prior to commissioning of the same.

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

Notification

37. The Licence Holder shall ensure that the parameters listed in Table 14 are notified to the CEO in accordance with the notification requirements of the table.

Table 14: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement[1]	Format or form
N/A	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	None specified
Condition 24	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

Definitions

In this licence, the terms in Table 15 have the meanings defined.

Table 15: 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).
annual period	a 12 month period commencing from 1 January until 31 December of the same year.
AS 4323.1	means the Australian Standard AS4323.1 *Stationary Source Emissions Method 1: Selection of sampling positions.*
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 5667.11	means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters.*
averaging period	means the time over which a limit is measured or a monitoring result is obtained.
books	has the same meaning given to that term under the EP Act.
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

Term	Definition
commissioning	means the process of operation and testing that verifies the works and all relevant systems, plant, machinery and equipment have been installed and are performing in accordance with the design specification set out in the Licence amendment application.
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	means material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, by-products and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
freeboard	means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point.
hardstand	means a surface with a permeability of 10^{-9} metres/second or less.
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.
NATA	means the National Association of Testing Authorities, Australia.
NATA accredited	means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis.
Premises	means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of this Licence.
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 in Schedule 1 to this licence.

Term	Definition
prescribed premises	has the same meaning given to that term under the EP Act.
quarterly	means the 4 inclusive periods from 1 January to 31 March, 1 April to 30 June, 1 July to 30 September and 1 October to 31 December.
Schedule 1	means Schedule 1 of this Licence unless otherwise stated.
Schedule 2	means Schedule 2 of this Licence unless otherwise stated.
spot sample	means a discrete sample representative at the time and place at which the sample is taken.
suitably qualified civil or mechanical or structural engineer	means a suitably qualified civil or structural engineer who: - for the Membrane Bioreactor Wastewater Treatment Plant (MBR) installation: • holds a Bachelor of Engineering recognised by Engineers Australia; and – • has a minimum of five years of experience working in a supervisory area of civil engineering. For the stages of CTD TSF construction: • holds a Bachelor of Engineering recognised by the Australian Institute of Engineers; and • has a minimum of five years of experience working in geotechnical engineering including experience in the design of tailings storage facilities.
TSF	means tailings storage facility.
waste	has the same meaning given to that term under the EP Act.
WWTP	means wastewater treatment plant.

END OF CONDITIONS

Schedule 1: Maps

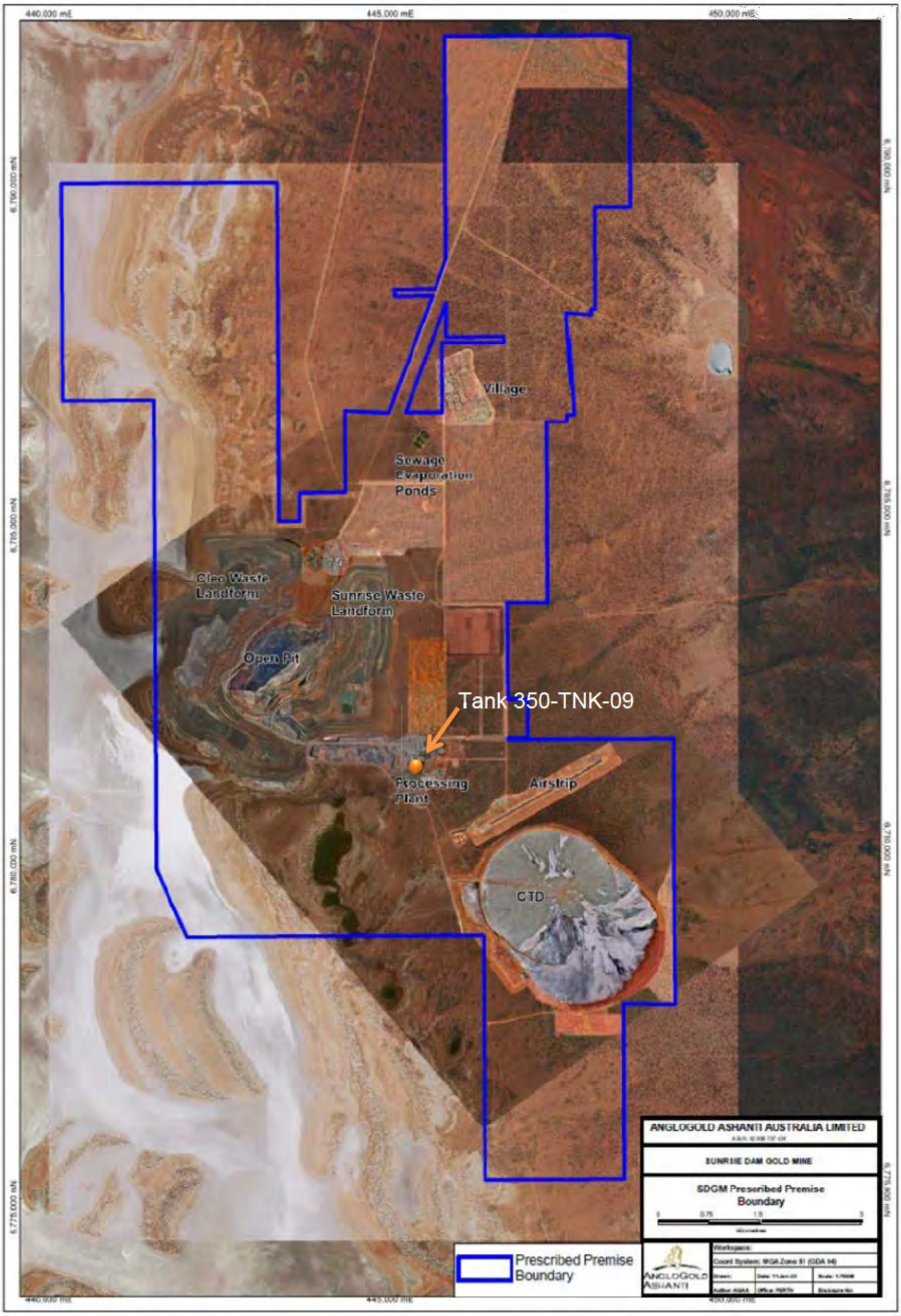

Figure 1: Premises map

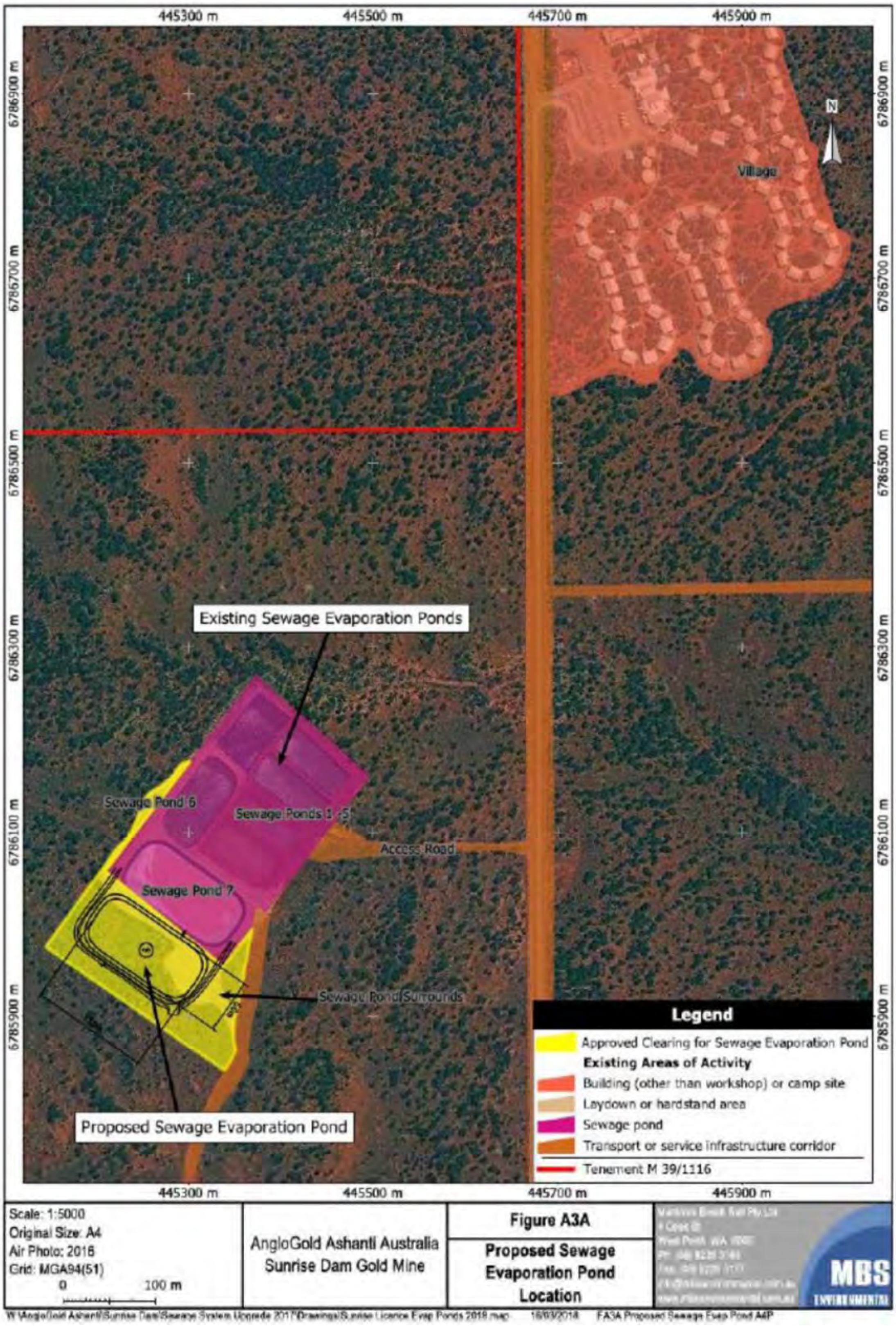

Figure 2: Location of proposed Sewage evaporation pond 8

Figure 3: Gold processing air emission points

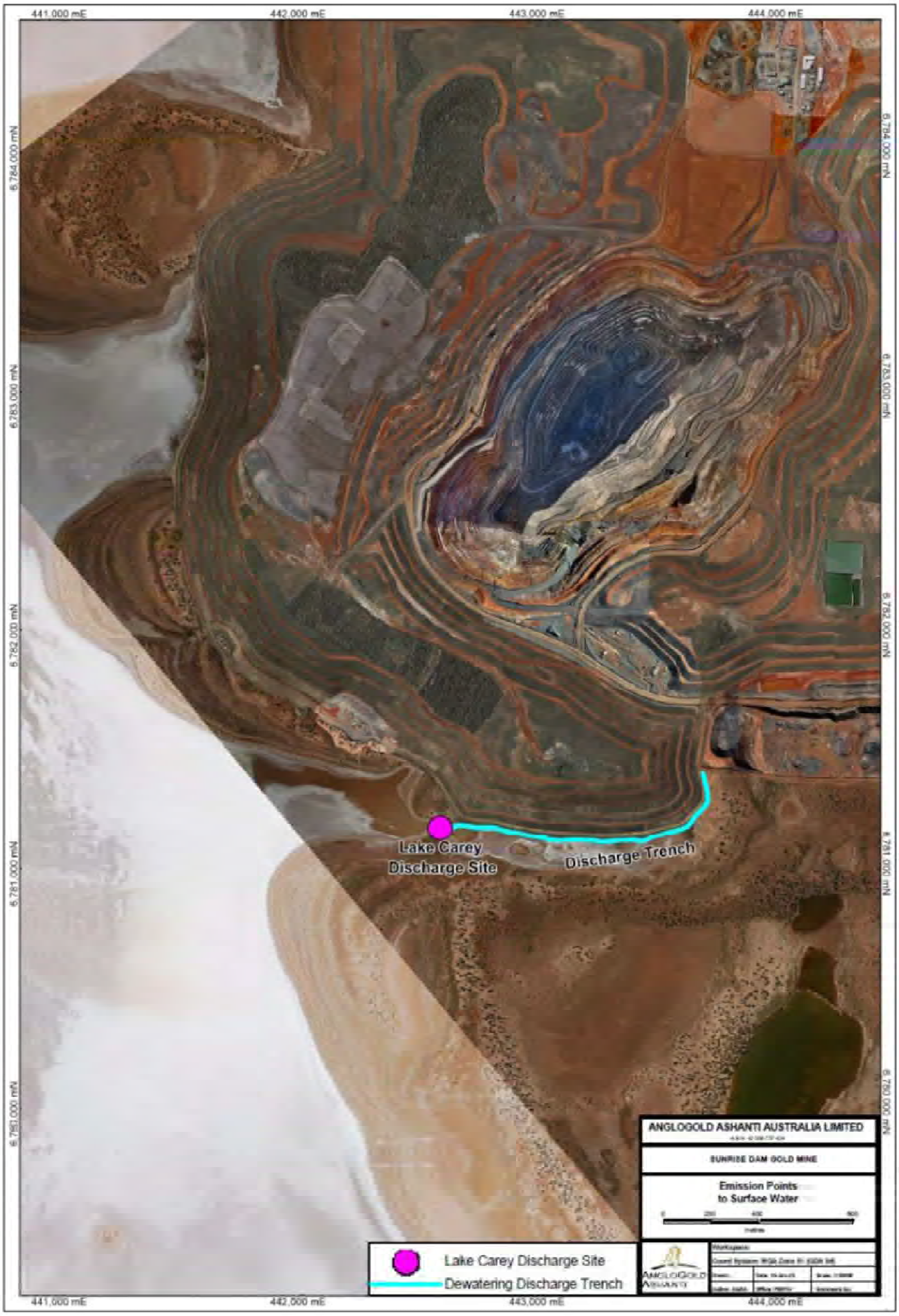

Figure 4: Dewatering discharge to Lake Carey

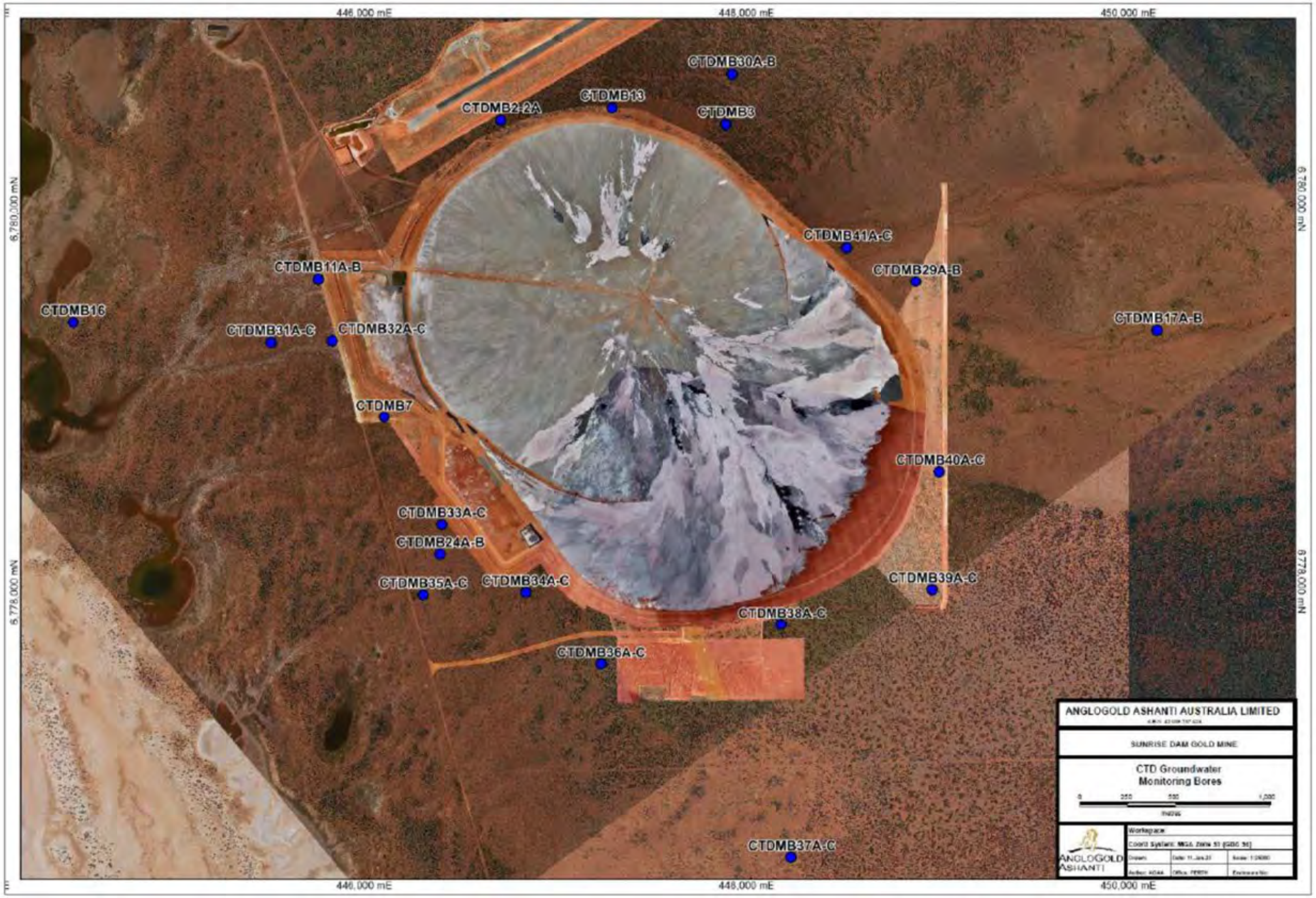

Figure 5: Groundwater monitoring bore locations

Figure 6: Landfill location map

Schedule 2: MBR Treatment Plant

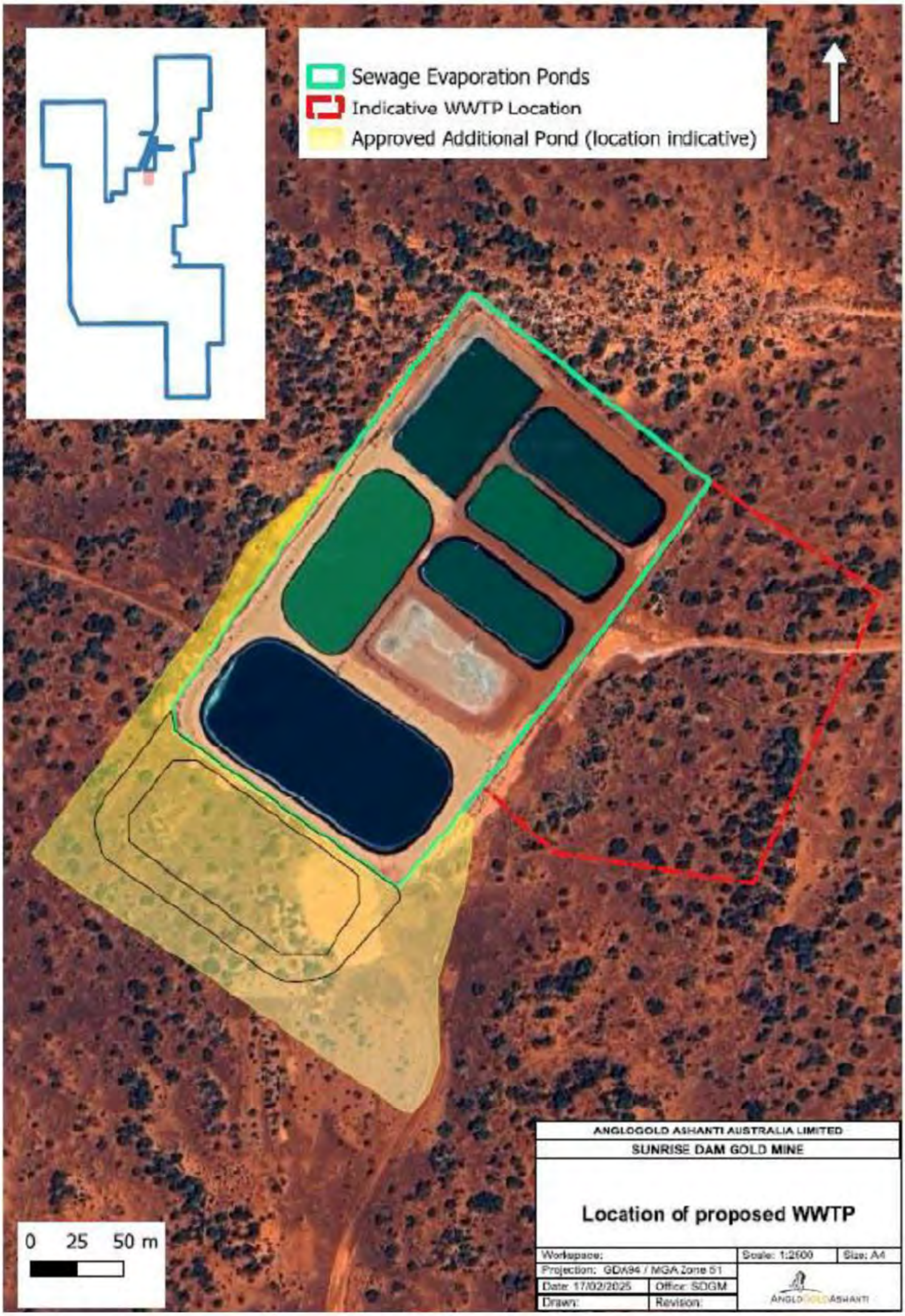

Figure 7: Membrane Bioreactor location

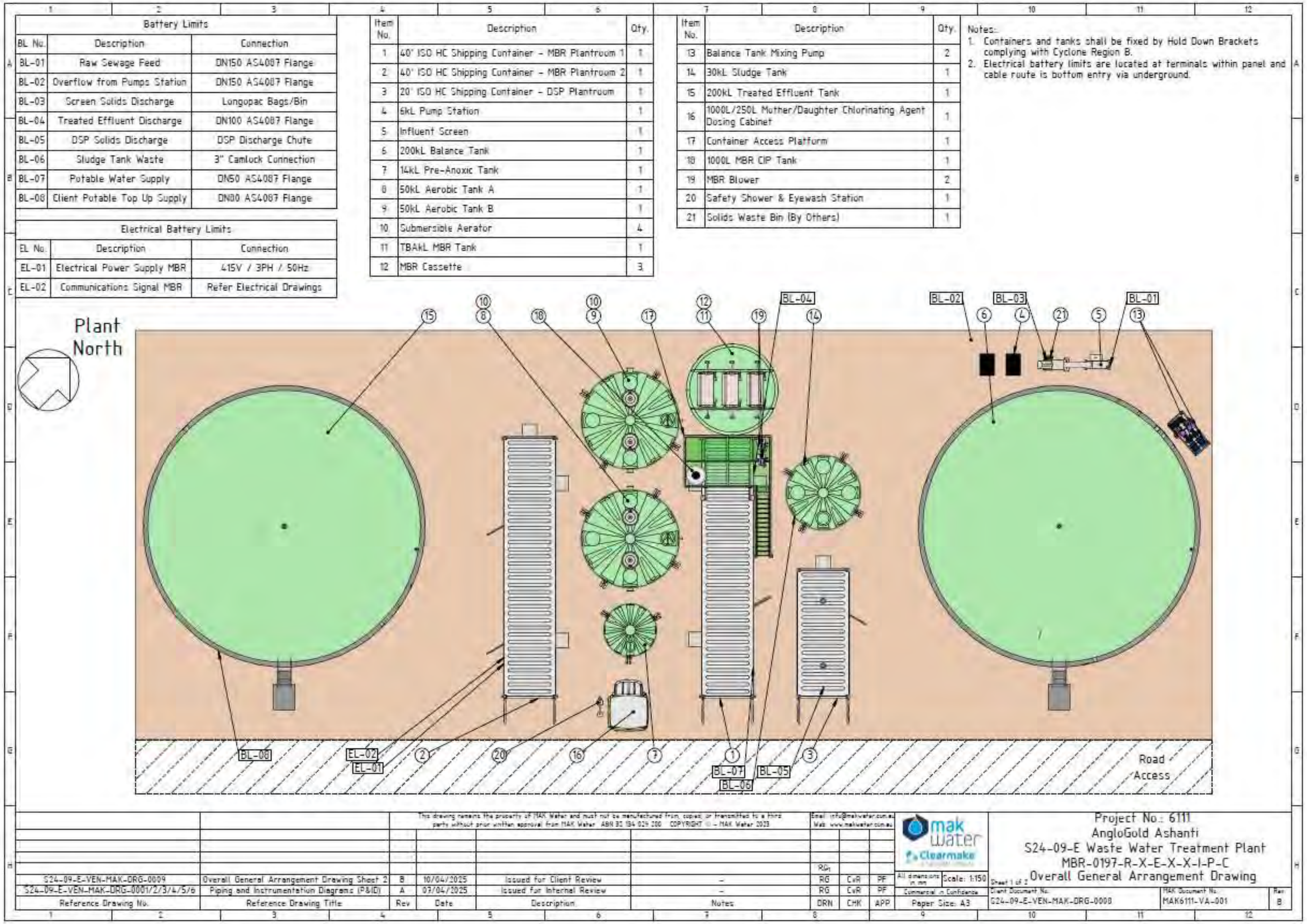

Figure 8: MBR treatment plant design

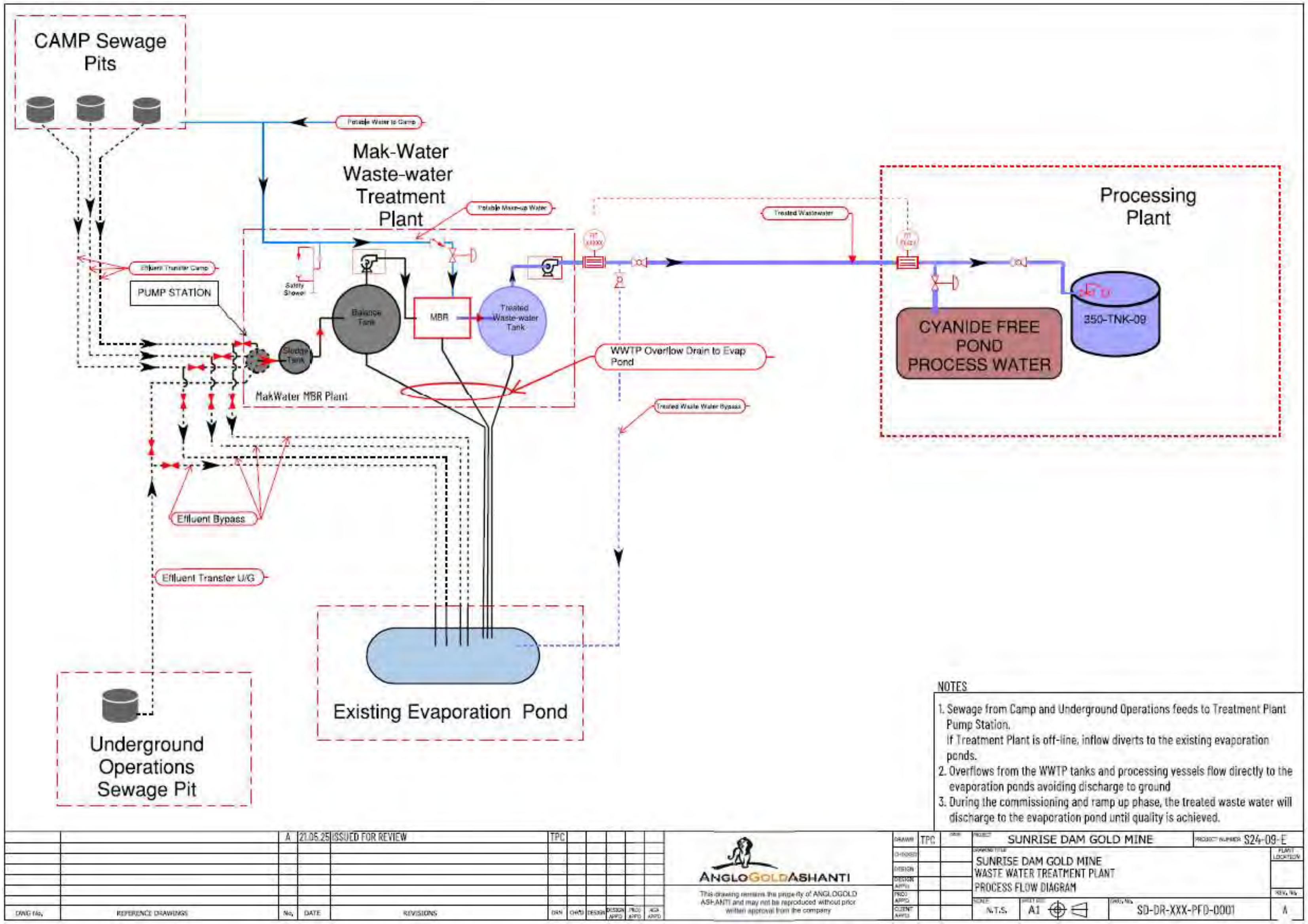

Figure 9: Sewage water process diagram

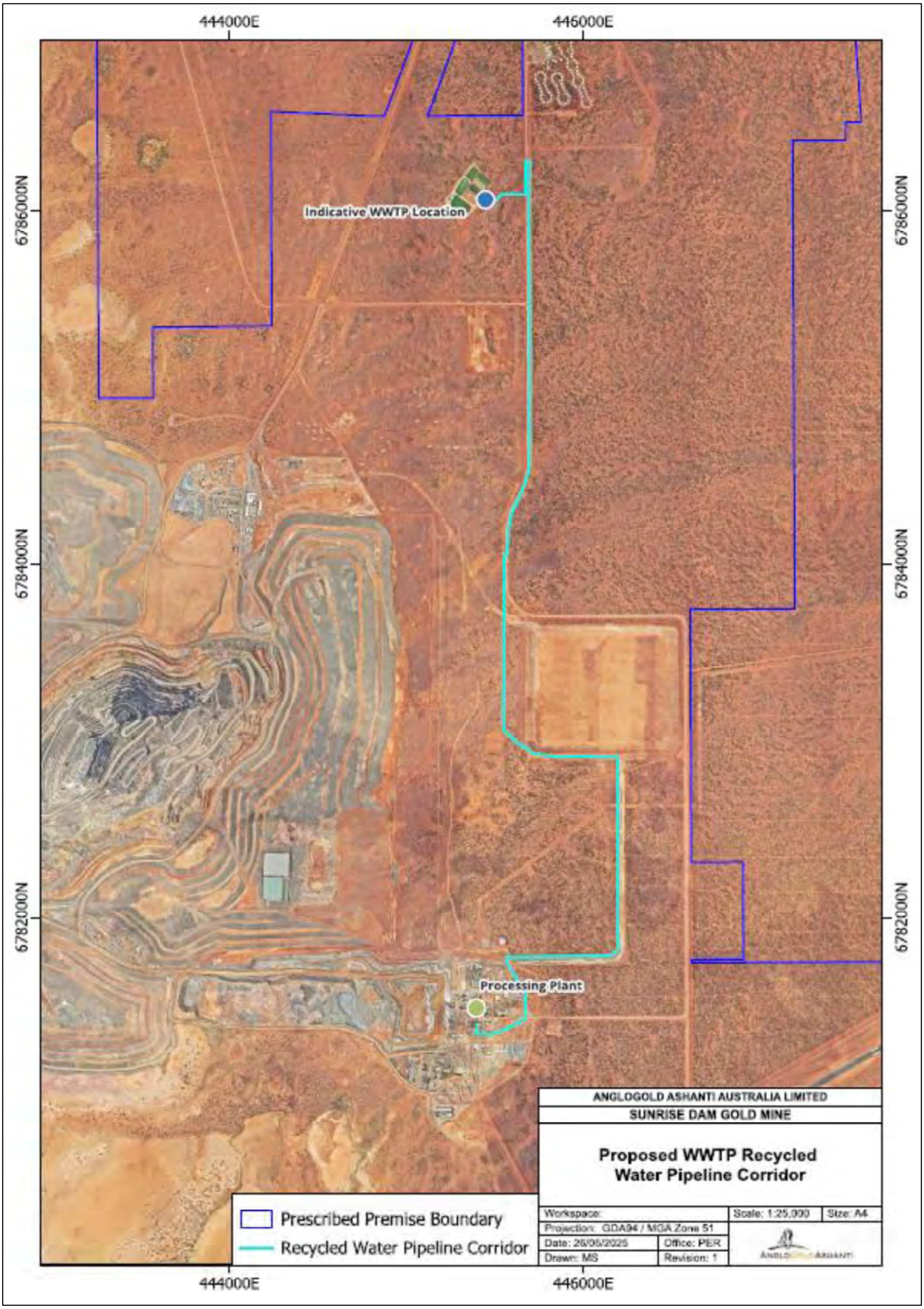

Figure 10: Treated water pipeline route

Appendix B Site Photographs 2025

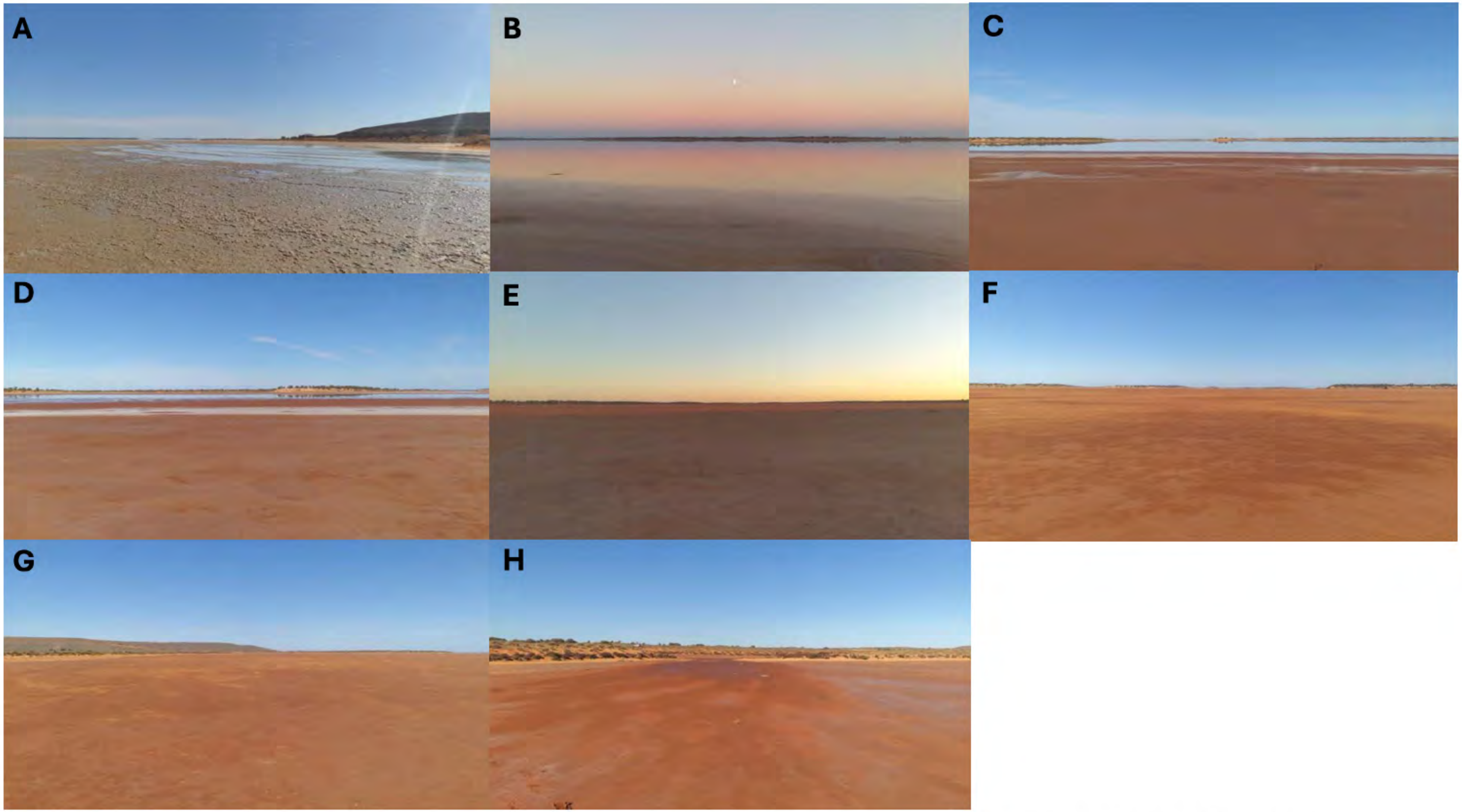

Plate B-1: Aquatic monitoring site photographs during the June 2025 survey; (A) SDDIS, (B) SDS1, (C) SDS2, (D) SDS4, (E) SDHD, (F) SDN1, (G) SDN2, and (H) SDN4.

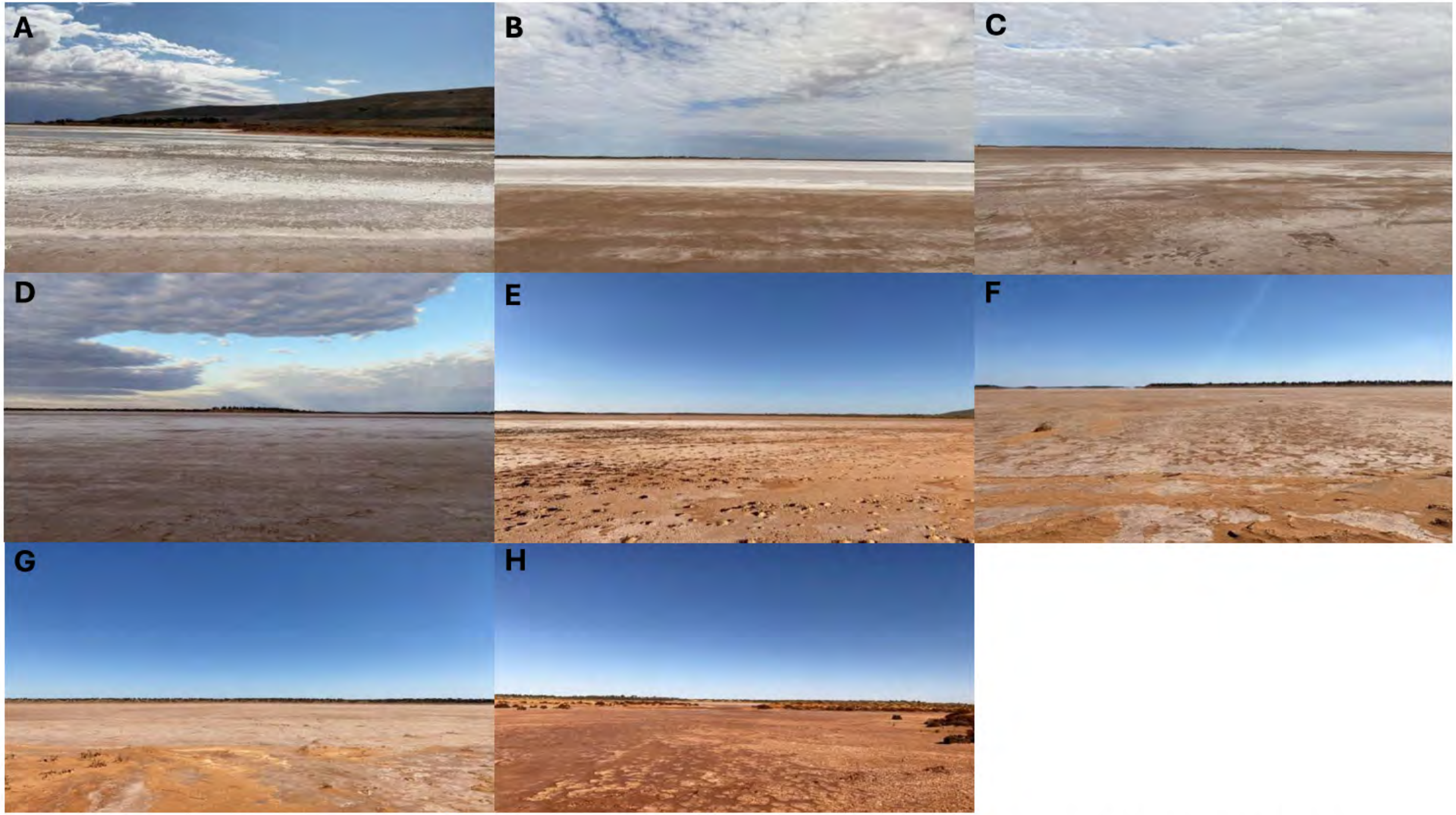

Plate B-2: Aquatic monitoring site photographs during the September 2025 survey; (A) SDDIS, (B) SDS1, (C) SDS2, (D) SDS4, (E) SDHD, (F) SDN1, (G) SDN2, and (H) SDN4.

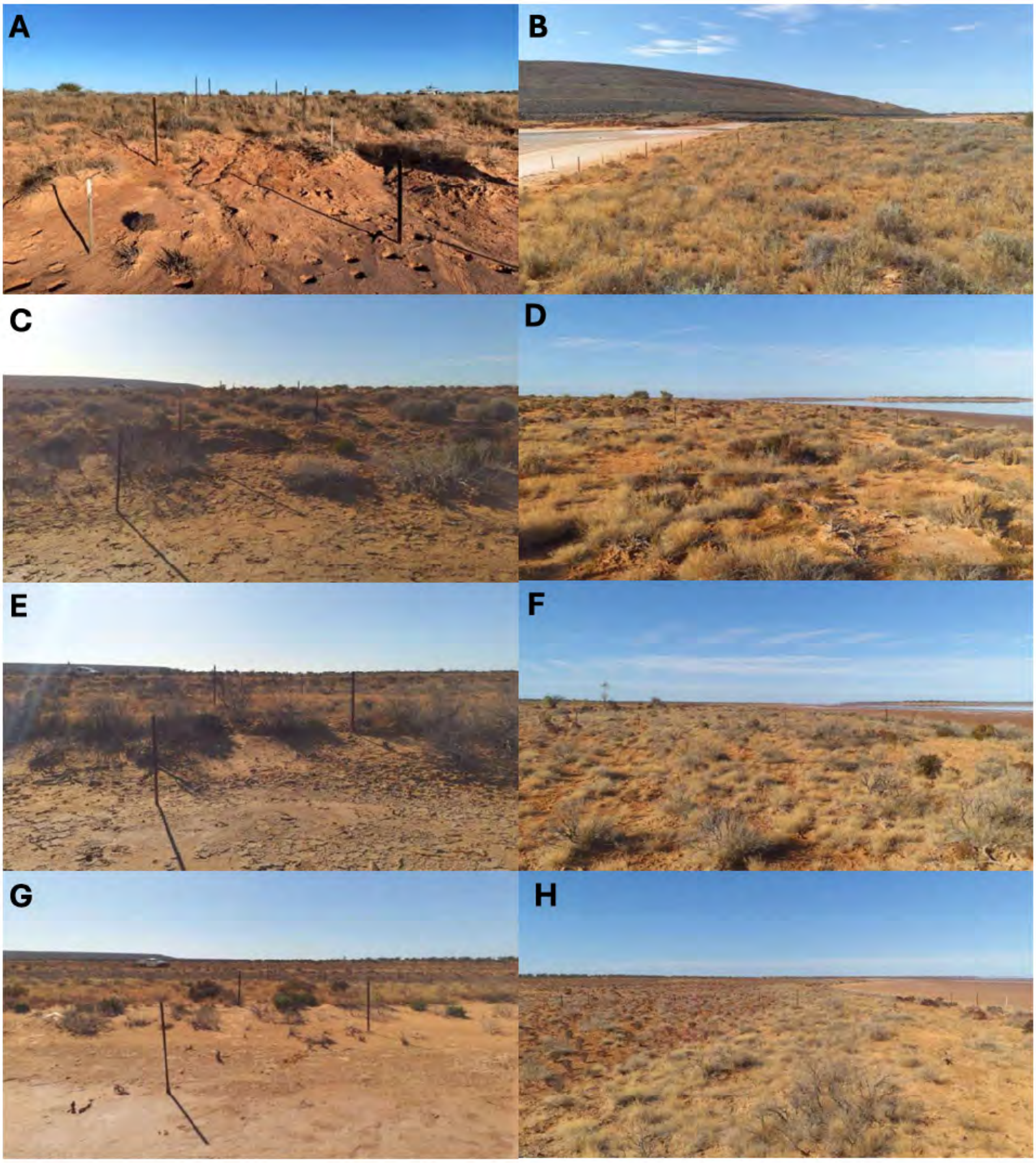

Figure B-3: Riparian vegetation monitoring transect photographs (front and side views) during the June 2025 survey: (A-B) SDDIS, (C-D) SDS1, (E-F) SDS2 and (G-H) SDS4.

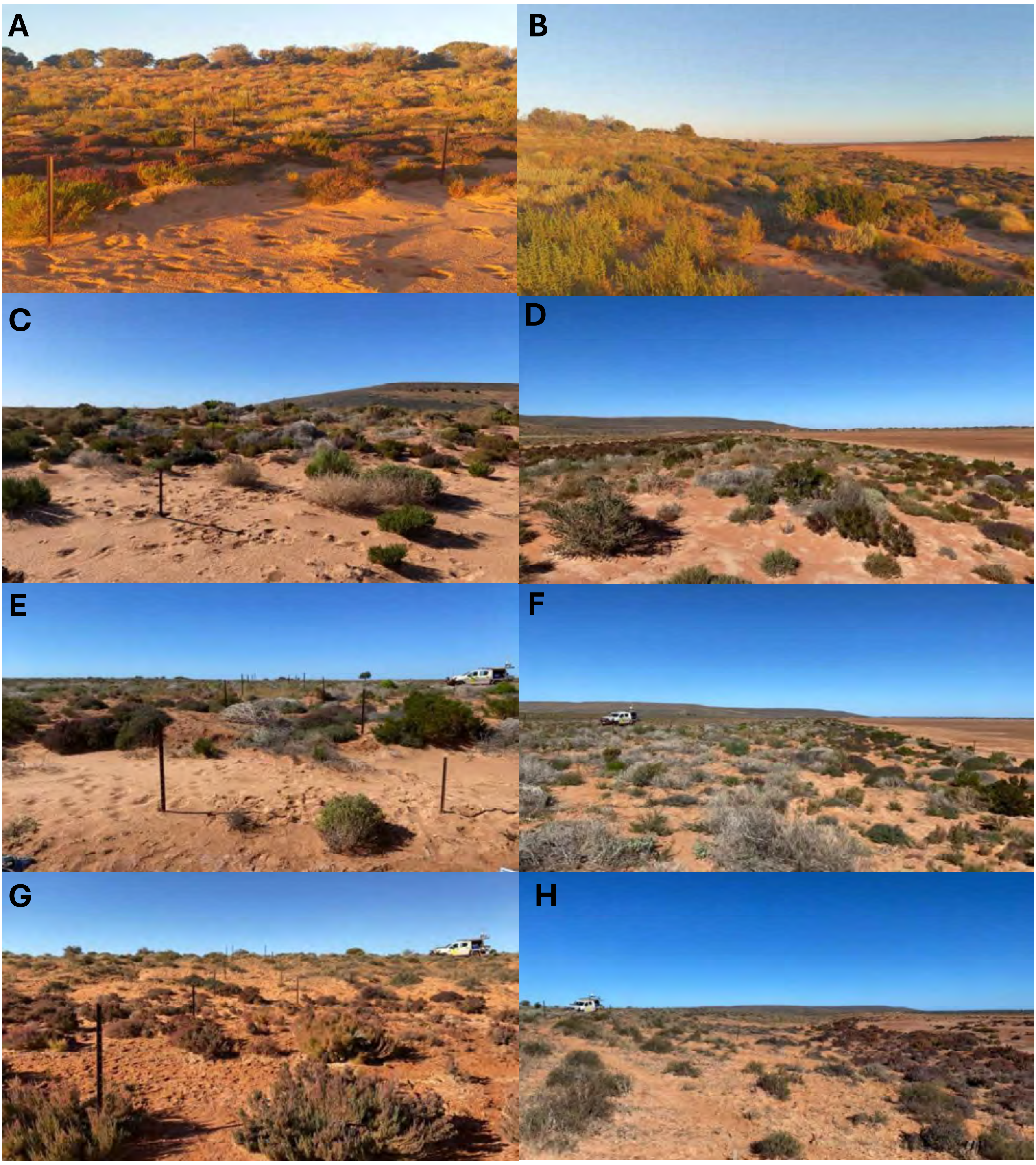

Figure B-4: Riparian vegetation monitoring transect photographs (front and side views) during the June 2025 survey: (A-B) SDHD, (C-D) SDN1, (E-F) SDN2 and (G-H) SDN4.

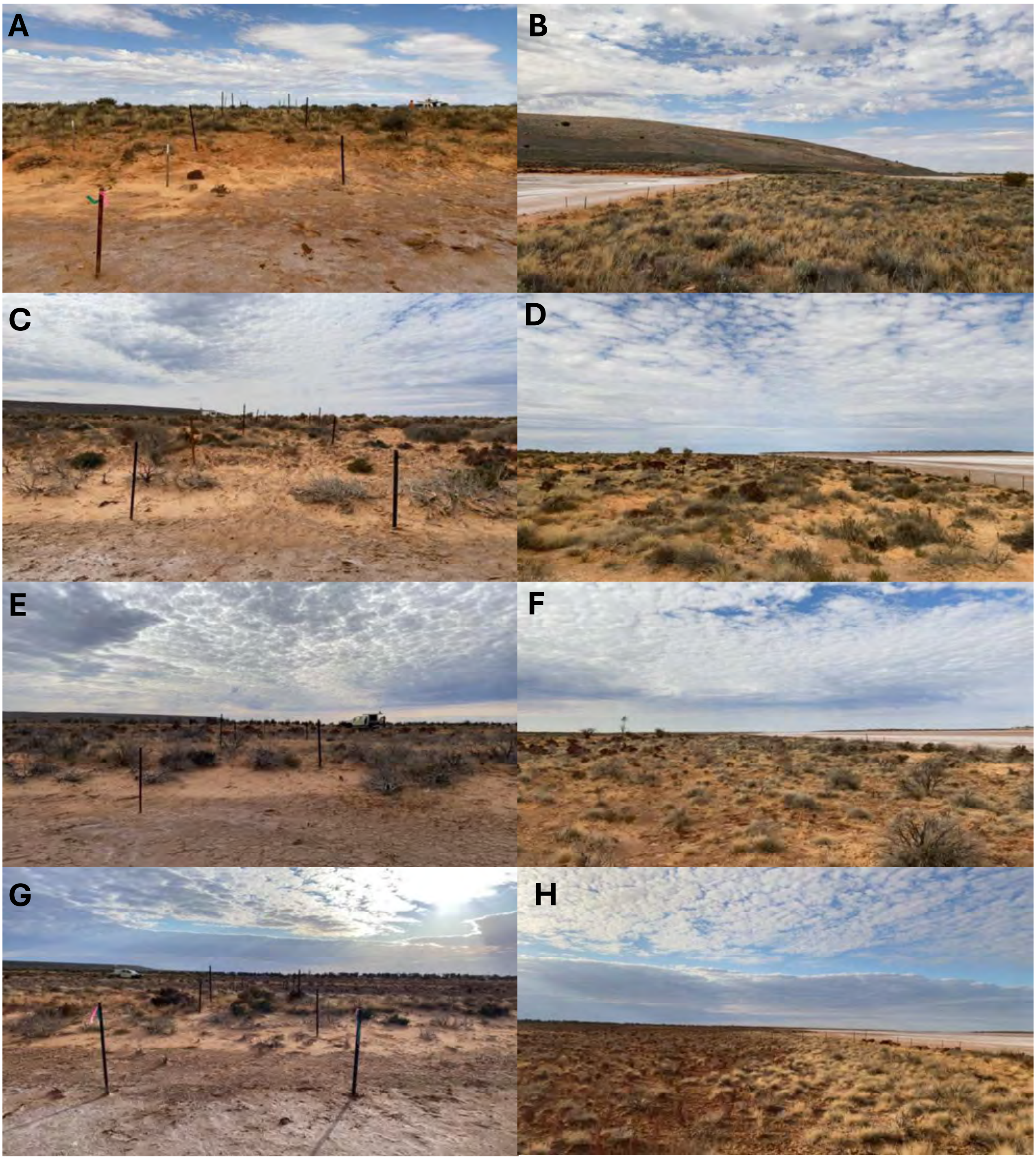

Figure B-5: Riparian vegetation monitoring transect photographs (front and side views) during the September 2025 survey: (A-B) SDDIS, (C-D) SDS1, (E-F) SDS2 and (G-H) SDS4.

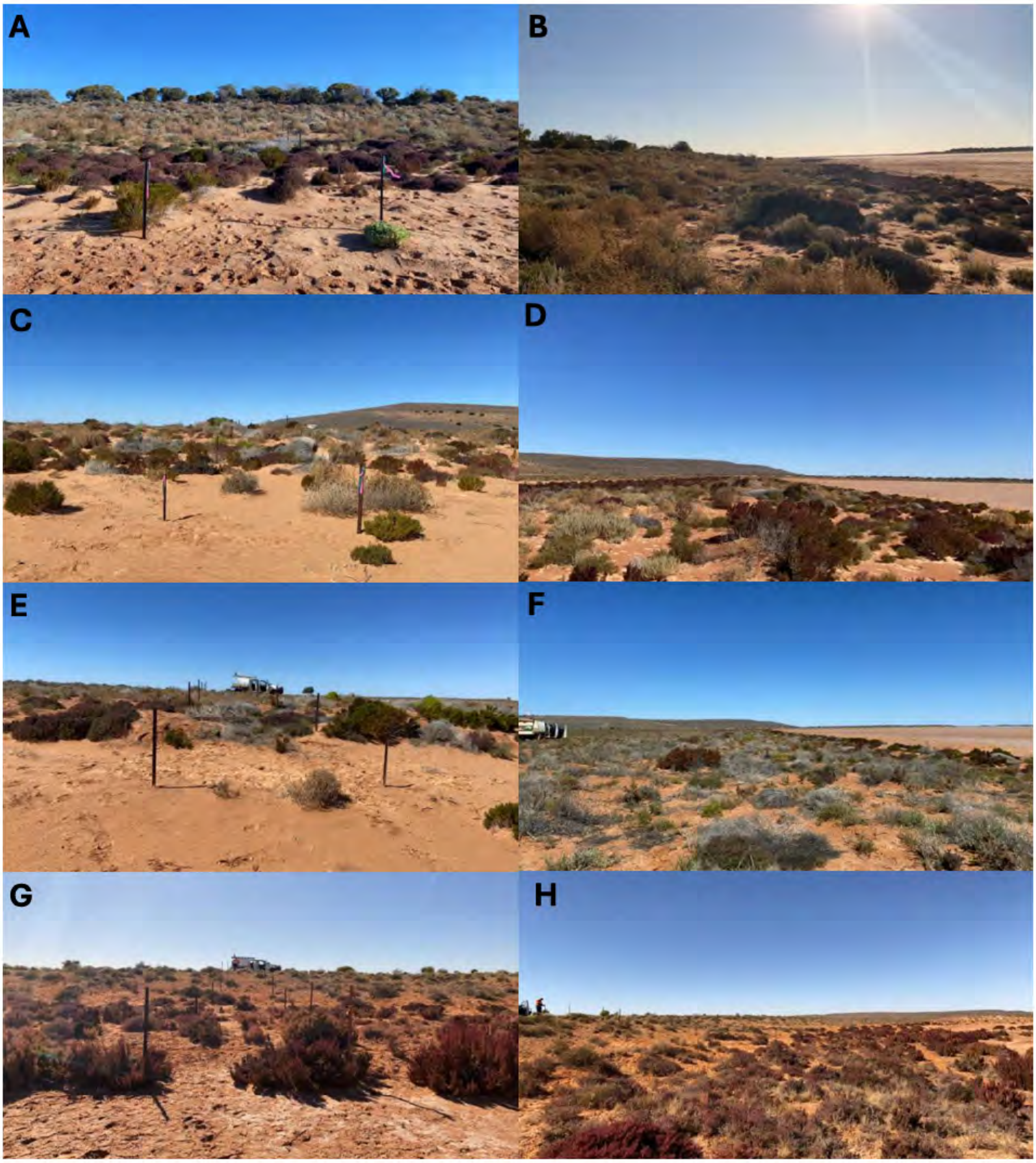

Figure B-6: Riparian vegetation monitoring transect photographs (front and side views) during the September 2025 survey: (A-B) SDHD, (C-D) SDN1, (E-F) SDN2 and (G-H) SDN4.

Appendix C *In situ* Water Quality Results

Table C-1: *In situ* water quality results collected during the 2025 Program.

Sites	pH	EC (µS/cm)	DO (mg/L)	ORP (mV)	Temp (°C)	Total Dissolved Solids (mg/L)	Water Depth (cm)	Salt Crust Thickness (cm)
June								
SDDIS	Not recorded						30	8
September								
SDDIS	7.1	222,695	1.45	110.4	21.2	122,430	50	8

Appendix D Historical Salt Crust Measurements

Table D-1: Changes in salt crust thickness over time on Lake Carey (measured in mm).

Year	SDDIS	SDS1	SDS2	SDS4	SDHD	SDN1	SDN2	SDN4
2013	15	15	3.75	2	1	0	0	0
2014	3	4.5	8.75	3.75	0	0	1.5	1.5
2015	10	1	2	1	1	1	0	0
2016	0	1	0	0	0	0	0	0
2017*	0	0	0	0	0	0	0	0
2018	1.5	5.5	5.5	2	0.5	0.5	1	1
2019	1.5	3.5	4	2.5	2	1.5	1	1.5
2020	2	6.5	2	0.75	1.25	0.25	1.25	1.5
2021	10	5	0	0	0	0	0	0
2022	3	5	3	3	0	0	0	0
2023	30	15	4	0	0	0	0	0
2024*	0	0	0	0	0	0	0	0
2025	30	0	0	0	0	0	0	0

*Note: * indicates major flood event.*

Appendix E Historical Discharge Volumes

Table E-1: Dewatering volume discharged onto Lake Carey from the SDGM between 1996 and 2025.

Volume (m^3)	January	February	March	April	May	June	July	August	September	October	November	December	Reporting Period Total
1996	0	0	0	94,564	118,409	93,429	83,914	73,767	81,080	8,360	72,250	52,805	678,578
1997	49,133	50,947	57,577	47,022	7,455	13,073	8,395	3,741	30,532	42,511	26,787	70,467	407,640
1998	33,951	48,011	51,991	51,182	31,552	97,475	56,513	70,547	75,080	99,561	78,666	76,666	771,195
1999	56,367	23,541	11,649	60,451	66,320	55,314	72,241	36,214	414	32,613	42,874	86,533	544,531
2000	72,391	69,356	57,688	0	0	0	0	0	0	65,219	63,522	25,351	353,527
2001	84,934	65,635	62,340	46,704	45,502	67,897	36,962	35,962	34,858	72,207	44,090	54,519	651,610
2002	43,757	22,821	32,802	25,612	36,280	5,579	8,639	22,934	75,581	73,058	38,093	37,844	423,000
2003	10,875	41,156	19,250	14,766	40,938	63,531	34,469	93,343	99,532	65,875	100,201	111,811	695,747
2004	33,406	138,740	437,906	929,286	368,279	142,796	195,071	110,683	58,016	4	0	0	2,414,187
2005	93,156	22,596	16,332	17,532	55,554	62,050	132,982	29,594	130,876	38,191	74,340	77,353	750,556
2006	119,055	66,078	130,109	64,258	77,867	111,452	36,564	42,030	36,876	24,609	14,546	19,204	742,648
2007	237,225	27,072	61,874	48,500	36,263	148,851	49,844	42,297	60,852	38,015	49,328	58,782	858,903
2008	47,734	163,560	66,189	83,081	79,094	92,406	116,657	76,625	20,062	28,274	73,719	133,736	981,137
2009	8,889	1,718	90,782	102,000	146,461	159,357	77,557	122,676	36,620	0	0	0	746,060
2010	0	0	20,000	28,000	10,000	10,000	25,000	110,000	110,000	130,000	25,000	20,000	488,000
2011	45,000	130,079	251,384	103,139	194,593	202,074	175,482	122,466	168,460	64,392	66,084	57,646	1,580,799
2012	164,761	79,681	159,554	159,554	174,753	171,999	46,719	95,179	44,236	34,873	32,856	32,717	1,196,882
2013	99,939	111,382	111,382	87,039	134,129	119,068	138,318	117,918	98,616	102,765	193,489	127,753	1,441,798
2014	132,090	121,586	91,801	112,814	143,976	109,960	87,259	80,264	79,169	114,403	47,220	77,895	1,198,437
2015	94,590	98,183	158,143	123,519	126,474	195,711	136,583	238,965	210,886	262,564	263,397	172,735	2,081,750
2016	278,478	210,208	284,232	197,507	171,362	202,878	282,910	258,570	263,696	346,963	365,953	265,609	3,128,366
2017	226,167	352,384	326,211	330,602	305,439	271,665	283,304	265,194	189,664	234,780	139,700	171,218	3,096,328
2018	232,095	351,958	154,308	90,618	126,275	165,069	123,993	117,593	75,518	90,983	162,043	155,218	1,845,671
2019	163,745	130,077	130,861	131,839	174,795	231,406	176,690	192,160	100,916	29,255	50,649	51,346	1,563,739
2020	260,540	50,896	58,167	19,389	1,212	27,872	7,271	59,379	0	110,881	1,212	101,792	698,611
2021	54,282	38,433	74,632	50,202	77,410	57,797	75,073	40,930	12,142	3,068	37,840	8,193	530,001
2022	5,798	30,034	36,737	43,244	72,387	55,628	58,067	62,027	10,897	17,840	38,455	18,749	449,863
2023	37,077	73,558	88,973	102,491	83,099	66,810	84,133	45,111	48,423	67,364	59,200	34,623	790,862
2024	118,275	38,609	269,725	148,637	157,995	174,944	165,852	141,869	57,610	94,582	119,903	126,064	1,614,065
2025	99,802	95,943	157,307	111,587	65,317	56,974	35,575	26,085	34,791	11,191	14,591,0	11,575,0	720,738
Total	2,803,711	2,558,300	3,312,599	3,313,551	3,063,872	3,176,090	2,776,462	2,708,038	2,210,612	2,293,209	2,281,418	2,226,629	32,724,491

Appendix F Historical Salt Load

Table F-1: Salt load deposited onto Lake Carey from the SDGM discharge water between 2005 and 2025.

Year	Salt Load (t)
2005	178,982
2006	186,218
2007	44,598
2008	255,523
2009	201,654
2010	122,200
2011	372,682
2012	311,218
2013	335,104
2014	281,371
2015	536,644
2016	612,279
2017	605,424
2018	409,895
2019	358,344
2020	166,566
2021	141,126
2022	125,046
2023	216,800
2024	371,253
2025	218,023
Total	**6,050,951**

Appendix G Historical Sediment Quality ANOVA Results

Table G-1: Summary of ANOVA results of historical sediment quality, comparing discharge and control sites, at Lake Carey over time. All units in mg/kg unless stated otherwise.

Sediment Quality Parameters		ANOVA Results		Means	
		p-value	Significance	Discharge	Control
Basic and Nutrients	pH (unit)	Data not normally distributed		7.8	7.8
	Total Soluble Salts	Data not normally distributed		103,113	68,590
	Moisture Content (%)	0.000	*	27.3	19.0
	Total Nitrogen	Data not normally distributed		412.0	370.8
	Total Phosphorus	0.001	*	177.0	143.1
	Total Organic Content (%)	Data not normally distributed		0.62	0.43
Metals and Trace Elements	Aluminium	0.000	*	5,399	7,498
	Chromium	0.000	*	55.7	68.1
	Cobalt	Data not normally distributed		6.51	6.22
	Copper	0.121	NS	21.4	18.1
	Iron	0.000	*	15,166	20,835
	Lead	Data not normally distributed		22.8	7.2
	Manganese	0.000	*	290.9	209.1
	Nickel	Data not normally distributed		21.3	22.9
	Vanadium	0.000	*	34.5	45.5
	Zinc	Data not normally distributed		34.1	20.2

Appendix H Historical Diatom Data

Table H-1: Historical diatom diversity recorded at Lake Carey in the vicinity of SDGM (2002 to 2025).

Diatom Taxa	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Amphora coffeaeformis	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
Amphora holsatica																●							●	
Amphora sp. aff. *luciae*																							●	
Caloneis bacillum													●		●								●	
Cocconeis placentula																●	●							
Craticula cuspidata					●							●	●	●										
Cyclotella meneghiniana		●		●																				
Entomoneis paludosa	●		●		●						●	●			●		●						●	
Entomeis sp. aff. *paludosa*																●								
Entomeis tenuistriata																							●	
Hantzschia amphioxys				●	●		●	●	●		●	●	●	●	●		●			●	●	●	●	
Hantzschia sp. aff. *baltica*	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Hantzschia sp. aff. *virgata*																●								
Hantzschia virgata					●											●							●	
Luticola cohnii													●		●		●							
Luticola mutica				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●
Luticola nivalis								●	●				●		●			●						
Luticola sp. aff. *kotschyi*												●					●							
Navicella pusilla	●		●	●	●	●		●		●	●	●	●		●	●	●	●	●		●		●	●
Navicula cryptocephala			●					●		●	●					●							●	
Navicula elegans			●	●	●	●	●		●		●	●	●	●			●							
Navicula ergadensis				●	●																			
Navicula recens																●								
Navicula sp. aff. *cryptotenella*											●													
Navicula sp. aff. *duerrenbergiana*																●								
Navicula sp. aff. *incertata*	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Navicula sp. aff. *incertata* var.1																●								
Navicula sp. aff. *salinicola*				●	●	●		●	●	●	●	●	●	●	●	●	●						●	●
Navicula sp. A (LC2005)													●				●							
Navicula tenelloides				●				●				●	●											
Nitzschia closterium																							●	
Nitzschia epithemoides																							●	
Nitzschia fontifuga																●							●	
Nitzschia frustulum				●						●														
Nitzschia microcephala																							●	
Nitzschia nana																							●	
Nitzschia ovalis	●		●					●		●	●				●	●	●		●				●	●
Nitzschia palea										●		●				●								
Nitzschia pellucida				●								●	●	●	●								●	
Nitzschia punctata	●		●	●	●	●	●	●		●	●	●		●				●	●		●			

Diatom Taxa	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Nitzschia punctata forma *minor*																●	●			●			●	
Nitzschia sp. aff. *agnita*																●								
Nitzschia sp. aff. *archibaldii*																●								
Nitzschia sp. aff. *rostellata*																●								
Nitzschia sp. A (LC2002)	●																							
Nitzschia sp. B (LC2004)			●																					
Pinnularia borealis						●	●						●	●										
Pinnularia divergens																							●	●
Pinnularia sp. A (LC2006)					●																			
Pinnularia sp. aff. *borealis*					●															●				
Pinnularia sp. aff. *viridis*																●								
Pleurosigma elongatum																●								
Pleurosigma salinarum																							●	
Proschkinia sp. aff. *complanata*																●								
Annual Diversity	**8**	**3**	**10**	**13**	**15**	**9**	**8**	**12**	**8**	**11**	**13**	**15**	**16**	**11**	**13**	**25**	**15**	**7**	**6**	**6**	**6**	**4**	**24**	**8**
Classification Diversity	**54**																							

Appendix I Historical Soil Analysis

Table I-1: Historical soil quality data from the riparian zone of Lake Carey between 2007 and 2018 (before new methods were introduced).

Year	D		HD	C		D		HD	C		D		HD	C	
	SR1b	SR8	SRHD	SRC	SRN	SR1b	SR8	SRHD	SRC	SRN	SR1b	SR8	SRHD	SRC	SRN
	pH (units)					Salinity (TSS mg/kg)					Moisture Content (%)				
2007		8.0			7.6		5,547			2,602		19.8			18.1
2008		7.9			7.8		5,680			3,513		15.6			13.5
2009		7.8			7.5		27,330			12,738		18.1			11.5
2010		8.1			8.0		9,898			10,703		17.7			14.7
2011		7.8			8.1		13,043			8,305		21.4			12.0
2012		8.0			7.5		57,370			7,355		17.6			8.4
2013		7.8			8.0		34,865			7,830		19.6			11.5
2014	8.2	7.9			8.2	48,725	57,303			8,753	22.1	20.2			12.9
2015	8.1	7.9			7.8	106,125	46,000			7,248	22.8	18.7			11.9
2016	8.0	7.7	7.9	7.8	7.9	50,150	29,790	21,503	18,520	7,370	21.9	21.2	14.4	14.2	12.9
2017	7.5	7.5	7.6	7.5	7.7	14,298	14,370	12,113	10,035	6,723	27.8	29.5	19.3	16.8	16.0
2018	7.7	7.3	7.4	7.275	7.3	103,150	58,200	49,852.5	35,100	43,400	17.625	19.175	11.6	15.9	14.7

Table I-2: Historical soil quality data from the riparian zone of Lake Carey between 2019 and 2025.

Soil Parameters	DO		D						HD		C					
	SDDIS		SDS1		SDS2		SDS4		SDHD		SDN1		SDN2		SDN4	
	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m
May-19																
pH (units)	8.0		8.4		8.4		8.6		8.1		8.4		8.4		8.2	
TSS (mg/kg)	54400.0		86500.0		64500.0		76500.0		30100.0		59500.0		54250.0		48250.0	
Moisture Content (%)	12.0		23.2		26.6		21.4		7.2		14.7		11.4		9.7	
May-20																
pH Value	8.2	8	8.1	8.1	8	8	8	8.2	7.9	7.8	8.1	8.1	8	7.9	8.6	7.7
Total Soluble Salts (mg/kg)	54,400	8,130	34,600	97,600	58,100	97,600	93,500	86,100	85,800	6,770	33,800	53,100	18,400	7,960	41,000	6,870
Moisture Content (%)	18.2	6.9	15.6	18.3	21.4	17.7	25.5	17.4	4.5	1.3	13.1	13.1	13.7	11.7	11	1.4
Sep-20																
pH Value	8.2	8	8.5	8.4	7.6	8.1	8.7	8.3	8.8	7.9	8.3	8.4	8.3	8	8.4	7.8
Total Soluble Salts (mg/kg)	39,900	6,690	37,600	38,600	28,900	38,400	40,000	18,900	48,200	7,440	20,600	49,900	33,600	6,610	43,300	6,240
Moisture Content (%)	19.1	6.9	21.1	13.3	23.4	20.8	12.5	15.8	7.2	1.5	10.9	9.7	15	11.3	22.3	3.7
May-21																
pH (unit)	8.4	7.6	8.6	8.8	8.4	8.6	8.5	8.6	8.2	7.7	8.4	8.3	8.4	8.1	8.2	7.6
TSS (mg/kg)	7,580	7,540	12,100	47,600	54,800	33,300	41,900	31,000	33,100	5,320	9,890	12,300	14,400	7,480	69,500	7,550
MC(%)	19.6	12.6	18.7	20.7	21.7	20.6	20.7	23.1	16.6	8.9	22.5	24.5	18.7	16	25.2	7.7
Sep-21																
pH (unit)	7.9	8	8.3	8.3	8.4	8.2	8	8.7	8.2	7.4	8.2	8.1	8.3	7.9	8.6	7.6
TSS (mg/kg)	51,900	8,160	81,300	42,800	60,600	35,500	50,500	21,100	44,900	11,400	44,000	72,200	22,300	8,530	38,400	7,600
MC(%)	21.8	6.2	29.2	23.5	24.3	27	19.5	19.7	11.5	1.8	16.6	13.6	17.3	11.4	13.2	2
May-22																

Soil Parameters	DO		D						HD		C					
	SDDIS		SDS1		SDS2		SDS4		SDHD		SDN1		SDN2		SDN4	
	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m
pH (unit)	8.1	8.2	8.2	8.4	8.6	8.6	8	8.6	8.3	8.2	8.2	8.2	8.2	8	8.5	7.8
TSS (mg/kg)	58,600	8,020	22,300	57,500	50,400	40,100	44,400	25,500	17,900	9,860	11,000	27,100	13,800	8,300	39,700	7,820
MC (%)	20.2	8.4	36.5	24	22.3	21.9	20.3	17.7	13.1	11.8	30.5	10.4	31.2	12.7	11.8	4.1
Sep-22																
pH (unit)	8	8.2	5.6	8.3	8.6	8.5	8.4	8.4	8.2	8.3	8.2	8.3	7.7	8	7.7	8.2
TSS (mg/kg)	7,700	65,600	30,600	47,200	29,800	38,400	34,900	67,100	9,010	9,890	16,600	15,300	8,600	9,690	7,450	11,700
MC (%)	9.8	20	21	25.8	19.3	23.1	19.4	24.1	12.4	16.7	13.4	18.8	11.4	14.9	3.9	13
Apr-23																
pH (unit)	7.6	7.7	8.4	8.6	8.4	8.5	7.8	8.5	7.9	7.9	8.1	8	7.9	7.9	8.3	7.8
TSS (mg/kg)	41,600	8,060	74,600	133,000	31,800	35,000	106,000	75,600	57,100	10,200	10,700	67,000	32,500	8,090	11,800	7,710
MC (%)	14.4	4.8	21.9	14.1	8.8	12.9	9.1	7.6	7.7	4.5	4.1	7.6	6.4	6	5.2	2.3
Sep-23																
pH (unit)	8.4	8	8.6	8.8	8.8	8.6	8.2	8.5	8.2	8.1	8.2	8.1	8.3	8.2	8.4	7.6
TSS (mg/kg)	66,700	7,810	74,200	69,200	57,300	50,900	61,500	103,000	19,800	76,100	39,200	54,900	44,600	17,800	32,400	8,280
MC (%)	21	9.8	24	17.8	23.3	22.9	21.9	19.2	13.3	9.6	14.5	10.1	15.2	11	9.3	1.7
Sep-24																
pH (unit)	8.2	8	7.7	8	7.7	8	7.7	8	8.2	8	8	7.6	8.1	7.9	8.1	7.8
TSS (mg/kg)	44,600	7,250	31,600	21,800	29,000	46,400	77,400	46,600	26,600	8,170	19,200	80,500	20,800	17,000	29,300	8,470
MC (%)	25.4	10	27.8	25	30.9	29.3	30.6	26.5	23.2	10.1	39.8	33.8	23.8	10.2	28.3	5.6
Jun-25																
pH (unit)	8.8	7.8	8.5	8.3	8.4	8.6	8.2	8.6	8.3	8.4	8.8	8.3	8.9	8.0	8.8	8.3

Soil Parameters	DO		D						HD		C					
	SDDIS		SDS1		SDS2		SDS4		SDHD		SDN1		SDN2		SDN4	
	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m	0m	30m
TSS (mg/kg)	48,800	8,230	16,500	13,800	18,500	50,000	51,500	56,100	8,260	7,990	8,190	31,300	8,230	8,260	60,400	8,020
MC (%)	16.6	7.8	19.5	17.9	21.2	24.4	23	25.8	15.8	16	17.2	16.7	16.7	11.7	18	7.6
Sep-25																
pH (unit)	8.2	8.1	6.9	7.1	7.1	7.6	7.2	7.3	8.0	7.8	7.9	7.9	7.9	7.7	8.3	7.8
TSS (mg/kg)	74,100	7,650	11,200	50,700	26,300	34,100	61,800	41,600	8,330	8,130	8,600	106,000	9,110	8,330	86,100	7,580
MC (%)	24.2	17.6	23.4	20.4	23.5	25.5	26.2	21.6	15.7	9.6	16.7	19.8	18.3	11.9	23.2	6.6

Appendix J Riparian Vegetation Monitoring Transect Data

Table J-1: Summary of riparian vegetation monitoring transect data at Lake Carey during the June survey of the 2025 Program.

Riparian Vegetation Taxa	Discharge Outfall			Discharge									Historic Discharge			Control								
	SDDIS			SDS1			SDS2			SDS4			SDHD			SDN1			SDN2			SDN4		
	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H
Aizoaceae																								
?Gunniopsis sp.	9	0.3	3																1	0.5	3			
Amaranthaceae																								
Ptilotus sp.	1	0.2	2																					
Asteraceae																								
**Sonchus oleraceus*	11	0.4	3																					
Asteridea chaetopoda				20	3.1	3																		
Chenopodiaceae																								
Atriplex ?bunburyana																			2	1	4			
Atriplex ?vesicaria																3	2.2	3	6	3.4	3			
Atriplex codonocarpa													1	0.1	3	1	0.2	2	4	0.4	3			
Atriplex vesicaria	3	2.9	3	1	0.2	3							13	9	3				1	0.2	3	6	2.4	3
Maireana appressa	5	0.9	3																					
Maireana erioclada													4	4.5	3	3	4.2	3	3	0.8	3	1	0.1	2
Maireana glomerifolia													1	1.2	3				0	0.4	3			
Maireana tomentosa subsp. *tomentosa*	3	0.3	3	9	1.1	2	1	0.1	2	1	1.3	4				2	5.5	2	8	3.5	3	1	0.1	2
Maireana amoena																1	0.2	3						
Salsola australis	9	0.7	3										171	32.6	2	49	28.1	2	137	48.9	2	1	0.1	2
Sclerolaena fimbriolata	80	3.3	3							16	0.3	2	4	0.4	2				11	2.7	3	79	6.3	2
Sclerolaena eurotioides																						1	0.3	3
Tecticornia calyptrata	1	0.6	3				3	1.9	3	2	0.3	2	39	61.6	3	22	16.6	3	13	24.9	4	16	5	2
Tecticornia mellarium				21	2.5	2										1	0.3	3				2	6.7	2
Tecticornia peltata										1	0.2	2												
Tecticornia pergranulata subsp. *pergranulata*																						4	6.3	2
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	1	0.1	2	8	4.4	3	18	14.1	3	136	15	3	8	5	3	24	30.2	3	0	3	3	6	9	2
Tecticornia undulata	3	1	3	4	0.6	3				2	0.3	2	1	1.4	3	6	10.3	3				3	0.7	2
Tecticornia pruinosa				54	9.9	3	11	5.2	3	84	5.1	2	2	2	3	5	4.5	2	1	0.8	3	22	11.1	2
Fabaceae																								
Swainsona purpurea	72	5	2																			50	3.6	2
Frankeniaceae																								
Frankenia cinerea							26	1	3	16	0.2	3				32	11.2	3				2	3.6	3
Frankenia pauciflora	10	0.4	3	213	8.6	3							51	11.4	4							1	0.3	3
Frankenia pauciflora var. *pauciflora*																			54	16.7	3			
Frankenia setosa																						12	0.4	3
Goodeniaceae																								
Coopernookia strophiolata	4	0.3	3				3	0.1	3	6	0.2	2							24	2.5	3			
Montiaceae																								
Calandrinia sp.																0	0.7	3						
Poaceae																								
Enneapogon caerulescens	16	1.1	3																			9	0.5	3
Eragrostis dielsii	51	6.5	3										2	0.3	3	2	0.3	3	3	0.4	3			
Eragrostis pergracilis	336	56.6	2	533	172.2	2	549	92.5	2	290	27.9	2	24	7.3	2				5	0.7	2	127	8.6	2

Riparian Vegetation Taxa	Discharge Outfall			Discharge									Historic Discharge			Control								
	SDDIS			SDS1			SDS2			SDS4			SDHD			SDN1			SDN2			SDN4		
	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H
Eragrostis setifolia	37	6,1	2																					
Solanaceae																								
Solanum nummularium																			1	0,2	3	1	0,1	3
Zygophyllaceae																								
Roepera eichleri				4	0,4	2													5	0,7	2	1	0,1	2
Grand Total	652	86,7	3	867	203	2	611	114,9	3	554	50,8	2	321	136,8	3	151	114,5	3	279	111,7	3	345	65,3	2

Table J-2: Summary of riparian vegetation monitoring transect data at Lake Carey during the September survey of the 2025 Program.

Riparian Vegetation Taxa	Discharge Outfall			Discharge									Historic Discharge			Control								
	SDDIS			SDS1			SDS2			SDS4			SDHD			SDN1			SDN2			SDN4		
	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H
Aizoaceae																								
Gunniopsis septifraga													1	0.1	2									
Amaranthaceae																								
Ptilotus sp.	3	0.1	2																					
Asteraceae																								
**Sonchus oleraceus*	6	0.3	2																					
Asteridea chaetopoda				18	3	3																		
Calocephalus sp.																						2	0.1	3
Minuria cunninghamii																1	0.1	3						
Trichanthodium skirrophorum	1	0.1	3																			19	0.4	3
Chenopodiaceae																								
Atriplex ?bunburyana																			2	0.7	3			
Atriplex ?vesicaria																2	1.4	3						
Atriplex codonocarpa													1	0.1	3	4	0.4	3	11	1.3	3			
Atriplex vesicaria	4	2.8	3	1	0.2	2							15	10.3	3				7	3.6	3	5	1.8	3
Maireana appressa	3	0.5	2																					
Maireana eriociada													5	4.2	3	4	3.8	3	5	0.8	3			
Maireana glomerifolia													1	1	3									
Maireana tomentosa subsp. *tomentosa*	4	0.3	2	6	0.6	2				1	1.3	3				2	2.8	2						
Maireana amoena																1	0.2	3	4	1.6	3			
Salsola australis	12	1	2										29	4.5	2	27	14.3	2	30	12	2	1	0.1	3
Sclerolaena fimbriolata	88	3.2	2							13	0.6	2	2	0.3	2				11	1.4	2	60	5.1	2
Sclerolaena eurotioides	1	0.3	2																			1	0.3	2
Tecticornia calyptrata	1	0.2	2				3	1.1	3	2	2.3	3	37	57.3	3	14	6.5	3	14	24	3	13	3.7	2
Tecticornia mellarium				23	2.3	2										3	6.1	3				4	7	3
Tecticornia peltata										1	0.1	2												
Tecticornia pergranulata subsp. *pergranulata*																						4	5.8	2
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	1	0.1	2	8	2	3	17	10.2	3	126	13.3	2	7	4.3	3	19	27.3	3	0	3	3	14	16	2
Tecticornia undulata	3	0.5	2	5	0.7	3				4	0.5	2	1	1.4	2	4	7.6	2				4	0.6	2
Tecticornia pruinosa				44	7.9	2	13	2.9	3	58	4.8	2	2	2	3	4	3	2	1	0.8	3	19	7.8	2
Fabaceae																								
Swainsona purpurea	74	3.05	3																			44	3	3
Frankeniaceae																								
Frankenia cinerea				45	1.1	3	39	1.6	3	11	0.4	2				27	10.4	3				5	3.6	3
Frankenia pauciflora	12	0.5	2	142	7.3	3							53	13	3							1	0.3	3
Frankenia pauciflora var. *pauciflora*																			45	16.3	3			
Frankenia setosa																						12	0.4	2
Goodeniaceae																								
Coopernookia strophiolata	6	0.6	3				1	0.1	3	5	0.4	3							17	2	3			
Malvaceae																								
Lawrencia densiflora																						1	0.1	2
Poaceae																								

Riparian Vegetation Taxa	Discharge Outfall			Discharge									Historic Discharge			Control								
	SDDIS			SDS1			SDS2			SDS4			SDHD			SDN1			SDN2			SDN4		
	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H	D	C%	H
Aristida contorta																						1	0.1	2
Enneapogon caerulescens	6	0.6	2																			6	0.4	3
Eragrostis dielsii	35	2	2										2	0.2	2	2	0.2	2	4	0.5	3			
Eragrostis pergracilis	220	19.5	2	170	13.5	2	76	1	2	79	4	2	16	2.4	2				4	0.4	2	96	5.7	2
Eragrostis setifolia	20	1.6	2																					
Eragrostis falcata																						20	0.5	2
Solanaceae																								
Solanum nummularium	1	0.1	2																1	0.2	3			
Zygophyllaceae																								
Roepera eichleri	45	1.6	2	3	0.3	2										0	0.3	3	5	1	3			
Grand Total	**546**	**39**	**2**	**465**	**38.9**	**2**	**149**	**16.9**	**3**	**300**	**27.7**	**2**	**172**	**101.1**	**3**	**114**	**84.4**	**3**	**161**	**69.6**	**3**	**332**	**62.8**	**2**

Appendix K Historical Riparian Vegetation Data

Table K-1: Historical riparian vegetation recorded from Lake Carey in the vicinity of the SDGM (2019 to 2025).

Riparian Vegetation Taxa	2019	2020	2021	2022	2023	2024	2025
Aizoaceae							
Disphyma crassifolium				•			
Gunniopsis septifraga						•	•
?*Gunniopsis* sp.							•
Amaranthaceae							
Ptilotus sp.							•
Surreya diandra	•	•	•				
Asteraceae							
Asteraceae sp.	•	•	•				
Asteridea chaetopoda						•	•
Brachyscome ciliaris			•				
Calocephalus multiflorus			•	•			
Kippistia suaedifolia						•	
Minuria cunninghamii							•
Senecio lacustrinus			•				
**Sonchus oleraceus*							•
Trichanthodium skirrophorum							•
Chenopodiaceae							
Atriplex bunburyana	•	•	•	•	•	•	
Atriplex ?bunburyana						•	•
Atriplex codonocarpa						•	•

Riparian Vegetation Taxa	2019	2020	2021	2022	2023	2024	2025
Atriplex ?nana					•		
Atriplex nummularia					•		
Atriplex sp.	•	•	•	•			
Atriplex vesicaria	•	•	•	•	•	•	•
Atriplex ?vesicaria						•	•
Dysphania sp.	•	•	•				
Dysphania sp.?	•	•					
Maireana aff. *tomentosa*	•	•	•	•	•		
Maireana amoena							•
Maireana appressa							•
Maireana erioclada							•
Maireana glomerifolia	•	•	•	•	•	•	•
Maireana oppositifolia	•	•	•	•			
Maireana pyramidata						•	
Maireana tomentosa subsp. *tomentosa*						•	•
Salsola australis	•	•	•	•	•	•	•
Sclerolaena densiflora						•	
Sclerolaena eurotioides	•	•	•	•	•	•	•
Sclerolaena fimbriolata	•	•	•	•	•	•	•
Tecticornia aff. *undulata*	•	•	•	•			
Tecticornia calyptrata							•

Riparian Vegetation Taxa	2019	2020	2021	2022	2023	2024	2025
Tecticornia halocnemoides subsp. *longispicata*					•		
Tecticornia mellarium	•	•	•	•	•	•	•
Tecticornia peltata							•
Tecticornia pergranulata subsp. *pergranulata*				•	•	•	•
Tecticornia pruinosa	•	•	•	•	•	•	•
Tecticornia sp.	•	•				•	
Tecticornia sp. 1			•	•	•		
Tecticornia sp. 1 (sterile)				•	•		
Tecticornia sp. 2			•	•			
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)	•	•	•	•	•	•	•
Tecticornia sp. Lake Carey 1						•	
Tecticornia sp. Lake Carey 2						•	
Tecticornia sp. Lake Carey 4						•	
Tecticornia sp. nov. 1						•	
Tecticornia undulata	•	•	•	•	•	•	•
?*Tecticornia halocnemoides* subsp. *longispicata*				•			
Euphorbiaceae							
Euphorbia australis		•					
Fabaceae							
Swainsona ?katjarra						•	
Swainsona oroboides			•				

Riparian Vegetation Taxa	2019	2020	2021	2022	2023	2024	2025
Swainsona pterostylis						•	
Swainsona purpurea							•
Frankeniaceae							
Frankenia cinerea						•	•
Frankenia irregularis	•	•	•	•			
Frankenia pauciflora	•	•	•	•	•	•	•
Frankenia pauciflora var. *pauciflora*							•
Frankenia setosa							•
Goodeniaceae							
Coopernookia strophiolata						•	•
Malvaceae							
Lawrencia densiflora							•
Sida ammophila	•	•	•	•			
Montiaceae							
Calandrinia sp.						•	•
Poaceae							
Aristida contorta						•	•
Aristida holathera Domin var. *holathera*				•			
Cenchrus ciliaris						•	
Enneapogon caerulescens						•	•
Eragrostis dielsii					•	•	•
Eragrostis falcata							•

Riparian Vegetation Taxa	2019	2020	2021	2022	2023	2024	2025
Eragrostis pergracilis						•	•
Eragrostis setifolia							•
Rytidosperma caespitosum	•	•	•	•			
?*Rytidosperma caespitosum*				•	•		
Polygonaceae							
**Rumex vesicarius*						•	
Scrophulariaceae							
Eremophila miniata	•	•	•	•			
Solanaceae							
Solanum lasiophyllum	•	•	•				
Solanum nummularium							•
Solanum orbiculatum	•	•	•	•			
Zygophyllaceae							
Roepera aurantiaca subsp. *aurantiaca*						•	
Roepera compressa			•				
Roepera eichleri						•	•
Roepera sp.	•						
Roepera tetraptera			•	•			
Annual Diversity	27	27	32	30	20	39	42
Total Diversity				88			

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APPENDIX C – ANNUAL VEGETATION ASSESSMENT REPORT

Sunrise Dam Gold Mine CTD TSF Vegetation Condition Monitoring 2025

Final

Prepared for:
AngloGold Ashanti Australia Limited

February 18, 2026

Prepared by:
Stantec Australia Pty Ltd

Project Number:
304501909

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[redacted]

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Executive Summary

In October 2025, Stantec Australia conducted annual monitoring of vegetation condition and soils surrounding the Central Thickened Discharge Tailings Storage Facility (CTD TSF) at the Sunrise Dam Gold Mine (SDGM), which is owned and operated by AngloGold Ashanti Australia Limited (AGAA). The monitoring fulfils the requirements as detailed in Environmental Protection Act Part V Prescribed Premises Licence L8579/2011/2, Condition 29 (previously Condition 22).

A total of 13 transects, consisting of seven impact transects located within the potential CTD TSF zone of influence and six control transects located outside the zone of influence, were assessed as a part of the annual monitoring program in 2025. Impact transects were compared to the corresponding control transects to highlight changes to soil and vegetation parameters that may be related to the CTD TSF. The installation of two new impact transects, both south of the CTD TSF, replace the former inaccessible impact sites in those areas. Surface soil analyses (pH, moisture, salinity and heavy metals) were also undertaken at each transect site. Groundwater parameters (groundwater level, pH and salinity) were assessed at seven bores located near the monitoring transects, to identify whether changes in groundwater could be linked to changes in vegetation parameters around the CTD TSF. Photo point monitoring at 28 locations was also conducted around the CTD TSF, focusing on the exterior drain and vegetation to identify any areas of declining vegetation condition.

The 2025 field assessment identified that lower storey vegetation was the most varied vegetation parameter, with the majority of both control and impact transects increasing in either lower storey cover or density since 2024. The most recent assessment suggested the previous declining vegetation at the northeastern impact transect (CTD09) and the northeastern control transect (CTD11) had improved. This assessment demonstrated that vegetation parameters had improved beyond values previously recorded at all transects excluding CTD15 and CTD07 where parameters species richness and density saw some decreases. Despite increased lower storey cover and density at most of the impact transects, they were, generally, still within the range of their corresponding controls, suggesting that increases in vegetation cover was widespread. Overall, upper storey cover and density at the monitored transects remained stable between assessments with only CTD14 and CTD07 recording changes in upper storey values.

In 2025, 28 photo monitoring locations were assessed to determine vegetation condition surrounding the CTD TSF. Vegetation conditions ranged from ‘completely degraded’ to ‘very good’, with minimal change in condition recorded between the 2024 and 2025 assessments. ‘Degraded’ vegetation was commonly recorded around the CTD TSF boundary, although the western boundary remained the most impacted region with evidence of weeds *Rumex vesicarius* (Ruby Dock) and introduced fauna *Oryctolagus cuniculus* (European rabbit) still present.

The soil assessment in 2025 determined that soil at the impact vegetation transects monitored around the CTD TSF were generally within the range of previous assessments and controls. Excluding the western impact areas where metal concentrations were generally above their control ranges and southern impact areas where metal concentrations tended to be below the control range. Overall, the southern impact area had the lowest total concentration of metals in 2025, while the northeastern impact area had the highest. Nickel exceeded pre-determined site-specific ecological investigation levels (EIL) for the sixth year in a row at the eastern impact transects. Nickel was also exceeded in the northeastern impact area (CTD09) as well as chromium (CTD08). Soil pH at the eastern and

western impact areas was ‘neutral’, while the northeastern impact area was ‘strongly acidic’ and the southern ‘slightly acidic’. Across the monitored impact areas soils were generally ‘non saline’ in 2025, except for the eastern impact area where soils were ‘moderately saline’ and western impact area where soils were ‘extremely saline’, which was expected due to its proximity to Lake Carey.

As in 2024, the 2025 hydrogeological assessment identified groundwater levels west of the CTD TSF were the closest to the surface and groundwater levels northeast of the CTD TSF were the furthest from the surface. Groundwater pH ranged from ‘mildly acidic’ at the eastern bores, to ‘neutral’ at the western and southern bores. Northeastern groundwater pH, which was previously sitting at ‘neutral’ in 2024, saw a sudden drop to a pH of 3 (‘acidic’), but this is suspected to be an erroneous result. Groundwater salinity around the CTD TSF was ‘hypersaline’ at all bores, except the southern bore (CTDMB38A) which rested within the ‘mesosaline’ range. Quarterly groundwater parameters monitored in 2025 were consistent with historical trends.

Overall, vegetation condition around the SDGM CTD TSF improved, differing from previous years where declines were more prominent. While the improvement in vegetation condition could not be linked to any specific climate or hydrological events during this time, it was likely supported by rainfall in August 2025, two months prior to monitoring, when rainfall exceeded the long-term monthly average. With two new southern impact transects in 2025 and several recent changes in site pairings and locations, there is potential to improve the assessment and build on historical data within the following years.

It is recommended that monitoring of areas surrounding the CTD TSF through quadrat-based vegetation transects, photo point monitoring, soil analysis and hydrogeological analysis continue to record potential impacts from the CTD TSF.

While previous investigations of the CTD TSF indicate geochemical stability, it is recommended that annual analyses of tailings chemistry (total elements, pH and EC) be undertaken to contrast against soil monitoring at transect locations, to illustrate whether tailings characteristics correspond with local changes in element, pH or salinity concentrations.

Furthermore, it is recommended that an additional groundwater monitoring bore is provided in the area south/southwest of the CTD TSF, where monitoring locations have undergone several changes in recent years, particularly near transects CTD07, CTD10, and CTD17. This would improve data continuity, accommodate recent shifts in monitoring locations, and enable more accurate comparisons between above- and below-ground assessments.

Due to several recent changes with the installation of CTD14 and CTD15 in 2024, CTD16 and CTD17 in 2025, and the discontinuation of southern impact sites CTD12 and CTD13, the suitability of current site-specific EILs should be reassessed. It is recommended that there may be opportunity to undertake a new site-specific EIL study to reflect updates to the monitoring network.

Acronyms / Abbreviations

Acronym / Abbreviation	Full Name
ABC	Ambient background concentration
ACL	Added contaminant limits
AGAA	AngloGold Ashanti Australia Limited
ALS	ALS Limited
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
BOM	Bureau of Meteorology
CEC	Cation exchange capacity
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTD	Central Thickened Discharge
CTDMB	Central Thickened Discharge Monitoring Bore
DPIRD	Department of Primary Industries and Regional Development
EC	Electrical conductivity
EIL	Ecological investigation level
IBRA	Interim Biogeographic Regionalisation for Australia
LOR	Limit of reporting
mTOC	Metres to top of casing
NAG	Net Acid Generation
NAPP	Net Acid Producing Potential
NATA	National Association of Testing Authorities
NDVI	Normalised Difference Vegetation Index
NEPM	National Environment Protection Measures
PCQ	Point centre quarter
PP	Photo point
SDGM	Sunrise Dam Gold Mine
TSF	Tailings Storage Facility
URS	URS Corporation, acquired by AECOM in 2014
USDA	United States Department of Agriculture
WA	Western Australia
WS	Weather station
WQ	Wandering quarter

1 Introduction

AngloGold Ashanti Australia Limited (AGAA) own and operate the Sunrise Dam Gold Mine (SDGM), located on the Mount (Mt) Weld Pastoral Lease, (No. 3114/1021) held by Mt Weld Pastoral Company Pty Ltd, approximately 55 kilometres (km) south of Laverton in the northeastern Goldfields of Western Australia (WA). Gold production commenced in 1997, with tailings from the operation initially deposited in Tailings Storage Facility (TSF) 1 from 1997 to 1999. The Central Thickened Discharge (CTD) TSF was brought into operation in 1999 and has remained the designated facility for tailings deposition since commissioning.

Early investigations by GCA (1995, 2002) and follow-up characterisation by MBS (2014) demonstrate that SDGM tailings are geochemically stable with strong buffering capacity. Successive ABA programs confirm that SDGM tailings possess high neutralising capacity relative to sulphide content, producing negative NAPP and alkaline NAG pH values. The combination of strong carbonate buffering, gypsum saturation, and high salinity confirms long-term geochemical stability under arid climatic conditions.

While the CTD TSF has displayed a level of geochemical stability, the potential for surrounding vegetation to be affected by windblown saline material from the tailings surface was identified as a risk during construction of the CTD TSF. Seepage from the CTD TSF, groundwater level changes, and nearby pastoral activities have also been identified as potential risks to surrounding vegetation. In 2002, Stantec monitored vegetation surrounding the CTD TSF for the first time, to identify whether dust, seepage from the CTD TSF, or changed surface drainage associated with the CTD TSF were potentially impacting vegetation. This monitoring has since continued annually, with the original monitoring program expanded over the years to include photo point monitoring around the CTD TSF and soil analyses.

Prior to the 2018 monitoring, the Stage 10 CTD TSF expansion program commenced. This required disturbance to approximately 276 hectares (ha) of vegetation and resulted in the removal of 11 photo point monitoring sites (PP01 and PP29 to PP37), two groundwater monitoring bores (CTDMB4 and CTDMB27a) and one vegetation transect (CTD03) from the monitoring program. The Stage 10 CTD TSF expansion also impacted photo point monitoring sites on the western boundary of the CTD TSF. New photo point monitoring sites were established and incorporated in the annual monitoring program in 2020, to assess vegetation along the edges of the Stage 10 expansion. In 2018, two new vegetation transects were established to monitor vegetation parameters in the area south of the Stage 10 CTD TSF expansion boundary. In 2025, these southern monitoring locations were replaced after access restrictions within a neighbouring lease made them inaccessible.

1.1 Objectives

This report presents the outcomes of the October 2025 condition monitoring program. The main objectives of the 2025 monitoring program were to:

- undertake vegetation monitoring and soil sampling and analysis at 13 transects located around the CTD TSF;
- assess 28 locations (41 photo points) in the immediate proximity to the CTD TSF;

- assess and describe any potential impacts from the CTD TSF on the soils and vegetation communities in proximity to the CTD TSF, using the monitoring data collected in 2025 and in previous years, and the CTD TSF groundwater monitoring data available for 2025; and,
- recommend future monitoring strategies based on the outcomes of this assessment.

In 2024, due to the historical decline in vegetative condition at control transect CTD13, the site was reassigned to become an impact transect and was due to be monitored with CTD12, against new corresponding control transect CTD14 (installed 2024). However, due to ongoing restrictions with accessing the neighbouring Kimberley Exploration Lease (E39/2327), the proposed monitoring of additional soil sampling sites and transects CTD12 and CTD13 in the southern Triodia hummock impact area was not completed. Instead, in 2024 general qualitative assessments were completed at the Triodia hummock impact transects from the boundary of the AGAA Lease and Kimberley Exploration Lease (~90 m away from CTD12), and from the boundary of the Matsa Gold Lease (E39/1889) and Kimberley Exploration Lease (~20m away from CTD13). The qualitative assessment provided an overview of vegetation health and composition in the broader area, differing from the annual quantitative quadrat-based vegetation monitoring method, as such results of the 2024 assessment could not be directly compared to data previously collected at these sites. In 2025, two new impact transects (CTD16 and CTD17) were established in matching vegetation communities on the AGAA lease to serve as suitable replacements for the inaccessible sites. This ensured that all vegetation monitoring in 2025 was completed using the quadrat-based method, maintaining comparability between control and impact sites and continuity with previous datasets.

As a result of these changes, long-term averages for pH, salinity, and heavy metals in the southern area use data collected from CTD12 and CTD13. While these historical values no longer directly correspond to the new sites, they represent a general overview of soil conditions throughout time in the area south of the CTD TSF and have been included for comparison between former and current impact locations and their associated control (CTD14). In addition, the modifications to southern impact site locations in 2025 (CTD16, CTD17) and their corresponding control site in 2024 (CTD14), has affected the suitability of the corresponding 2020 site specific southern EILs as a creditable indicator for hazardous heavy metal concentrations. These long-term trends and former EILs (for the southern transects) remain in the 2025 report to provide historical context but cannot be used to draw definitive conclusions against 2025 results.

2 Background

2.1.1 Biogeographical context

The SDGM is located within the East Murchison subregion of the Murchison Interim Biogeographic Regionalisation for Australia (IBRA), within the Austin Botanical District (Beard 1990). The bioregion encompasses an area of 28,120,558 ha and is recognised as the transition zone between the Eucalypt-dominated environments of southern WA and the Mulga/spinifex-dominated area of Central Australia (Morton et al. 1995). The East Murchison subregion is characterised by internal drainage, extensive areas of elevated red desert sandplains with minimal dune development, salt lake systems associated with occluded paleodrainage systems, broad plains of red-brown soil and breakaway complexes, and red sand plains (Cowan 2001). The vegetation is dominated by Mulga (*Acacia aneura* complex) woodlands which are rich in ephemeral species, hummock grasslands, salt-bush and blue-bush shrublands, and *Tecticornia* shrublands (Cowan 2001).

Of the twelve SDGM mining tenements, operations (including the CTD TSF) occur predominately on M39/1116, cover approximately 11,900 ha and are located within the Mt Weld Pastoral Lease (Lot 377 on Deposited Plan 238645). The dominant land use surrounding the mine is pastoral (cattle). Historical pastoral activity within the subregion has resulted in land degradation due to clearing and grazing, causing vegetation loss and erosion in some areas (Pringle 1994).

2.1.2 Climate

The Murchison bioregion typically has an arid climate with majority of rainfall occurring in winter (Cowan 2001) however, local long-term rainfall data indicates that years with cyclone-related weather systems receive higher amounts of rainfall in summer. The closest Bureau of Meteorology (BOM) weather station (WS) to SDGM is located approximately 50 km north at Laverton (station number 012045) (BOM 2025). Weather data from this BOM WS along with weather data collected since 2017 at the SDGM on-site WS (AGAA 2025a) is presented in Figure 2-1 and Figure 2-2. Missing data at the BoM-operated Laverton weather station during March and May–September 2025 resulted in the exclusion of these rainfall records. Although such gaps are suboptimal, confidence in the assessment remains unaffected because SDGM's onsite rainfall monitoring provides continuous coverage for the same period.

The long-term average annual rainfall at Laverton WS was 235 millimetres (mm), with mean maximum temperatures that ranged between 36 degrees Celsius (°C) in summer (February) and 18°C in winter (July) (BOM 2025). As of September, the 2025 calendar year received an annual rainfall of 40 mm, 195 mm lower than the long-term annual average at Laverton WS (Figure 2-1, Figure 2-2).

In the 12 months preceding the 2025 monitoring (October 2024 to September 2025), 303 mm of rainfall was recorded at SDGM, 179 mm more than the total rainfall recorded at Laverton over the same period (Figure 2-1) and 68 mm more than the long-term average at Laverton WS. The lower rainfall at Laverton was due to significant gaps in the weather observations from the Laverton WS, in March and again in May through to September in 2025, where there was no available data. The highest monthly total recorded at SDGM station during the 12 months prior to 2025 monitoring was 74 mm, recorded in December 2024. In the six months prior to the 2025 monitoring, SDGM WS received 78 mm of rain, 133 mm less than what was recorded six months prior to monitoring in 2024 (211 mm).

Notably, two months prior to monitoring in August 2025, rainfall exceeded long term average monthly rainfall.

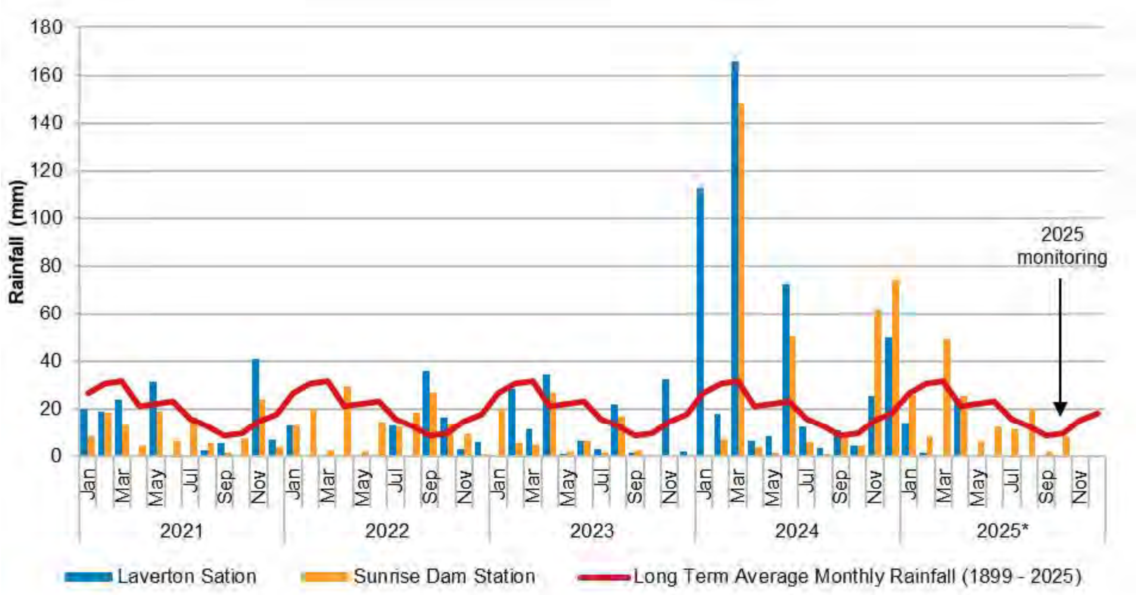


Figure 2-1: Monthly rainfall at Laverton (station number 012045) and SDGM WS over the last five years, in comparison with the Laverton station long term average monthly rainfall (1899-2025) (BOM 2025, AGAA 2025a)

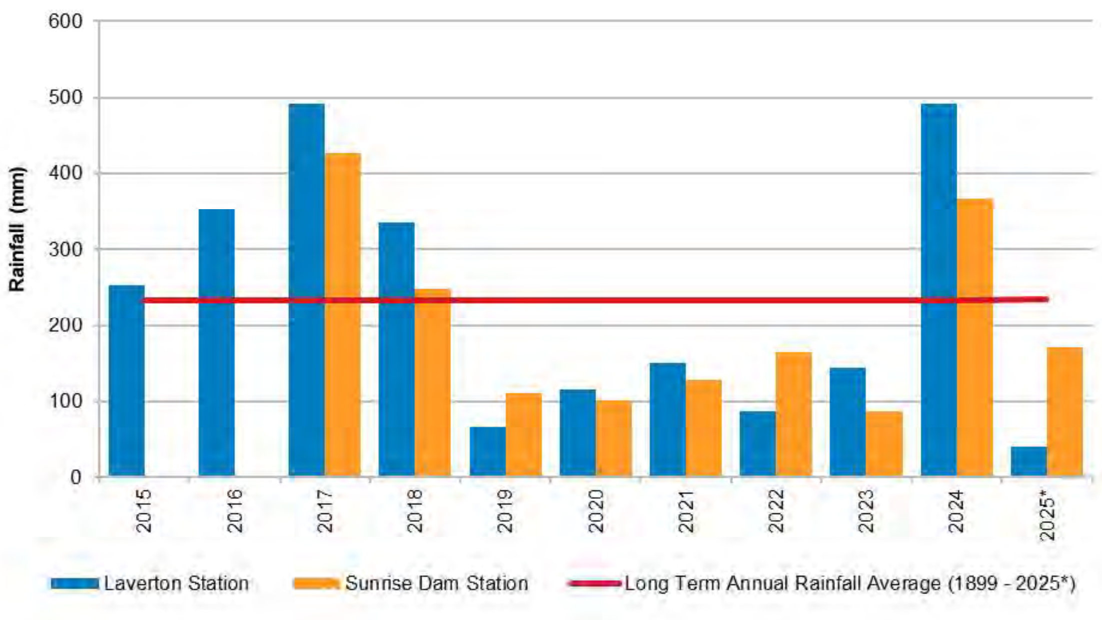


Figure 2-2: Annual rainfall recorded at Laverton (station number 012045) and SDGM WS over the last 10 years, in comparison with the Laverton long term annual average (1899-2025); *2025 annual rainfall total does not include rainfall data in November and December

3 Materials and Methods

3.1 CTD TSF vegetation transect assessment

In 2025, vegetation monitoring was conducted at 13 transects (Figure 3-1, Table 3-1) consisting of seven impact and six control transects. Due to neighbouring mining tenement access restrictions, impact transects CTD12 and CTD13, south of the CTD TSF, were inaccessible in 2024. These sites were monitored under a qualitative approach, assessing the general landform and vegetation features of the accessible areas in proximity to the transects. In 2025, two new impact transects (CTD16 and CTD17) were established within the AGAA tenement as replacements for the inaccessible sites.

Impact transects were situated in areas where potential impacts of the CTD TSF may occur. Control transects were assumed to be situated outside of the potential impact area and in similar vegetation communities to the impact transects. Those similarities in vegetation community composition were the basis for the impact-control transect groupings.

Prior to the September 2020 assessment, all sites were assessed using the point centre quarter (PCQ) and belt transect methods for lower storey vegetation and the wandering quarter (WQ) or area method for upper storey vegetation (greater than 3 metres (m). As agreed between AGAA and Stantec, all vegetation assessment methods were replaced in 2020 with a quadrat-based approach to ensure comparability with the Stage 10 Topsoil Stockpile Monitoring program and to align with contemporary vegetation monitoring practices. This quadrat-based method has been used from 2020–2025, enabling direct comparison across the post-2020 monitoring period. Under this method, vegetation parameters such as native plant cover, density and diversity were measured using ten quadrats arranged along a transect (Figure 3-1). The quadrats (2 m by 2 m) were positioned at 5 m intervals on the right side of the transect when traversing the transect from start to end. The left side of the quadrat was positioned in contact with the transect line. The vegetation assessment only included living plants. Within each quadrat, perennial plant species were counted to quantify lower storey density (plants per ha (plants/ha)) and estimates of foliage cover were made for each species to quantify upper and lower storey cover (%). Plants over-hanging the quadrat (with the plant base rooted outside the quadrat) were given a cover value, but a density of zero. A larger quadrat (50 m by 20 m) was used to capture the number of upper storey species and quantify upper storey density (plants/ha) (Figure 3-1).

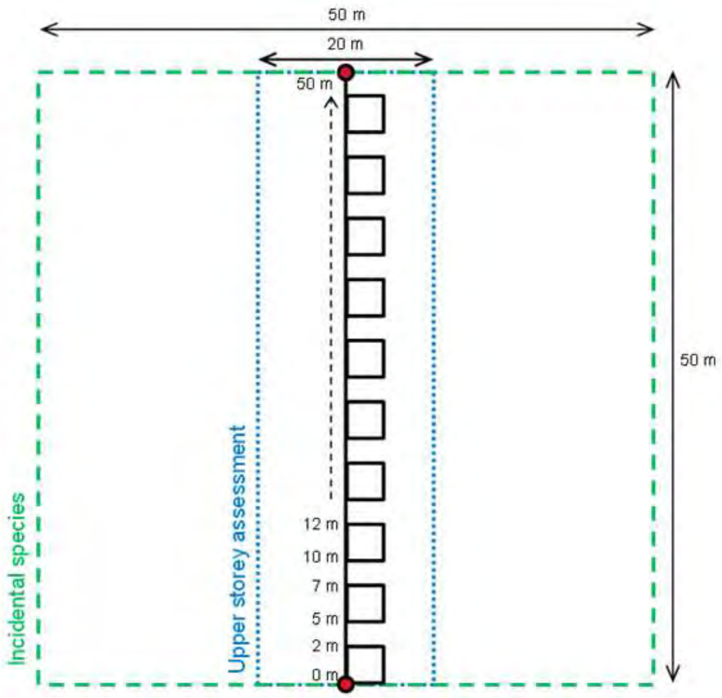


Figure 3-1: Vegetation monitoring transect design for quadrat assessment

The following data was collected within each 2 m x 2 m quadrat:

- litter and log cover (%);
- total perennial native cover (%);
- total perennial native cover (%) <3 m in height (lower storey);
- total perennial native cover (%) ≥3 m in height (upper storey);
- annual native cover (%); and,
- total weed cover (%).

Incidental species identified within a 50 m by 50 m buffer quadrat surrounding the transect (Figure 3-1), not present within the transects 2 m by 2 m quadrats, were recorded in the species list. Perennial species richness at each transect included perennial species recorded within the quadrat assessment, as well as the upper storey assessment area. Incidental species and annuals were not included in species richness values.

Table 3-1: CTD TSF vegetation monitoring transects assessed in 2025

Direction	Type	Transect	Vegetation community description	Distance from CTD TSF (km)	Location (start) UTM: GDA 94	Location (end) UTM: GDA94	Transect install (year)
Eastern	Impact	CTD01	*Frankenia* / Chenopod shrubland	0.78	51 J 449186 6780122	51 J 449233 6780141	2002
		CTD02	*Frankenia* / Chenopod shrubland	0.48	51 J 449092 6779778	51 J 449141 6779781	2002
	Control	CTD15	*Frankenia* / Chenopod shrubland	1.36	51 J 450196 6779575	51 J 450190 6779528	2024
Western	Impact	CTD04	*Frankenia* shrubland	0.11	51 J 445655 6779527	51 J 445603 6779511	2002
	Control	CTD06	*Acacia* / Chenopod sparse woodland	1.06	51 J 444683 6779466	51 J 444676 6779520	2008
		CTD07	*Frankenia* / Chenopod shrubland	1.16	51 J 446396 6777041	51 J 446390 6777088	2008
		CTD10	*Frankenia* / Chenopod shrubland	0.72	51 J 447147 6777127	51 J 447150 6777076	2016
Northeastern	Impact	CTD08	*Acacia* open shrub / woodland	0.4	51 J 448085 6780560	51 J 448082 6780609	2013
		CTD09	*Acacia* open shrub / woodland	0.99	51 J 448185 6781192	51 J 448210 6781231	2013
	Control	CTD11	*Acacia* open shrub / woodland	0.87	51 J 446698 6781284	51 J 446657 6781312	2016
Southern	Impact	CTD16	*Acacia* / *Eucalyptus* low open woodland over a *Triodia* hummock grassland	0.09	51 J 448735 6778065	51 J 448739 6778015	2025
		CTD17	*Acacia* / *Eucalyptus* low open woodland over a *Triodia* hummock grassland	0.28	51 J 447076 6777649	51 J 447115 6777615	2025
	Control	CTD14	*Acacia* / *Eucalyptus* low open woodland over a *Triodia* hummock grassland	1.53	51 J 448676 6776449	51 J 448641 6776408	2024

[1] New southern impact transects, CTD16 and CTD17, installed in 2025 to replace transects CTD12 and CTD13 that were not assessed in 2024 & 2025 due to ongoing access restrictions.

3.2 CTD TSF photo point monitoring

A total of 41 photographs were taken at 28 photo monitoring locations surrounding the CTD TSF in 2025, to assess general condition and health of vegetation adjacent to the CTD TSF (Figure 3-3, Figure 3-4). Observations were recorded at each photo point regarding vegetation condition using the Keighery (1994) scale (Appendix A), and areas where salts were visible on the soil surface were recorded. The presence of weeds, erosion and wind-blown debris was also recorded. Photo points located where CTD TSF features, such laydown areas, access roads or perimeter firebreaks were present, were classified as “not applicable” when receiving a vegetation condition rating.

Photo monitoring locations were not physically marked to minimise additional disturbance; instead, GPS coordinates were used to ensure consistent relocation of monitoring points between years. In this report, photo points have been referred to as a number with the prefix ‘PP’ (photo point), and where dashes are used, the location remains the same as the whole number while the direction of the photograph changes (e.g. PP06, PP06-1 and PP06-2 are taken from the same location but from different directions).

3.3 Soil surface assessment

Changes in soil parameters such as pH, salinity and total element concentrations have the potential to impact vegetation health. Soil surface sampling was conducted at each of the vegetation monitoring transects assessed in 2025, with samples collected from 0-0.02 m and 0-0.10 m depth intervals of the soil profile, at both ends (start and finish) of each transect (Figure 3-1). Soil pH H_2O, pH $CaCl_2$, electrical conductivity (EC) (as salinity) and moisture content were measured in the 0-0.10 m and categorised according to the standards described in Appendix A. The total concentrations of 15 elements were analysed in the 0-0.02 m depth interval samples. All soil analyses were performed by Australian Laboratory Services (ALS) Environmental Division in Perth, a National Association of Testing Authorities (NATA) accredited laboratory. Descriptions of procedures and methods of assessment are described in Appendix A.

Soil pH results were compared to soil surface assessment standards for pH (Van Gool, Tille and Moore 2005). Soil salinity results were compared to soil surface assessment standards for salinity based on standard United States Department of Agriculture (USDA) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) categories (Appendix A).

In 2020, site-specific Ecological Investigation Levels (EILs) for certain total elements analysed (copper, lead, nickel, chromium and zinc) were calculated to provide context to the measured concentrations at all transects (Appendix B, Appendix C). The site-specific EILs were derived by summing the added contaminant limits (ACLs) and the ambient background concentration (ABC) (NEPM 2013).

Based on SDGM’s location and environmental values, the EILs were adopted for the land use setting encompassing national parks and areas of ecological significance, with a species protection of 99% (NEPM 2013). However, it should be noted that this represents a conservative approach to screening and does not necessarily indicate concentrations of environmental significance.

Two impact transects, namely CTD16 and CTD17, were established in 2025 to replace former southern impact transects CTD12 and CTD13, which have been inaccessible since 2023. Historical data from these sites is included for context but does not directly correspond to the new locations. The 2020 southern EILs remain applicable; however, changes to site locations and pairings limit their suitability for comparison with 2025 results. As a result, they are included in this report primarily to provide historical context.

3.4 Hydrogeological assessment

Changes in groundwater attributes, such as static groundwater levels, pH and salinity, have the potential to impact vegetation health. The CTD TSF is located above a shallow aquifer. Baseline groundwater salinity (beneath and surrounding the CTD TSF) has varied considerably, from ‘brackish’ to ‘hypersaline’ (URS 2011).

Monthly groundwater levels, quarterly pH and EC (as salinity) data from seven CTD monitoring bores (CTDMB03, CTDMB41A CTDMB29B, CTDMB11A-B, CTDMB11B, CTDMB16 and CTDMB38A) in proximity to six CTD TSF monitoring transects (CTD01, CTD02, CTD04, CTD06, CTD08 and CTD12) were collected and provided by AGAA (AGAA 2025b) and used to identify changes in groundwater parameters (Figure 3-2). Field-collected groundwater data received from AAGA for pH and EC was used in this report. The September 2020 groundwater pH monitoring data was excluded.

Groundwater levels in this report were measured in the field and include the height of the bore casings with the unit metres to top of casings (mTOC). Bores CTDMB4 and CTDMB27A used in previous reports, were capped during the CTD expansion in late 2018, and subsequently removed from the monitoring program. New monitoring bores, CTDMB41A and CTDMB29B, were installed between late 2018 and early 2019 to replace the capped bores close to vegetation monitoring transects CTD01 and CTD02. Bore CTDMB38A was added to the 2019 report due to its proximity to transect CTD12. There are currently no monitoring bores assessed near transects CTD07, CTD09, CTD10, CTD11, CTD14, CTD15, CTD16 or CTD17 (Figure 3-2).

Groundwater pH was compared to the classification system developed by Foged (1978) (Appendix A), comprising acidic waters (pH 4.5 to 6.5), circumneutral waters (pH 6.5 to 7.5), and alkaline waters (pH >7.5). Groundwater-measured EC, and therefore groundwater salinity, was classified comparing to Hammer (1986) classifications of surface waters as freshwater (<3,000 milligrams per litre (mg/L)), hyposaline (3,000 to 20,000 mg/L), mesosaline (20,000 to 50,000 mg/L) and hypersaline (>50,000 mg/L) categories (Hammer 1986) through conversions according to Williams (1998). Converted salinity classifications to EC are freshwater (<5 milli Siemens per centimetre (mS/cm)), hyposaline (5 to 30 mS/cm), mesosaline (30 to 70 mS/cm) and hypersaline (>70 mS/cm) (Appendix A).

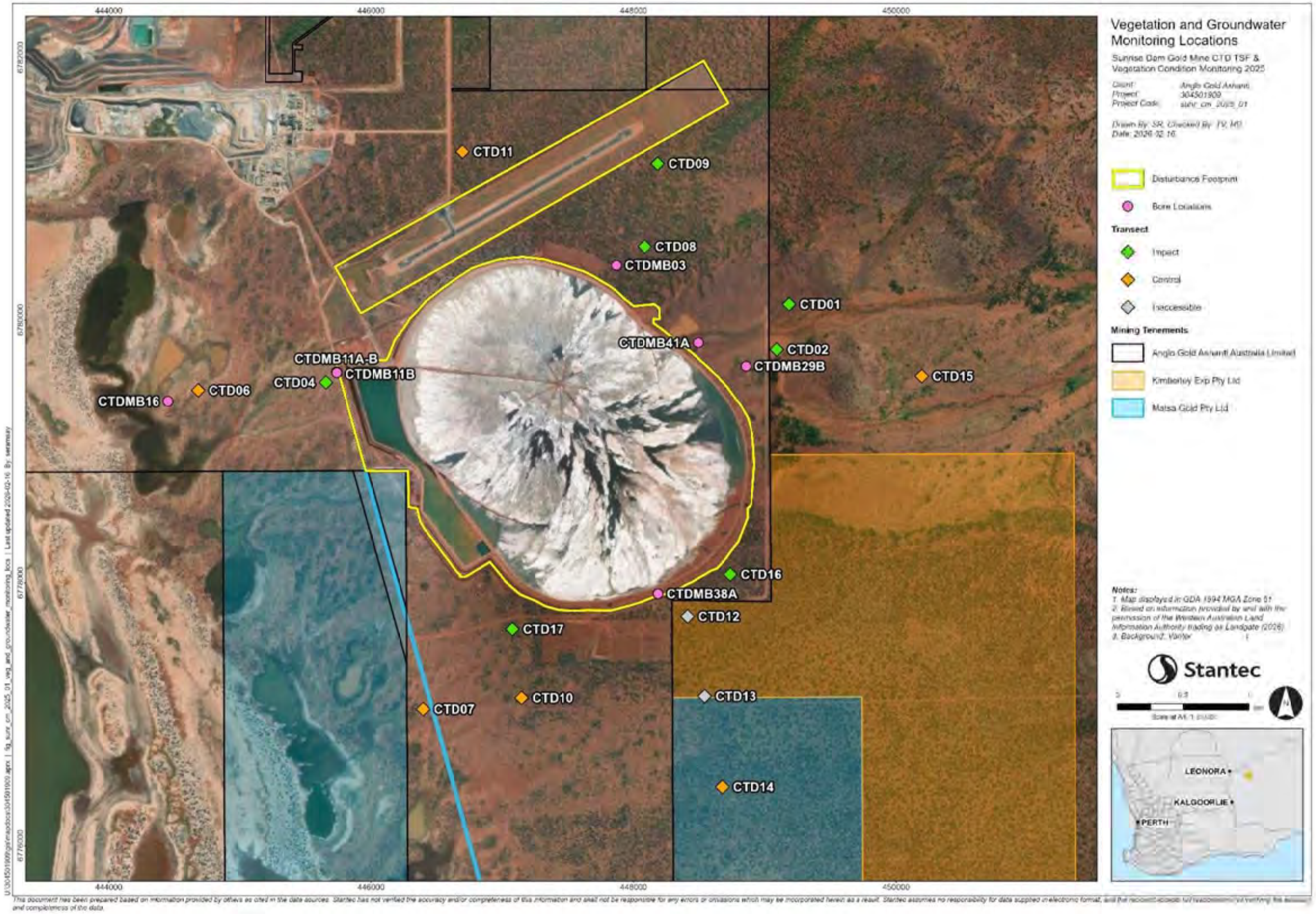


Figure 3-2: Location of the vegetation monitoring transects, and monitoring bores assessed at SDGM CTD TSF in 2025

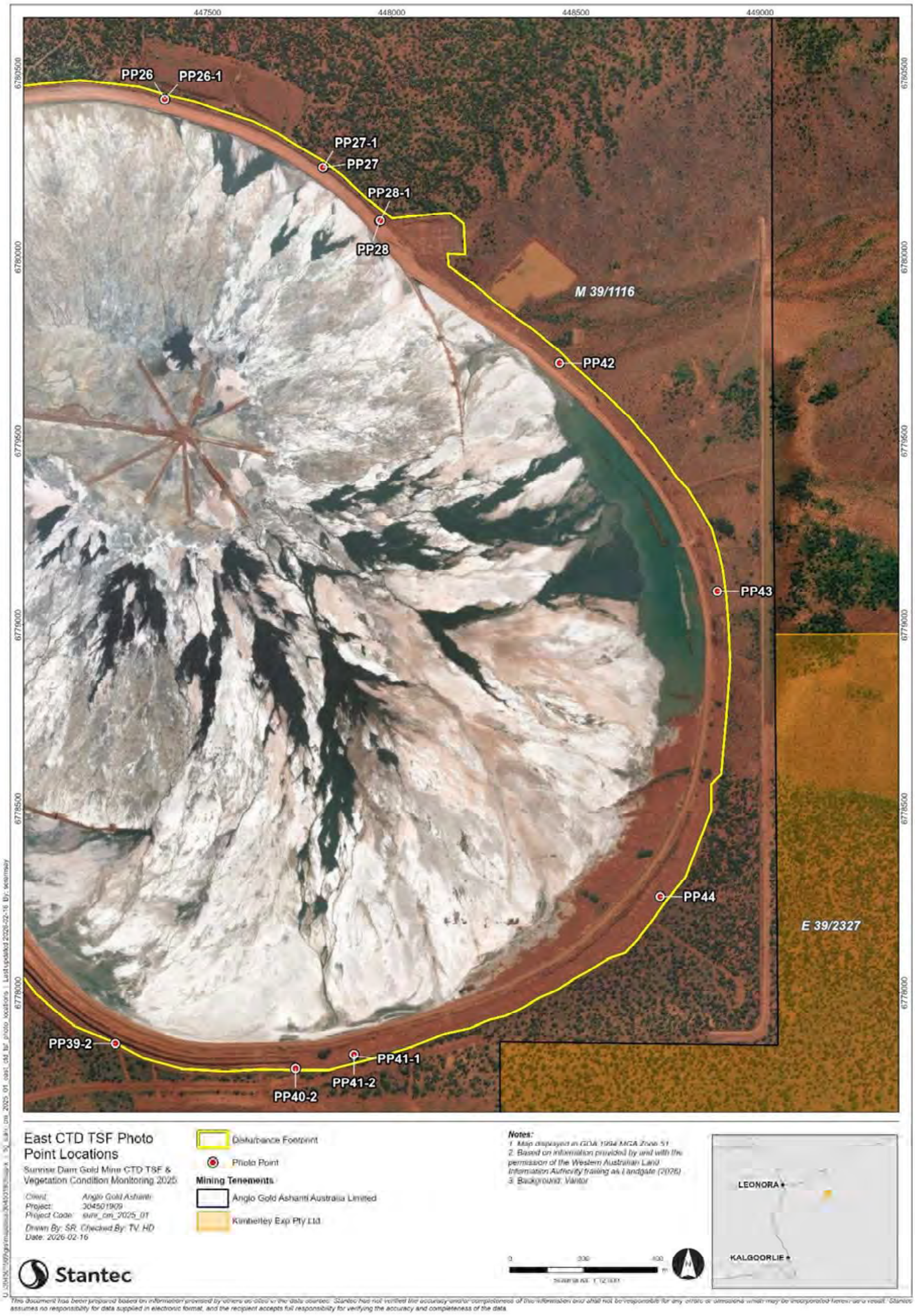


Figure 3-3: Photo-monitoring locations assessed east of the SDGM CTD TSF in 2025

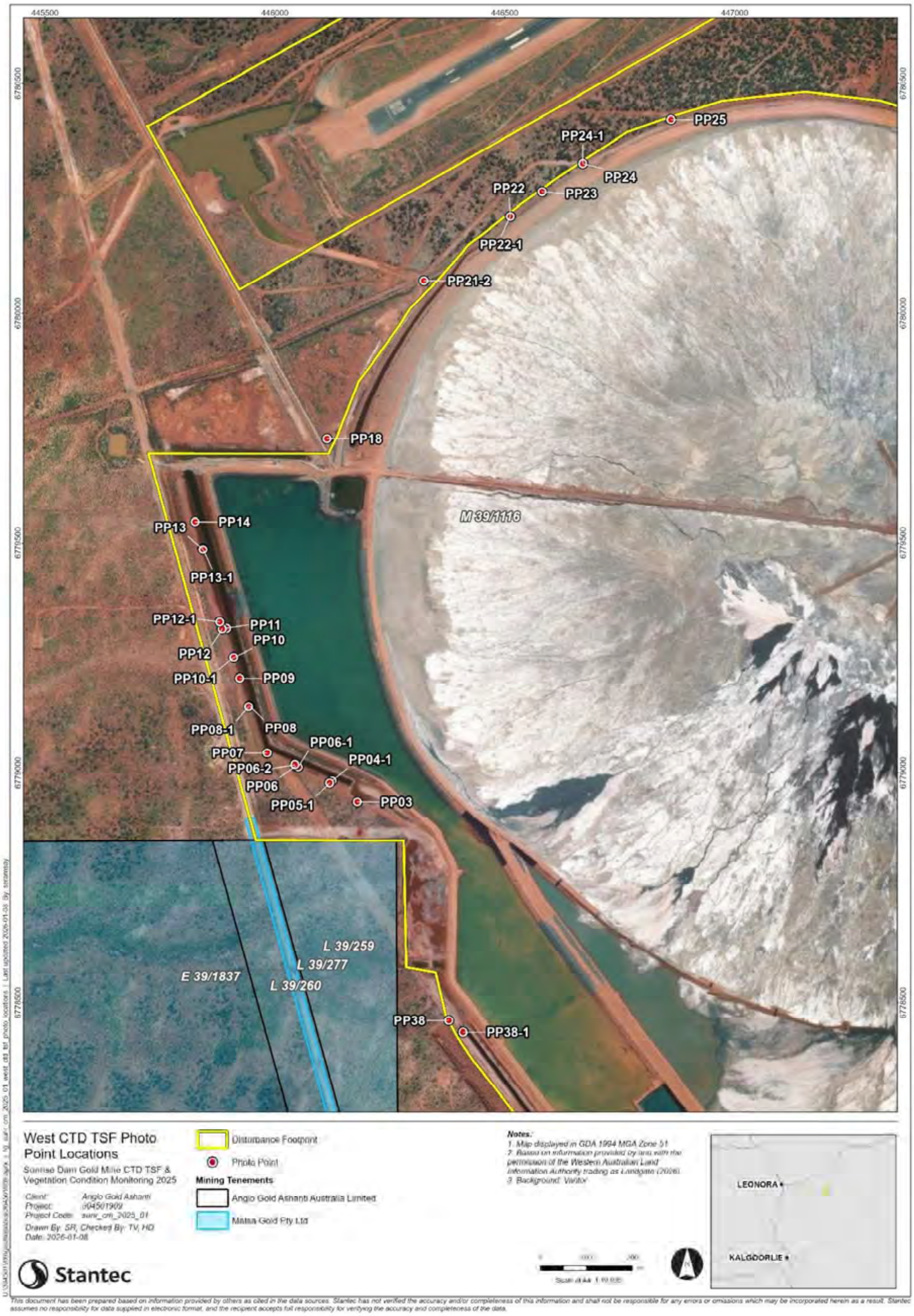


Figure 3-4: Photo-monitoring locations assessed west of the SDGM CTD TSF in 2025

4 Results and Discussion

4.1 Vegetation assessment

4.1.1 Control transects

Six control transects were assessed in 2025: CTD06, CTD07, CTD10, CTD11, CTD14 and CTD15 (Figure 4-1, Appendix D). Transect CTD13, which was formerly a control transect, was assessed as an impact transect in 2024 due to continued decline in vegetation cover. In response, transect CTD14 was installed in 2024 and assessed as a new control transect in place of CTD13. The CTD14 control now corresponds to the new impact transects south of the CTD TSF (CTD16 and CTD17). In 2024, control transect CTD15 was installed to the east of the CTD TSF and assessed as the corresponding control for the eastern impact transects.


Acacia / Chenopod sparse woodland (CTD06) control transect in 2024 (left) and 2025 (right)


Frankenia / Chenopod shrubland (CTD07) control transect in 2024 (left) and 2025 (right)


Frankenia / Chenopod shrubland (CTD10) control transect in 2024 (left) and 2025 (right)


Acacia open shrub / woodland (CTD11) control transect in 2024 (left) and 2025 (right)


Acacia / Eucalyptus low open woodland over a *Triodia* hummock grassland (CTD14) control transect in 2024 (left) and 2025 (right)


Frankenia / Chenopod shrubland (CTD15) control transect in 2024 (left) and 2025 (right)

Figure 4-1: Control transects monitored in 2024 and 2025

4.1.1.1 Eastern control transects

Between 2024 and 2025, vegetation conditions at the eastern control transect CTD15 remained stable in cover but exhibited notable changes in density and species richness (Appendix E). Upper storey cover values were consistent with 2024, which recorded no upper storey species. Lower storey cover also showed minimal variation in 2025, with *Cratystylis subspinescens* retaining the highest cover of any species within the transect.

In contrast, lower storey vegetation density declined in 2025. This reduction was largely driven by the absence of the short-lived perennial grass *Enneapogon caerulescens*, which in 2024 increased density counts but offered comparatively low vegetation cover. An individual *Hakea preissii* was identified within the upper storey assessment area and was responsible for the increase in upper storey density in 2025.

Species richness at CTD15 decreased in 2025 (Figure 4-2, Appendix E). This decline was attributed to the absence of several juvenile species recorded in 2024, including *Eremophila eriocalyx, Leichhardtia australis, Maireana georgei, Corchorus sp.,* and *Streptoglossa liatroides.* This reduction is likely due to richness returning to baseline conditions following the record rainfall that preceded the 2024 monitoring. These species had very low abundance previously, which explains the negligible impact their absence had on cover values in 2025. *Maireana pyramidata* remained the dominant species while an increased incidence of *Maireana tomentosa* subsp. *tomentosa* helped maintain overall abundance. Despite the reduction in richness, CTD15 retained one of the highest species richness scores (n=12) among control sites in 2025 (Figure 4-3, Appendix E).

4.1.1.2 Western control transects

The western control transects CTD06, CTD07 and CTD10 witnessed variable changes between 2024 and 2025 monitoring seasons (Figure 4-2, Figure 4-3, Appendix E) Between 2024 and 2025, vegetation conditions at the western control transects CTD06, CTD07, and CTD10 exhibited variable changes across cover, density, and species richness (Figure 4-2, Appendix E).

Lower storey cover remained stable at CTD07 and CTD10 but increased markedly at CTD06, which recorded the highest cover of the three western control sites. This overall increase was largely driven by a significant increase in the short-lived perennial grass *Aristida contorta* throughout the transect. Upper storey cover remained unchanged across all sites, with no upper storey species recorded in either monitoring period.

In 2025, lower storey vegetation density remained consistent at CTD10 and reported significant increases at sites CTD06, and CTD07 (Figure 4-2, Appendix E). This increase was attributed to a significant spike in the abundance of *Aristida contorta* at CTD06, and new grass species *Eragrostis falcata* at CTD07. While CTD07 reported the largest increase in the low storey density in 2025, upper storey density decreased from 2024. This change was triggered by the loss of a singular *Acacia caesaneura* previously identified in 2024. As this individual was recorded as upper storey for the first time in 2024, but not observed in 2025, it is likely to have declined in condition or died between monitoring periods. Transect CTD06 retained upper storey density values consistent with 2024.

Species richness across the western control transects ranged between eight and 13 in 2025, with CTD06 and CTD10 recording the highest counts in the past five years (Figure 4-3). In contrast, CTD07 experienced a marked decline in richness, largely due to the absence of four previously low-abundance species—*Minuria leptophylla*, *Ptilotus obovatus*, *Maireana tomentosa* subsp. *tomentosa*, and *Roepera reticulata*—each recorded only once in 2024. Overall, species composition remained relatively stable across sites. Transect CTD10 continued to be dominated by *Maireana glomerifolia*, while CTD06 showed further increases in *Aristida contorta*. At CTD07, composition was broadly consistent between assessments; however, the lower storey was dominated by the new grass species *Eragrostis falcata*, while *Cratystylis subspinescens* persisted as the most prominent shrub in 2025.

4.1.1.3 Northeastern control transects

The northeastern control transect CTD11 saw a marked increase in vegetation condition in 2025, with several significant changes in cover, density and species richness. Total cover in the northeastern control area increased considerably, due to increases in lower storey cover with several new species identified in 2025. At the northeastern control transect, perennial species exceeding 3 m in height contributed to total cover greater than those under 3 m. This was the only control site in 2025 to exhibit these results (Figure 4-2, Appendix E). *Acacia caesaneura* and *A. ramulosa var. ramulosa* were the sole contributing genus for >3 m cover within the transect, consistent with the 2024 assessment. Lower storey cover continued to be dominated by *Eremophila eriocalyx*. Increases in lower storey cover was attributed to the presence of newly recorded species at CTD11, *Maireana tomentosa subsp. tomentosa,* which in 2025 was the most abundant species by a substantial margin.

The most notable change between the 2024 and 2025 monitoring assessments at the northeastern control transect, was the substantial increase in density (Figure 4-2, Appendix E). This was predominantly due to the increased abundance of juvenile *Maireana tomentosa subsp. tomentosa,* that had not been identified to the species level at CTD11 in previous assessments. Otherwise, density for lower storey species remained consistent with data from the previous monitoring year. Upper storey density within the area also exhibited minimal change. The upper storey assessment added one new species of *Acacia ramulosa var. ramulosa*, not previously identified in 2024.

In 2025, five new species were identified within the transect area, namely *Maireana tomentosa subsp. tomentosa, Sclerolaena cuneata, Maireana georgei, Acacia tetragonophylla,* and *Monachather paradoxus* (Figure 4-2, Appendix E). This increased the species richness score from eight in 2024, to 11 in 2025. *Maireana tomentosa subsp. tomentosa* in 2025 was the most abundant species by a substantial margin. In 2024, control transect CTD11 was dominated by an *Acacia* woodland upper storey with a mixed low shrubland of *Eremophila eriocalyx* and *Teucrium teucriiflorum*. However, in 2025 *Teucrium teucriiflorum* was not identified, replaced in abundance by *Maireana tomentosa subsp.*

tomentosa, and bolstered by a healthy continuation of *Eremophila eriocalyx* and *Monachather paradoxus.*

4.1.1.4 Southern control transects

Between 2024 and 2025, vegetation conditions at the southern control transect CTD14 showed overall improvement, with measurable increases in cover, density, and species richness (Figure 4-2, Figure 4-3, Appendix E). These improvements were driven predominantly by changes within the lower storey. However, the upper storey experienced a reduction in cover. Despite the decline in upper storey cover, the transect continued to support an upper storey assemblage dominated by *Acacia aneura, A. caesaneura* and *A. incurvaneura*.

Upper storey cover values decreased in 2025, reflecting the observed loss of *Acacia aneura* from the species list in 2025. In contrast, lower storey cover exhibited the largest increase, indicating enhanced ground-layer performance across graminoids and chenopods. This increase is consistent with the presence of a *Triodia basedowii* and *Monachather paradoxus* grassland, which maintained and expanded its functional footprint within the transect. Reoccurring lower storey species, particularly *Ptilotus obovatus* and *Solanum lasiophyllum*, remained stable and continued to contribute to both cover and compositional consistency.

Vegetation density also increased at CTD14 in 2025, aligning with the broader rise in lower storey cover. The density increases were supported by the addition of short-lived and tussock-forming grasses and forbs, including *Enneapogon caerulescens* and *Aristida* spp. (i.e. *Aristida latifolia* and *A. contorta*), which collectively increased total species abundance without disproportionately inflating cover results. These changes, paired with the stability of *Ptilotus obovatus* and *Solanum lasiophyllum* populations, suggest favourable recruitment and stable conditions within the lower storey of the southern control transect.

Species richness at CTD14 increased from nine in 2024, to 12 in 2025 (Figure 4-3, Appendix E). The rise in richness was attributed to the addition of four species: *Sclerolaena cuneata*, *Aristida latifolia*, *A. contorta* and *Enneapogon caerulescens*. Conversely, two species recorded in the 2024 monitoring were absent in 2025, namely *Roepera reticulata* and *Acacia aneura*, although the latter was present in the surrounding upper storey assessment. The net change indicates a compositional shift towards grasses and chenopods in the lower storey, which is consistent with the observed increase in both cover and density for that stratum, despite some variation in upper storey cover.

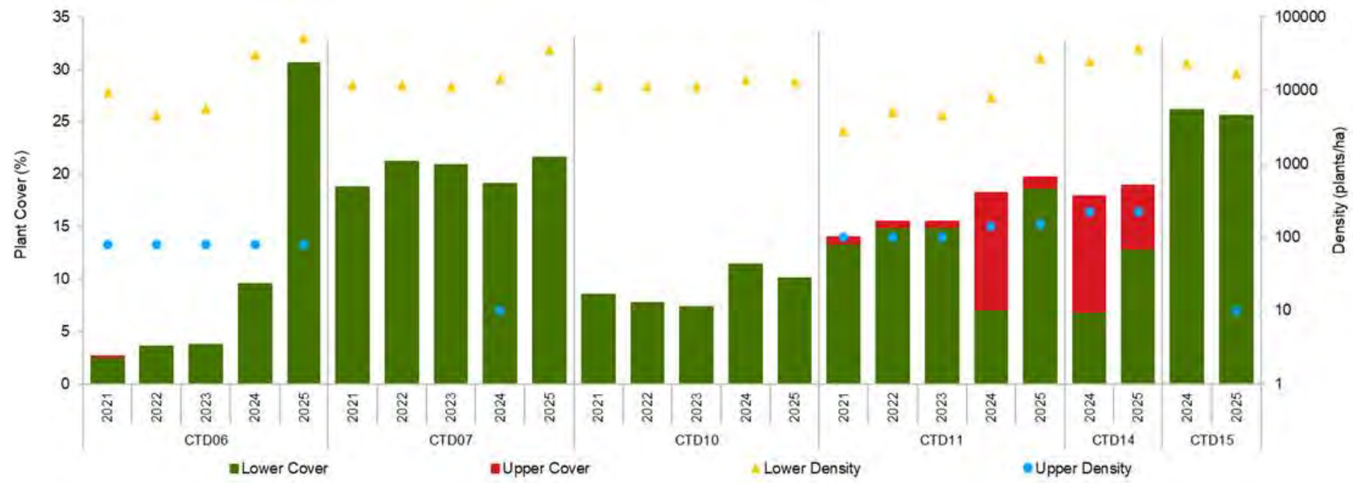


Figure 4-2: Changes in native perennial plant cover (%) and density (plants/ha) at the control transects over the last five years

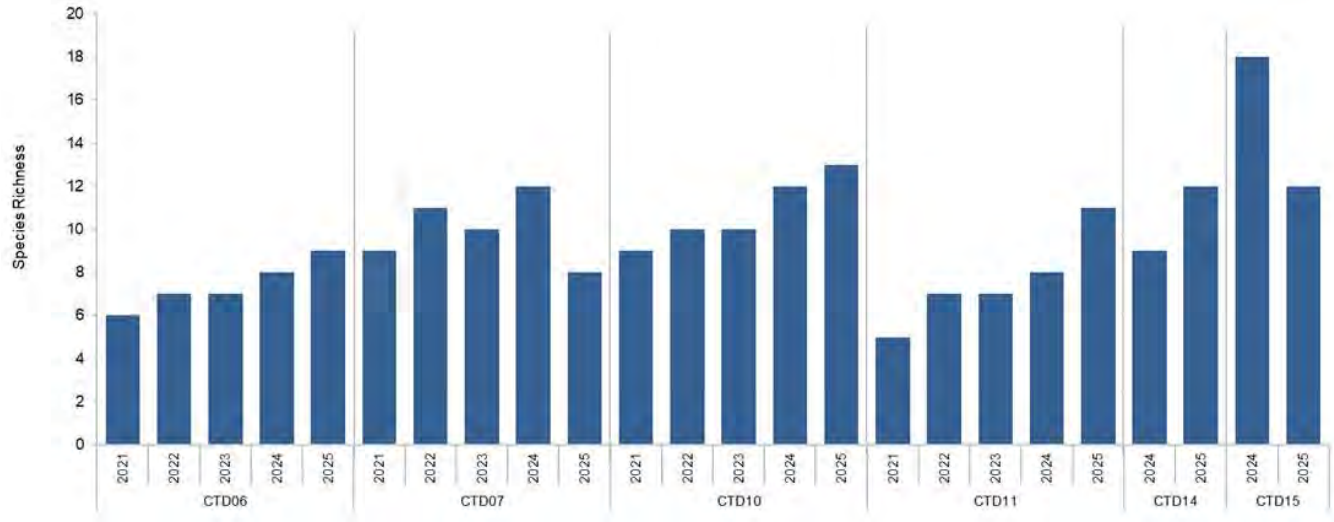


Figure 4-3: Changes in native perennial species richness at the control transects over the last five years

4.1.2 Impact transects

4.1.2.1 Eastern impact transects

Two impact transects were assessed on the eastern side of the CTD TSF in 2025: CTD01 and CTD02 (Figure 4-4, Appendix D) and were compared to corresponding control transect CTD15. As in previous reports, vegetation monitoring data from CTD01 and CTD02 has been presented as mean values in the following section, due to their proximity to each other (approximately 350 m) and are within similar vegetation communities. Previously, the eastern impact transects were compared to western control transects CTD07 and CTD10 due to similar vegetation types. While CTD15 continues to have *Frankenia*/Chenopod shrubland vegetation type, in 2024 it was installed to the east of the CTD TSF (Figure 3-1) and therefore is subject to more similar environmental influences.


Frankenia/Chenopod shrubland (CTD01) eastern impact transect in 2024 (left) and 2025 (right)


Frankenia/Chenopod shrubland (CTD02) eastern impact transect in 2024 (left) and 2025 (right)

Figure 4-4: Eastern impact transects monitored in 2024 and 2025

Between 2024 and 2025, the vegetation condition of the eastern impact transects (CTD01 and CTD02) remained consistent (Figure 4-5, Appendix E). All vegetation parameters across the two impact transect sites, excluding lower storey density (25,875 to 26,750 plants/ha) and cover (17.2 to 19.2%), remained consistent between monitoring assessments. Only lower storey density exceeded the corresponding control transect (CTD15) in 2025 (Figure 4-5, Appendix E). As reported in previous assessments, no upper storey vegetation was recorded at the eastern impact transects (Appendix F) but was measured in low density at the control transect (CTD15).

The increase in lower storey plant density at the impact transects was mostly due to an increase in *Frankenia pauciflora, Cratystylis subspinescens,* and *Maireana amoena*, the three most dominant species for both CTD01 and CTD02. These species, which were also dominant in 2024, each increased in individual species cover and density in 2025. As in 2024, neither of the eastern impact transects had annual species present within the transect.

Average species richness of the eastern impact transects decreased from 11.0 to 9.5 species, below the species richness at the corresponding control transect (12 species) (Figure 4-6). The impact transects were dominated by a lower storey of *Frankenia pauciflora, Cratystylis subspinescens* and *Maireana* spp., which were also present at the corresponding control transect (Appendix E). Species richness reduced at both impact sites in 2025. This reduction was largely driven by the absence of *Maireana pyramidata* and *Tecticornia sp.* at CTD01, and the absence of *Sclerolaena eurotioides* and *Sclerolaena sp*. at CTD02. *Aristida contorta* was the only new species recorded in 2025, identified in low numbers at CTD01.

Field notes from 2025 monitoring indicated eastern impact areas contained qualities of a functional ecosystem. These qualities included evidence of reproducing flora, good overall plant health, and few dead or dying species. Plentiful bird life was observed at CTD02, however there was no obvious presence of ground-dwelling native fauna. Transect CTD01 showed evidence of cattle visitation.

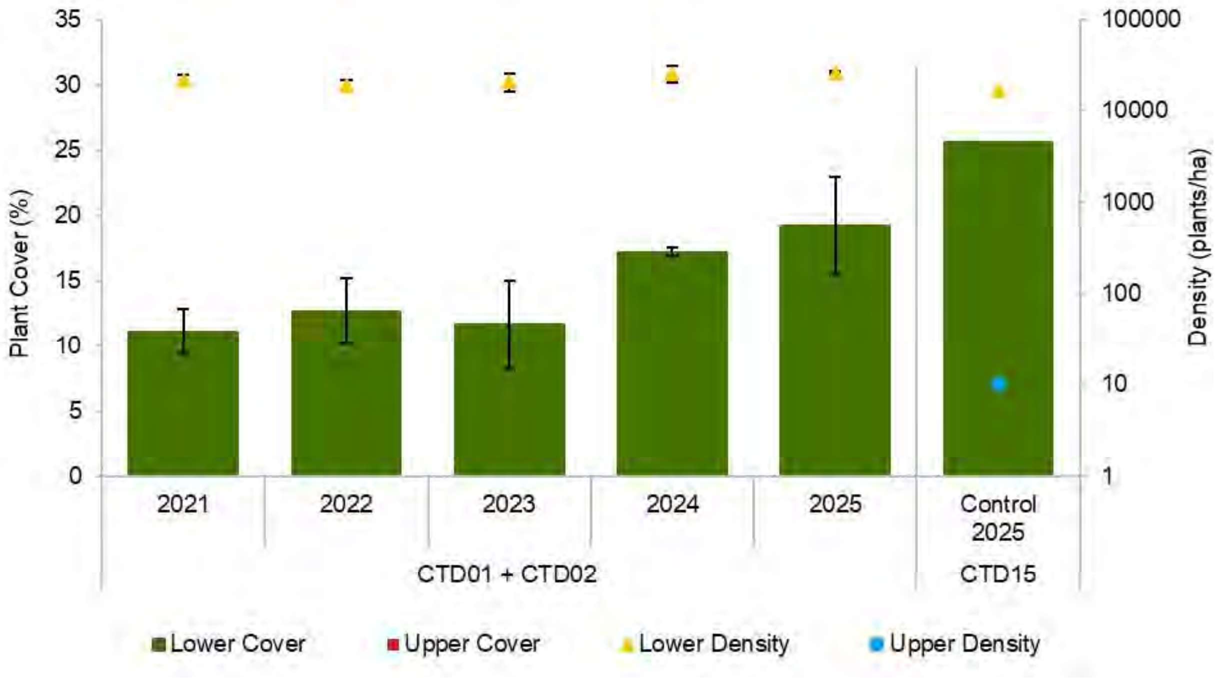


Figure 4-5: Changes in native perennial plant cover (%) and density (plants/ha) over the last five years at the eastern CTD TSF impact transects in comparison with the corresponding control transect

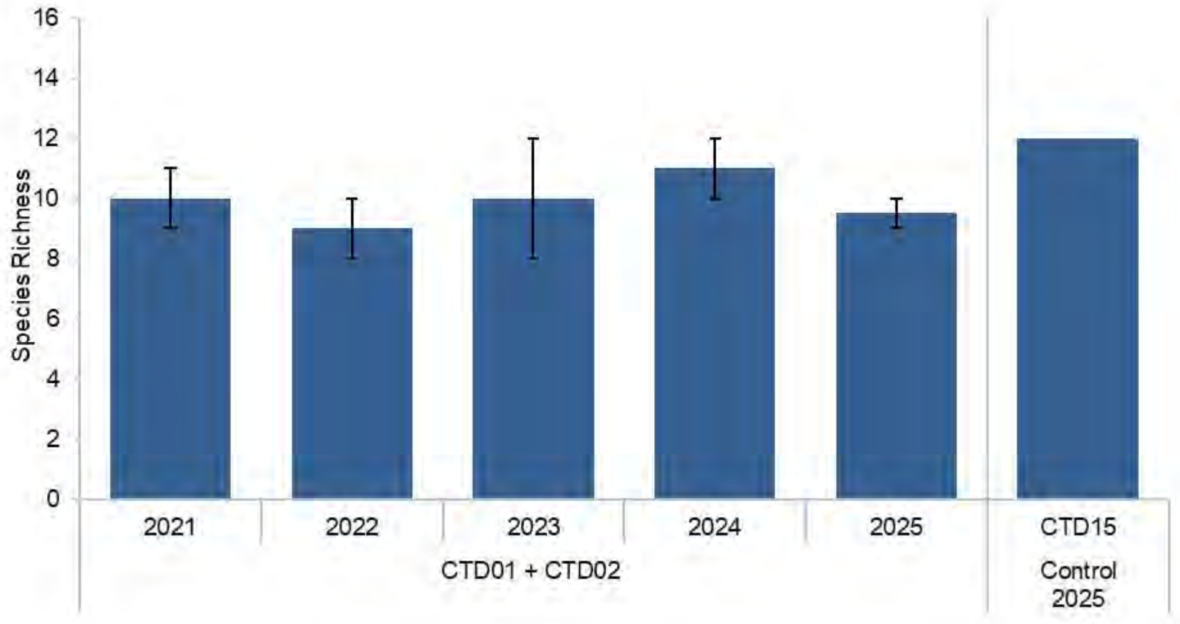


Figure 4-6: Change in native perennial species richness over the last five years at the eastern CTD TSF impact transects in comparison with the corresponding control transect

4.1.2.2 Western impact transects

One impact transect was assessed on the western side of the CTD TSF in 2025: CTD04 (Figure 4-7, Appendix D), and was compared to corresponding control transects CTD06, CTD07 and CTD10.

Frankenia shrubland (CTD04) western impact transect in 2024 (left) and 2025 (right)

Figure 4-7: Western impact transect CTD04 monitored in 2024 and 2025

Between 2024 and 2025, CTD04 increased in lower storey cover (10.9 to 18.8%) and lower storey density (23,500 to 72,250 plants/ha) (Figure 4-8, Appendix E). No upper storey was recorded at the western impact transect, consistent with previous assessments (Appendix F). Both lower storey cover and density were within the range of the corresponding control transects (CTD06, CTD07 and CTD10) in 2025. The increase in lower storey density and cover at CTD04 was attributed to further growth of juvenile/germinative *Frankenia pauciflora* and the presence of *Eragrostis falcata* (first identified in 2025). The annual species *Calandrinia eremaea*, previously identified at CTD04 in 2024, was recorded once again at the site in 2025.

Species richness at CTD04 decreased slightly between 2024 and 2025, from nine to eight, but was still within the control range (Figure 4-9). In 2025, CTD04 was dominated once more by *Frankenia pauciflora*, followed closely by *Eragrostis falcata*, which was not previously identified at the CTD04 transect. While the impact site reported the *Eragrostis* sp. grass for the first time in 2025, *Roepera reticulata* and *Chenopodium gaudichaudianum* species was not observed (both recorded once in 2024). Of the 2025 species list, only *Atriplex vesicaria* was not observed in the western control transects for the area (Appendix E). Although CTD06 was the closest located control transect to CTD04, the vegetation at CTD06 had fewer similarities than CTD07 and CTD10, mainly consisting of an *Aristida contorta* dominated lower storey and an upper storey of scattered *Acacia caesaneura*, neither of which were recorded at the CTD04 site.

Field notes from 2025 monitoring indicated that the western impact area contained qualities of a functional ecosystem. These qualities included evidence of reproducing flora, increased annual cover, and perennial seedlings present. Increased vegetation parameters may be related to the above average rainfall that occurred in August 2025, two months prior to the 2025 monitoring event (Figure 2-1). The area around CTD04 noted no weed species but did note scat indicative of cattle visitation, as well as evidence of kangaroo visitation noted within the surrounding area. While the area was noted to have good vegetation cover, it exhibited only moderate overall plant health, due to the presence of dead or dying *Frankenia pauciflora, Sclerolaena cuneata* and *Sclerolaena eurotioides*.

Figure 4-8: Changes in native perennial plant cover (%) and density (plants/ha) over the last five years at the western CTD TSF impact transect in comparison with the corresponding control transects

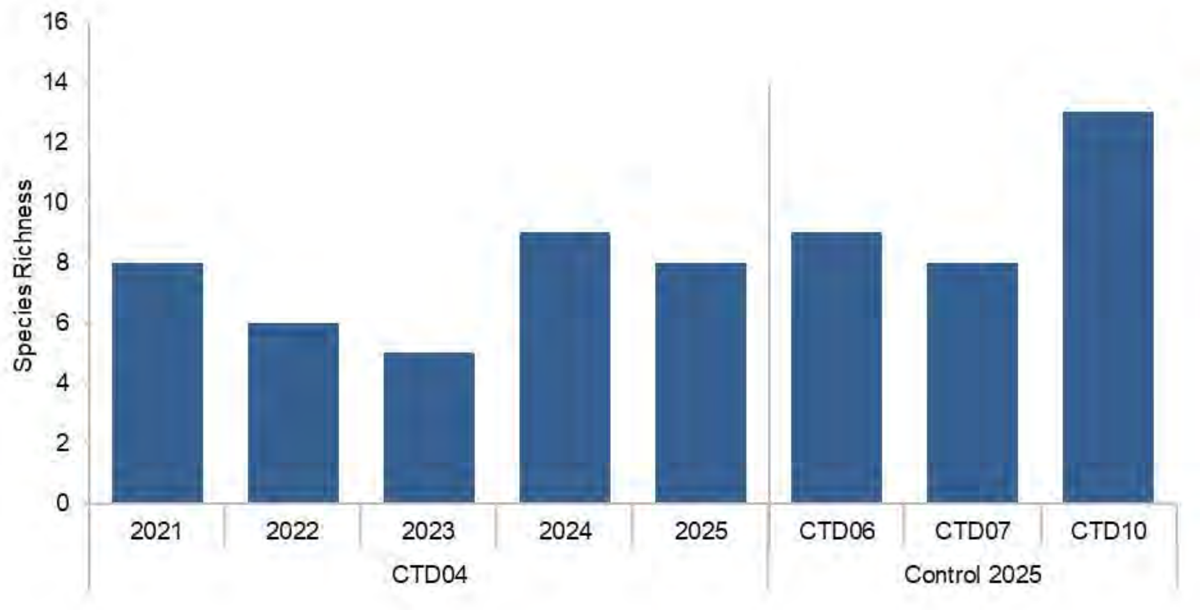


Figure 4-9: Change in native perennial species richness over the last five years at the western CTD TSF impact transect in comparison with the corresponding control transects

4.1.2.3 Northeastern impact transects

Two impact transects were assessed on the northeastern side of the CTD TSF in 2025: CTD08 and CTD09 (Figure 4-10, Appendix D) and were compared to corresponding control transect CTD11.

Acacia open shrub/woodland (CTD08) northeastern impact transect in 2024 (left) and 2025 (right)


Acacia open shrub/woodland (CTD09) northeastern impact transect in 2024 (left) and 2025 (right)

Figure 4-10: Northeastern impact transects monitored in 2024 and 2025

Between 2024 and 2025, vegetation parameters at the northeastern impact transects CTD08 and CTD09 increased overall in cover and density (Figure 4-11, Appendix E). Transect CTD08 increased lower density (8,250 to 18,860 plants/ha). Upper storey cover (10.0 to 9.5%) and lower storey cover (11 to 12%) remained relatively consistent. Upper storey density remained unchanged (140 plants/ha) (Figure 4-11). Transect CTD09 increased in lower storey cover (15 to 23%), lower density (4,000 to 19,360 plants/ha), and remained unchanged in upper storey cover (9.5%) and upper density (140 plants/ha).

In comparison to the corresponding control transect (CTD11), the impact transects lower storey cover was above, while lower storey density, upper storey cover and upper storey density was below (Figure 4-11). The increase in the parameters of the lower storey vegetation at CTD08 was largely attributed to the addition and proliferation of *Monachather paradoxus*. Similarly to CTD08, CTD09 increased in lower storey cover and density due to the growth of *Monachather paradoxus*, and *Sida fibulifera,* both were newly recorded at the impact site area in 2025. In addition to these species, *Acacia tetragonophylla* and *Aristida contorta* were identified for the first time at CTD09, while *Monachather paradoxus* was the sole addition to the CTD08 species list.

No consistent long-term vegetation cover and density trends could be determined at CTD08 and CTD09. This is due to continued data fluctuations in 2025 (Appendix F). In 2025, zero annual species were identified at the northeastern impact transects, which was a considerable decrease from the five species recorded in 2024. Increased vegetation parameters may be related to the above average rainfall that occurred in August 2025, two months prior to the 2025 monitoring event (Figure 2-1).

Species richness at the northeastern impact transects increased from nine to 10 species at CTD08, and from eight to nine species at CTD09 in 2025 (Figure 4-2). In 2025, the impact transects were below the corresponding control transect species richness of 11 (CTD11), which increased from eight to 11 species in 2025. The northeastern impact transects had species compositions comparable with the control transect, as they were largely dominated by an *Acacia* woodland upper storey with a mixed low shrubland, including *Eremophila eriocalyx* and *Monachather paradoxus* (Appendix E).

Field notes from the 2025 vegetation monitoring undertaken northeast of the CTD TSF showed that the area displayed features consistent with a functional ecosystem. These qualities included evidence of reproducing flora, increased annual cover, few dead or dying species, and vegetation covering multiple strata. Although noting a lack of perennial seedlings in the areas around CTD08 and CTD09, overall plant health and vegetation cover was considered good. In addition, the northeastern impact areas had evidence of native fauna, including native trapdoor spider burrows at CTD09 and wallaby/kangaroo scat at CTD08.

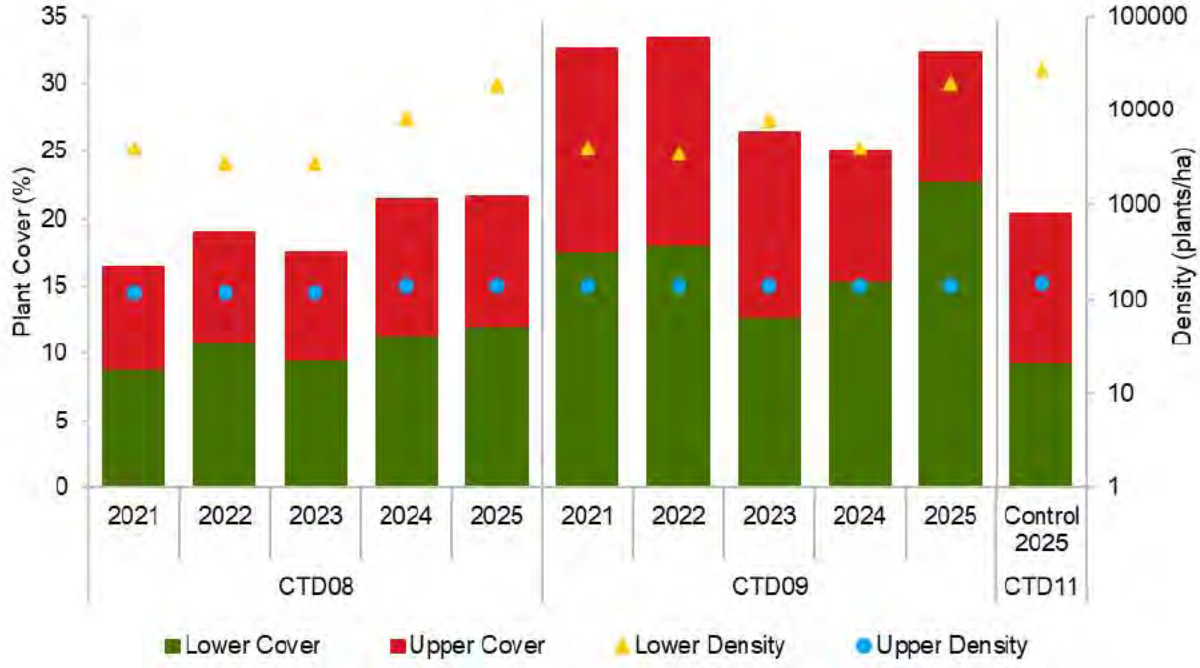


Figure 4-11: Changes in native perennial plant cover (%) and density (plants/ha) over the last five years at the northeastern CTD TSF impact transects in comparison with the corresponding control transect

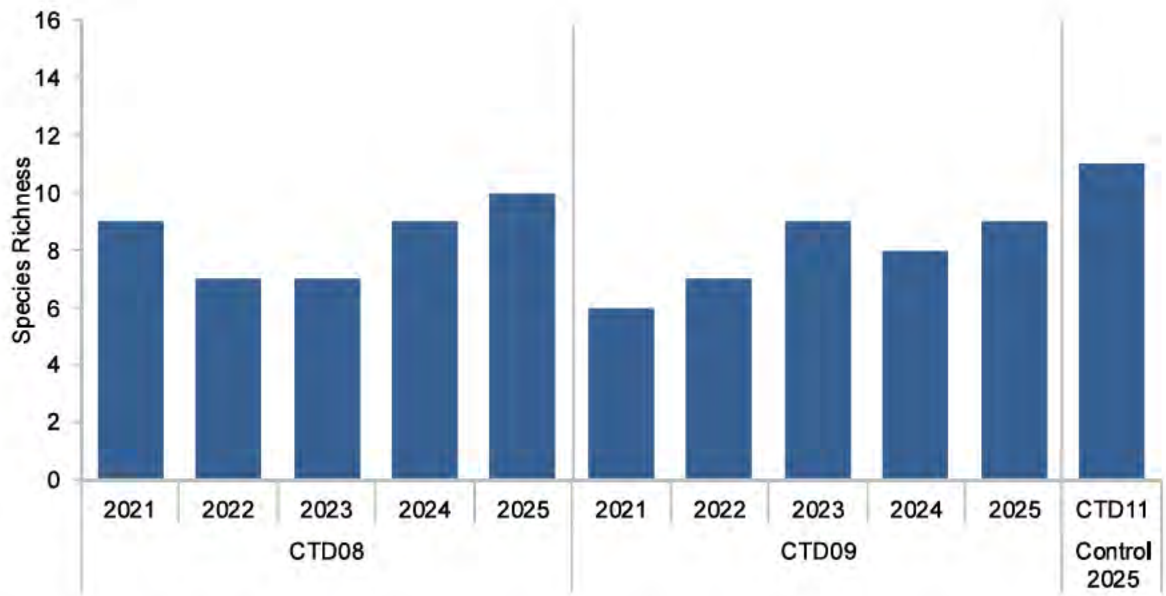


Figure 4-12: Change in native perennial species richness over the last five years at the northeastern CTD TSF impact transects in comparison with the corresponding control transect

4.1.2.4 Southern impact transects

Due to tenement access restrictions, in 2025 the former southern impact transects CTD12 and CTD13 were replaced by newly installed transects CTD16 and CTD17. As these transects were monitored for the first time in 2025, direct historical comparisons could not be made. Instead, results were contrasted against the corresponding control transect CTD14, and the 2025 data for CTD16 and CTD17 are treated as baseline conditions for future monitoring.

Acacia/*Eucalyptus* low open woodland over a *Triodia* hummock grassland CTD16 (left) and CTD17 (right) southern impact transects in 2025

Figure 4-13: Southern impact transects monitored in 2025

In 2025, each of the impact transects had a greater lower storey cover and density than the control transect (CTD14) (Figure: 4-14). Transects CTD16 (27%) and CTD17 (17%) recorded lower storey cover results greater than the southern control transect (13%). Additionally, CTD17 (15%) recorded a greater upper storey cover than the control (6%), while CTD16 (3%) recorded slightly lower cover results. Both CTD16 and CTD17 contained an upper storey vegetation density of 60 plants/ha, whereas the control had a density of 220 plants/ha. Transect CTD16 recorded the highest lower storey density of any impact or control transect at SDGM (51,940 plants/ha), while the lower storey density score for CTD17 (37,690 plants/ha) was more consistent with the control CTD14 (37,530 plants/ha) (Figure: 4-14). The lower storey density recorded at CTD16 was most likely attributable to the presence of juvenile *Triodia basedowii* and *Monachather paradoxus*. While CTD17 lower storey cover was bolstered by *Triodia basedowii*, *Aristida contorta* cover contributed more than any other species.

Transects CTD16 (11 species) and CTD17 (20 species) had the highest species richness scores of any impact transects in 2025 (Figure 4-15) while the southern control site CTD14 had a species richness of 12. Transect CTD17 reported the largest species richness score of any impact or control transect from the last 5 years. However, 12 of the 20 species were very low in density (≤ 2) (Figure: 4-14). This is worth noting as it would not be unusual to see a significant drop in species richness in the next monitoring year, especially if rainfall is below average in the months prior to the planned 2026 assessment. The impact transect results reflect the core composition of species located within the southern control transect, namely dominant species, *Triodia basedowii, Monachather paradoxus, Acacia ramulosa var ramulosa*, and several species belonging to *Acacia aneura* complex (Appendix E).

While the impact transects includes a mix of grasses and chenopods that are not present at the control site, these are all present in low numbers.

Field notes from 2025 monitoring indicated that the northeastern impact areas contained qualities of a healthy ecosystem. These qualities included evidence of reproducing flora, increased annual cover, a general lack of dead or dying species, and vegetation covering multiple strata. At both impact sites, perennial seedling was evident and overall plant health and vegetation cover was good. At CTD17, evidence of native fauna visitation was observed through various indicators, including scats and burrows, bird calls, egg casings and cocoons, as well as webs and direct sightings of spiders. Additional signs included scats from dingo, rabbit, and wallaby/kangaroo. At CTD16, evidence of invertebrate activity included ants/termites, spiders and various flying insects. Signs of introduced fauna were also noted, such as scat and tracks from cattle. Kangaroo scat was observed, indicating native species presence.

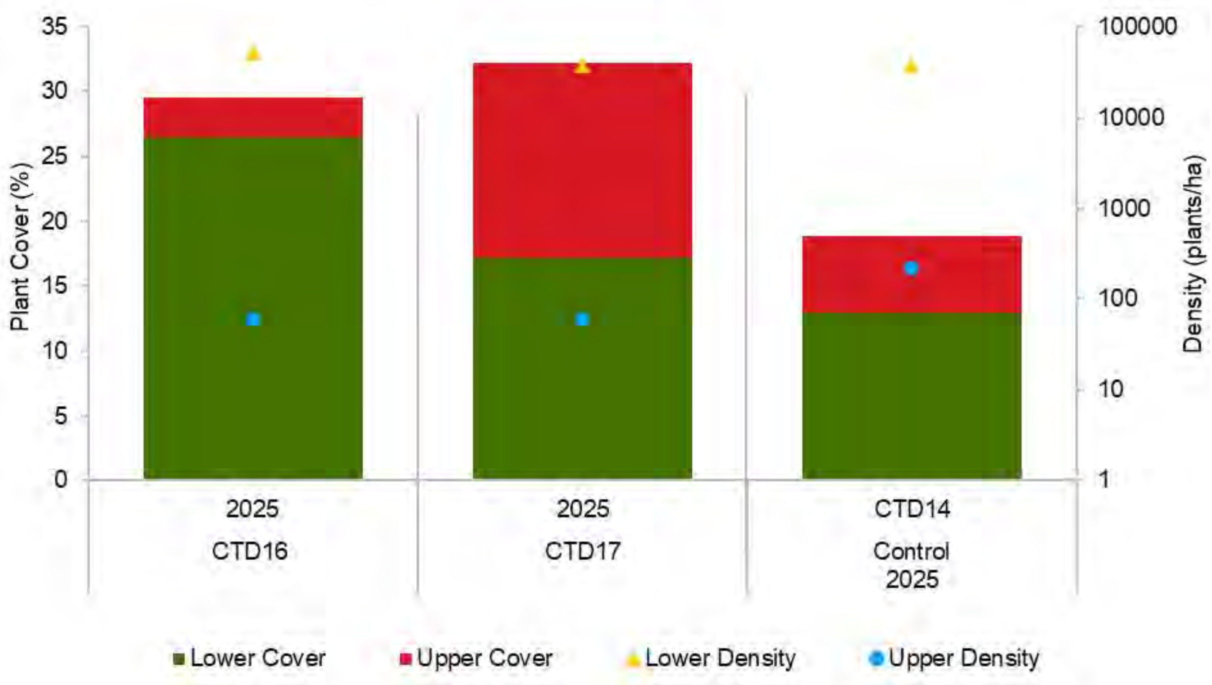


Figure: 4-14: Changes in native perennial plant cover (%) and density (plants/ha) over the last five years at the southern CTD TSF impact transects in comparison with the corresponding control transect

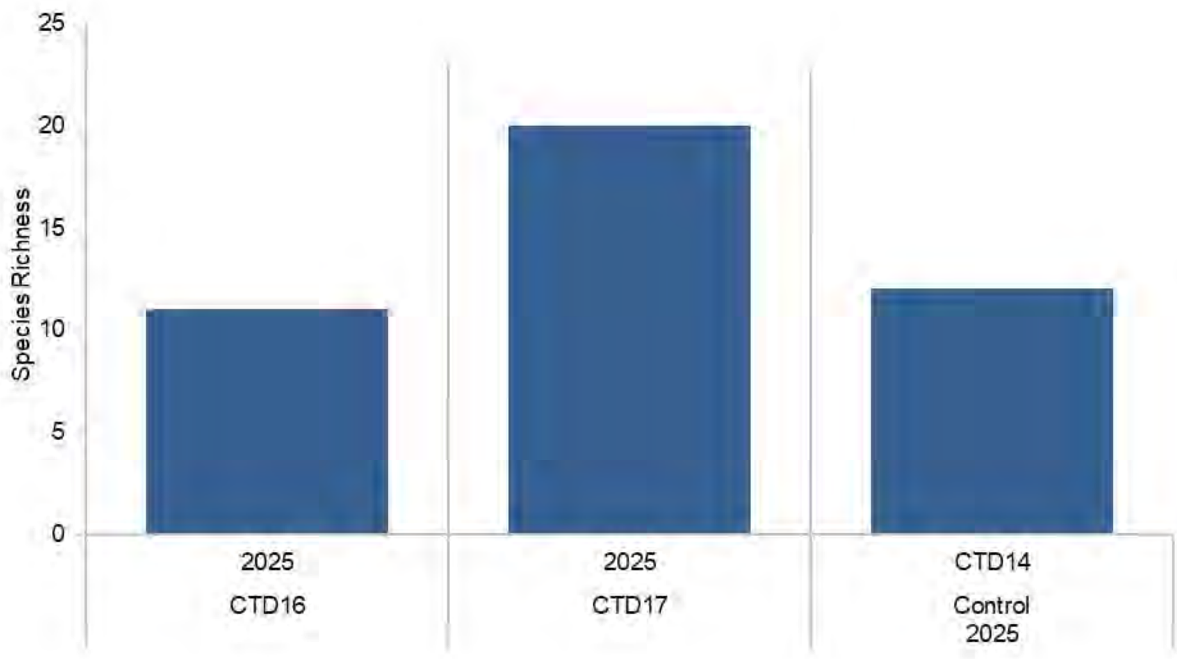


Figure 4-15: Change in native perennial species richness over the last five years at the southern CTD TSF impact transects in comparison with the corresponding control transect

4.2 CTD TSF photo monitoring

In 2025, the vegetation condition at photo monitoring points around the CTD TSF ranged from 'completely degraded' to 'very good' based on the level of disturbance identified (vegetation condition scale, Appendix A) (Table 3-1, Appendix G). A total of forty-one photo points were assessed during 2025, after several changes to the scope in 2024 regarding removal of photo points classed as 'not applicable'. Where multiple photographs were taken at an area, Figure 4-16 and Figure 4-17 show the highest rating for each photo point location.

Overall, in 2025 vegetation condition ratings across the photo monitoring locations remained consistent with the 2024 assessment. Of the 41 photo monitoring points assessed, vegetation condition ratings changed at five sites; one received a higher rating (PP09), one received a lower rating (PP43), and one previously classified as 'not applicable' (PP38-1) was reassigned to 'completely degraded' (Appendix G). Although not evident in Table 3-1, two other sites changed condition ratings in 2025: one improved from 'completely degraded' to 'degraded', while another declined from 'degraded' to 'completely degraded'. The condition at PP43 was decreased due to reduced vegetation density and health, with significant salt crusting observed during the assessment, supporting its reclassification to 'completely degraded' (Keighery 1994) (Appendix A). Conversely, PP09 received a higher rating than in previous assessments, reflecting the improved vegetation health. Over recent years, species composition has diversified and stabilised, contributing to this change.

Similar to previous assessments, the 2025 survey found that vegetation at most photo points remained in a 'degraded' condition, with 29 of the 41 sites reported in this category. Of the remaining sites, six were classified as 'completely degraded', representing an increase from five in 2024. Five photo points retained a 'good' vegetation rating, and one site continued to be rated as 'very good' (Table 3-1). The increase in photo points rated as 'completely degraded' was primarily due to the reassignment of a site previously marked as 'not applicable'. Site PP38-1 was re-evaluated because vegetation was present but sparse and in poor condition - particularly beyond the toe drain - aligning the site with a 'completely degraded' rating (consistent with its pre-2024 classification). Despite site PP38-1's close proximity to infrastructure, it was rated in 2025 due to several subtle changes in vegetation over the last five years, with the aim to monitor updates in the next monitoring period.

The northwestern region of the CTD TSF (Figure 4-17) remained the most impacted region, with both historic and recent vegetation deaths, and minimal vegetation establishment since the Stage 10 expansion earthworks in 2018. The presence of weeds (*Ruby Dock) and introduced fauna (rabbits and cattle) has increased in this region. Wet, boggy soils and increased salt crusting on the soil surface is extending further from the toe drain was also noted, in the northwestern region in 2025 (Appendix G). In 2025, three of the five photo points with 'good' vegetation conditions were located northeast of the CTD TSF (Figure 4-16, Appendix G). The northeastern region of the CTD TSF also contained the highest rated vegetation, with a rating of 'very good' for the established vegetation, exterior to the CTD TSF boundary at PP26. However, at the same monitoring location, PP26-1 received a condition rating of 'degraded' for the vegetation within the CTD TSF boundary (Figure 4-16, Appendix G). Vegetation surrounding the CTD TSF was generally dominated by salt-tolerant species, primarily *Maireana* and *Atriplex* species. Around the CTD TSF expansion area, vegetation also included several forms of saltbush, but recent monitoring has highlighted notable recruitment of juvenile and established *Acacia, Solanum,* and *Triodia* species, along with a high annual cover. Beyond the CTD TSF boundary, vegetation was typically characterized as established *Acacia* woodlands.

Table 4-1: Summary of the vegetation condition ratings between 2021 and 2025

Vegetation Condition Rating	2021	2022	2023	2024	2025
Completely Degraded	5	5	10	5	6
Degraded	33	28	27	29	29
Good	4	9	6	5	5
Very Good	0	0	1	1	1
Excellent	0	0	0	0	0
Not applicable*	14	14	12	1	0
Total number of photographs	**56**	**56**	**56**	**41**	**41**

* Not applicable applies to the photo point monitoring locations where vegetation structure progression is limited by CTD TSF features such as laydown areas, access roads or perimeter firebreaks.

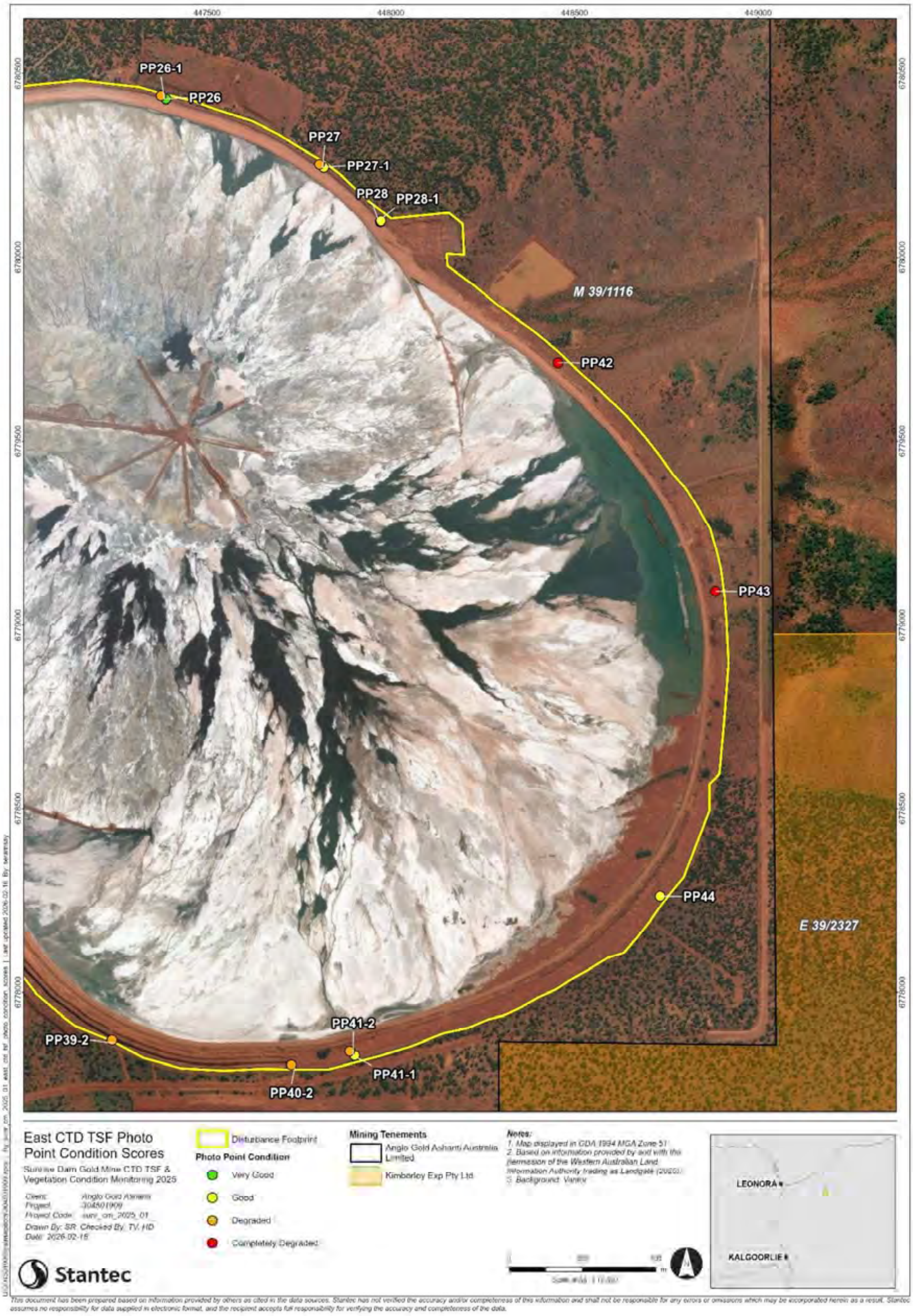


Figure 4-16: Vegetation condition across eastern photo monitoring points assessed in 2025, based on the highest rating when multiple CTD TSF aspects were assessed

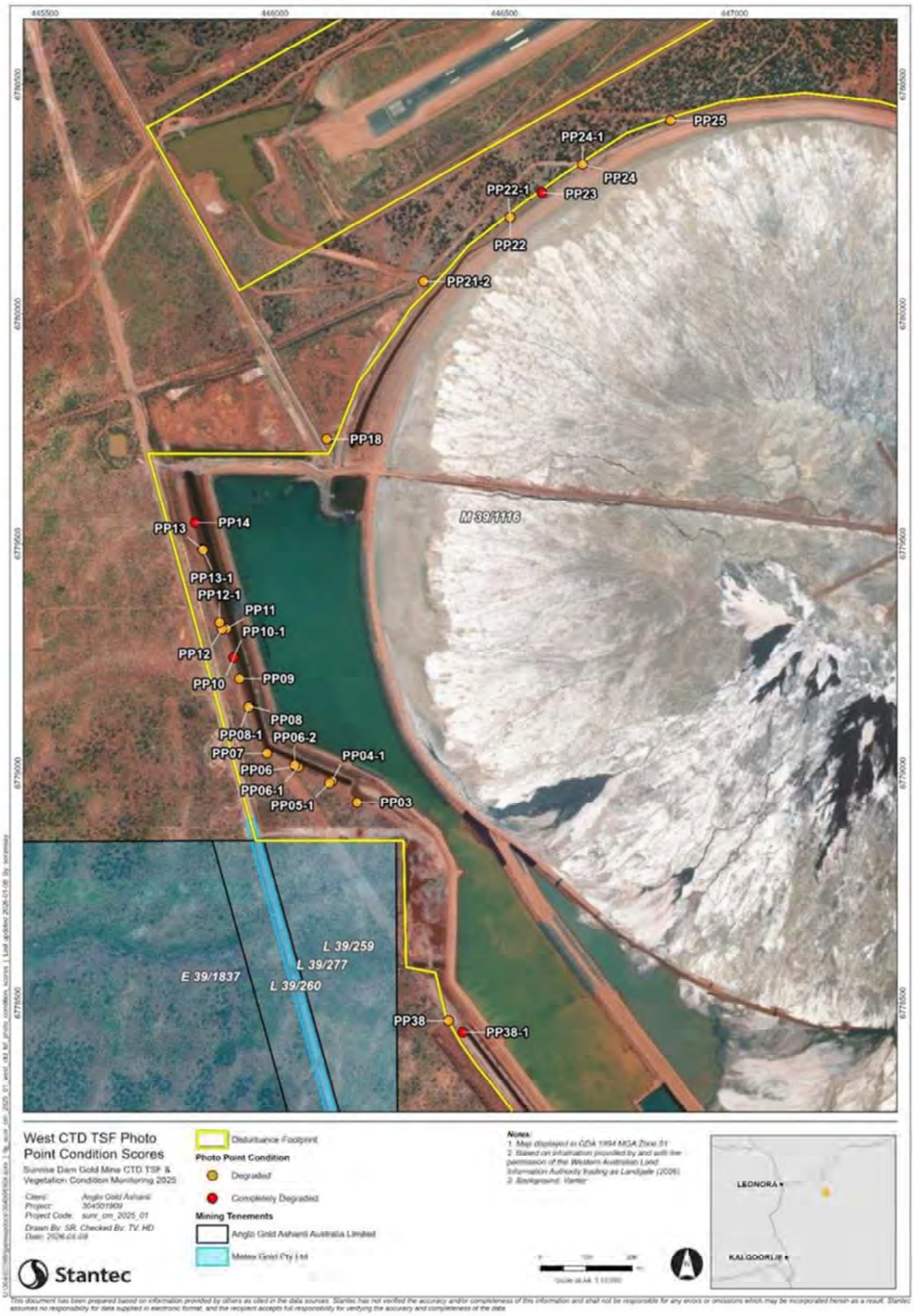


Figure 4-17: Vegetation condition across western photo monitoring points assessed in 2025, based on the highest rating when multiple CTD TSF aspects were assessed

4.3 Soil assessment

Transects CTD16 and CTD17, installed in 2025, replaced the former southern impact transects (CTD12 and CTD13) to continue the assessment of the CTD TSF's impact in the southern area of the AGAA lease. Long-term averages for pH, salinity and total elements in the following results utilise data collected from transects CTD12 and CTD13, which have been inaccessible since 2023. While these historical values no longer directly correspond to the new sites, they represent a general overview of soil conditions in the area south of the CTD TSF and have been included for comparison between former and current impact locations and their associated control (CTD14). Subsequently, the modifications to southern impact site locations in 2025 (CTD16, CTD17) and their corresponding control site in 2024 (CTD14), has affected the suitability of the corresponding 2020 site-specific southern EILs as an indicator for potentially hazardous total element concentrations. These long-term trends and former EILs remain in this report to provide historical context but cannot be used to draw definitive conclusions against 2025 results.

As the former southern impact transects (CTD12 and CTD13) were installed after the 2018 Stage 10 expansion, the long-term soil assessment averages for the southern area utilises data from 2018 to 2024. Long-term impact averages for the remaining areas utilises data from 2016 to 2024.

4.3.1 Soil pH

In 2025, soil pH ($CaCl_2$) classifications across impact areas (Van Gool, Tille and Moore 2005; Appendix A) ranged from 'strongly acidic' to 'neutral' (Appendix H). Average pH_{CaCl2} values were 'neutral' (pH 6.2) for eastern transects (CTD01, CTD02), 'neutral' (pH 6.9) for the western transect (CTD04), 'strongly acidic' for northeastern (CTD08, CTD09; pH 4.4) and 'slightly acidic' for southern transects (CTD16, CTD17; pH 5.0). The impact transects soil pH_{CaCl2} results were compared to the average results of corresponding control transects. The 2025 soil pH_{CaCl2} results for the eastern, western and northeastern impact transects were within the range, and similar to that of the corresponding control transect averages. With a 'slightly acidic' (pH_{CaCl2} 5.0) classification, the southern impact transect soil pH_{CaCl2} results was more alkaline that of the corresponding control transect average, which was classified as 'strongly acidic' (pH_{CaCl2} 4.4).

In 2025, soil pH (H_2O) classifications across impact areas ranged from 'moderately acidic' to 'moderately alkaline' (Van Gool, Tille and Moore 2005; Appendix A). Average pH_{H2O} values were 'moderately alkaline' (pH 8.2) for eastern transects (CTD01, CTD02), 'neutral' (pH 7.2) for the western transect (CTD04), 'moderately acidic' for northeastern (CTD08, CTD09; pH 5.9) and 'slightly acidic' southern transects (CTD16, CTD17; pH 6.1). The impact transects soil pH_{H2O} results were compared to the average results of corresponding control transects. The 2025 soil pH_{H2O} results for the western, southern and northeastern impact transects were within the range, and like that of the corresponding control transect averages. With a 'moderately alkaline' (pH_{H2O} 8.2) classification, the eastern impact transect soil pH_{CaCl2} results was more alkaline that of the corresponding control transect average, which was classified as 'neutral' (pH_{H2O} 7.4).

Overall, in 2025, impact and control transects located east and west of the CTD TSF were typically classified as pH 'neutral'. Impact and control transects located northeast and south of the CTD TSF were typically classed as 'slightly acidic' to 'moderately acidic' (Appendix H). This is noted as acidic soils can potentially reduce vegetation health by limiting root access to water and nutrients (DPIRD 2017). In overly acidic conditions (not observed in the 2025 results), essential nutrients and some trace elements become less available - and may become completely unavailable for plant uptake (DPIRD 2017). Therefore, if substantial changes in soil pH occur at the sites surrounding the CTD TSF, it may be an indication of potential impact.

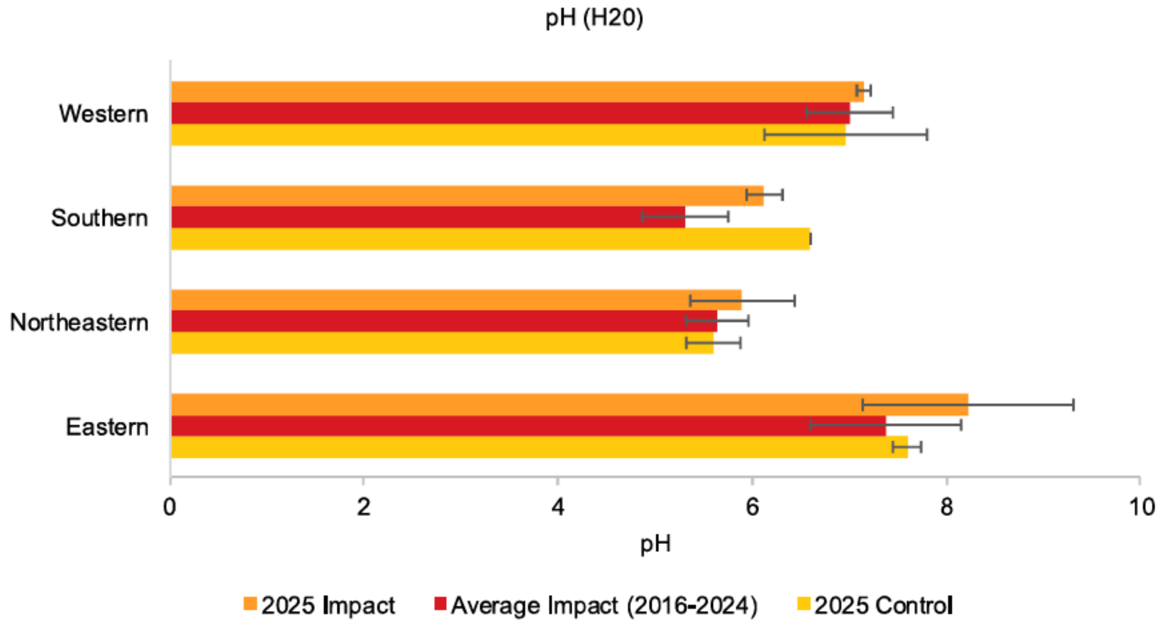


Figure 4-18: Surface soil pH (H_2O) at the impact areas in 2025, compared to the impact areas long-term (2016-2024) average and 2025 corresponding control transects range

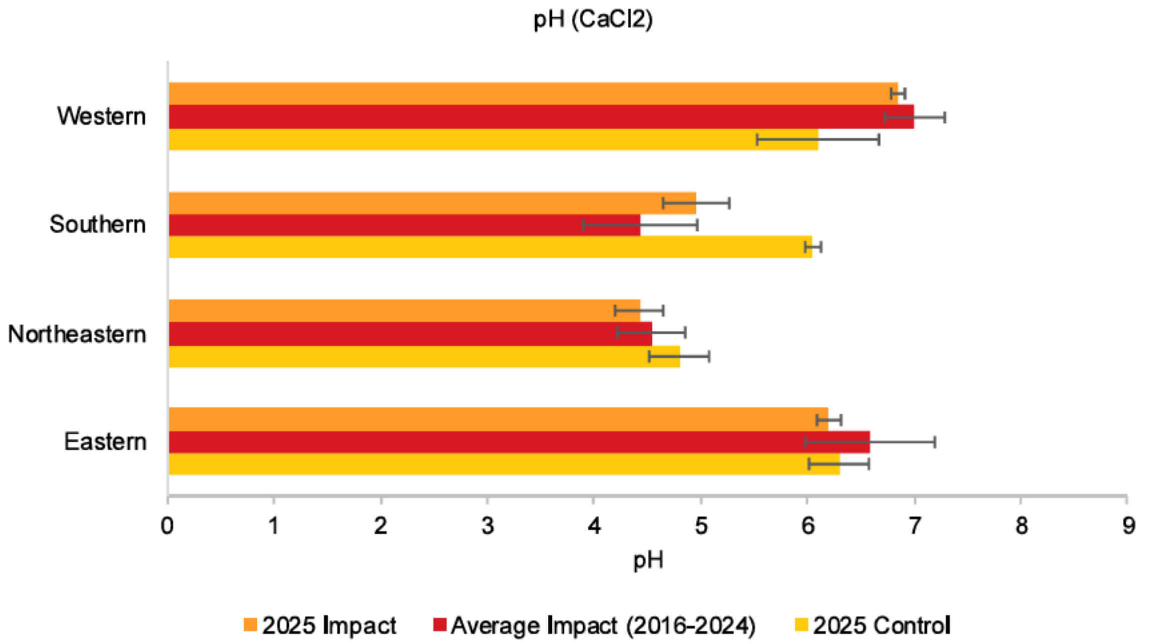


Figure 4-19: Surface soil pH ($CaCl_2$) at the impact areas in 2025, compared to the impact areas long-term (2016-2024) average and 2025 corresponding control transects range

4.3.2 Soil salinity

In 2025, soil EC classifications (based on standard USDA and CSIRO categories (Appendix A)) at the impact areas ranged from ‘non-saline’ to ‘extremely saline’ (Appendix H, Figure 4-20). Average soil EC values at northeastern impact transects (CTD08 and CTD09) and southern impact transects (CTD16 and CTD17) were ‘non-saline’ (0.02 deci Siemens per metre (dS/m) and 0.04 dS/m respectively). Average soil EC values at the eastern impact transects (CTD01 and CTD02) was ‘moderately saline’ (0.50 dS/m) and ‘extremely saline’ (2.31 dS/m) at the western impact transect (CTD04).

The impact transects soil EC results were compared to the average results of corresponding control transects. The 2025 soil EC results for the southern and northeastern impact transects were within the range, and similar to, that of the corresponding control transect averages. With a ‘moderately saline’ (0.50 dS/m) classification in 2025, the eastern impact transect soil EC results was less saline that of the corresponding control transect average, which was classified as ‘extremely saline’ (average 4.8 dS/m). However, it should be noted that the control transect CTD15 was installed in 2024, therefore average data is only available for 2024 and 2025.

With an ‘extremely saline’ (2.31 dS/m) classification in 2025, the western impact transect soil EC results was more saline that that of the corresponding control average, which was classified as ‘moderately saline’ (average 0.39 dS/m). Soil EC values, and therefore salinity, has been steadily increasing at the western impact transect CTD04 since 2017.

Overall, two impact transects (CTD01 and CTD04) and three control transects (CTD07, CTD10, and CTD15) had soils categorised between ‘moderately saline’ and ‘extremely saline’ in 2025 (Appendix H). These transects were located east (CTD01 and CTD15), west (CTD04 and CTD07) and southwest (CTD10) of the CTD TSF.

Salinity affects many aspects of plant development, including seed germination, growth, water and nutrient uptake (Shrivastava & Kumar, 2015). Given SDGM’s proximity to Lake Carey, a large inland salt lake (750 square kilometres (km^2)) (Timms et al., 2006), elevated salinity at impact and control transects west of the CTD TSF and closest to the lake (CTD04, CTD06, CTD07, and CTD10) is to be expected.

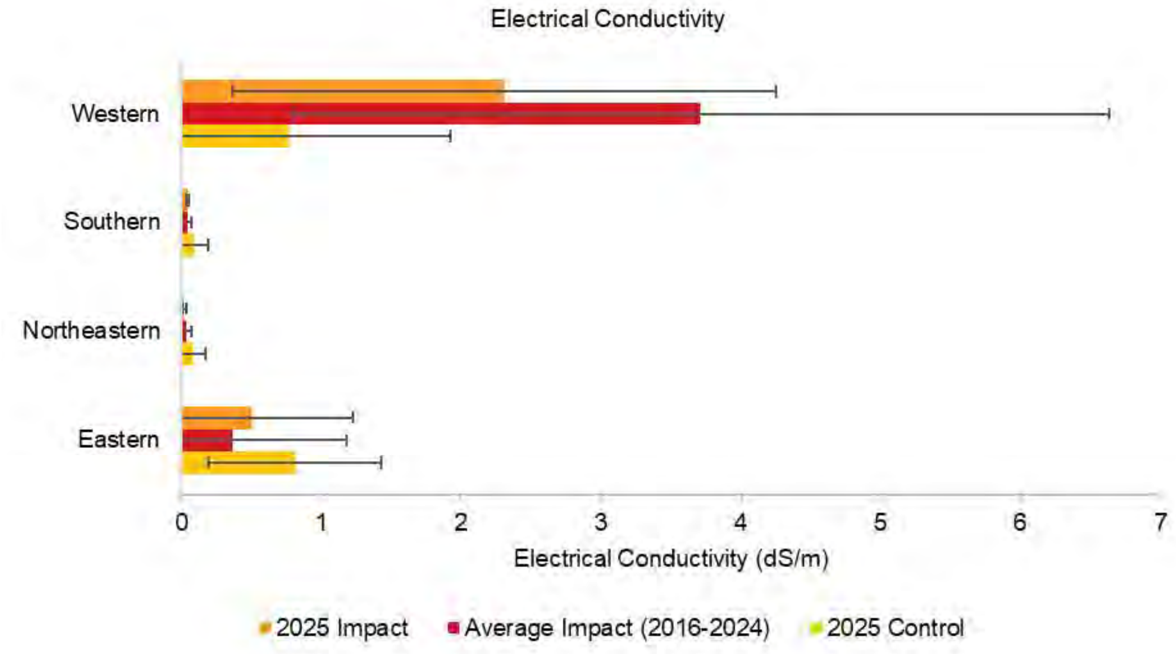


Figure 4-20: Surface soil salinity at the impact areas in 2025, compared to the impact areas long-term (2016-2024) average and 2025 corresponding control transects range

4.3.3 Soil total element concentrations

Individual total element concentrations that returned results above the laboratory limit of reporting (LOR), measured across the impact transects between 2016 and 2024 are shown in Figure 4-21. Total concentrations of arsenic, beryllium, boron, mercury, and selenium were not detected above the LOR in 2025. These elements have not been detected above the LOR since analysis commenced in 2016.

Across all the impact areas in 2025, barium, lead and manganese reported total concentrations above long-term average ranges. Nickel, zinc, chromium, vanadium, manganese and cobalt reported total concentrations above the control ranges. The northeastern impact transects reported the highest overall total concentrations of chromium, cobalt, copper, lead, vanadium and zinc (Appendix H).

Since 2020, soil data at all transects (impact and control) has been compared to National Environment Protection Measure (NEPM) guideline, site-specific, EILs for elements where available (chromium, copper, lead, nickel, and zinc). In 2025, no transects exceeded the site-specific EILs for copper, lead, and zinc. However, three transects, two impact (CTD02 and CTD09) and one control (CTD15) exceeded the EIL for nickel (Table 4-2). This assessment marks the sixth year in a row that total nickel concentrations have exceeded the adopted EIL. This is an increase from 2024, where only two transects exceeded the EIL for nickel. In addition, impact transect CTD08 exceeded the EIL for chromium in 2025.

While most elements analysed at SDGM are naturally occurring, their individual toxicity can be affected by changes in the physiochemical properties of the soil (NEPM 2013). These properties include clay content, CEC, pH, iron and organic carbon content (NEPM 2013).

4.3.3.1 Western transects

Total element concentrations at the western impact transects in 2025 were within the long-term (2016-2024) average impact range for all elements, excluding manganese, lead and zinc. Total lead concentrations was above the upper range of the long-term average. Total concentrations of manganese and zinc was below the lower range of the long-term average. When compared to the 2025 corresponding control, total element concentrations at the western impact transects in 2025 were within the control range for barium and lead, above the control range for nickel and zinc, and below the control range for the remainder of the total elements that reported results above the LOR (Figure 4-21).

4.3.3.2 Southern transects

Total element concentrations at the southern impact transects in 2025 were within the long-term (2016-2024) average impact range for all metals excluding barium and magnesium, where the 2025 concentration for manganese and barium was above the range of long-term average. When compared to the 2025 corresponding control, metals at the southern impact transects in 2025 were within the control range for cobalt, vanadium and zinc, above the control range for chromium and below the control range for the remaining metals (Figure 4-21).

4.3.3.3 Northeastern transects

Total element concentrations at the northeastern impact transects in 2025 were within the long-term (2016-2024) average impact range. Total concentrations of copper, lead, chromium, and barium at the northeastern impact transects were within the control range. All other elements at the northeastern impact transects were above the corresponding control range in 2025 (Figure 4-21).

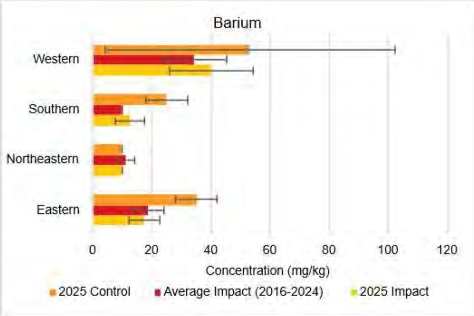
4.3.3.4 Eastern transects

Total element concentrations at the eastern impact transects in 2025 were within the long-term (2016-2024) average impact range. All soil metal concentrations at the eastern impact transects were within the long-term (2016-2024) average impact range in 2025. Of these, four elements (lead, chromium, manganese and zinc) were also within the 2025 corresponding control range. Concentrations of vanadium at the eastern impact transects in 2025 were above the control range. Nickel, copper, barium and cobalt concentrations were below the control range (Figure 4-21).

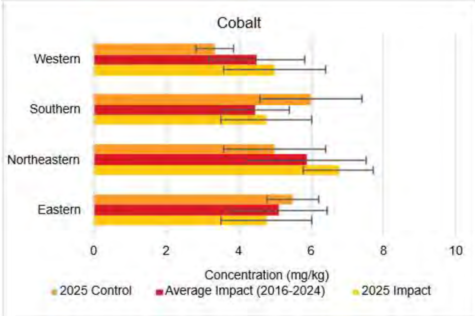
Table 4-2: Metal concentrations at the impact and control transects in 2025, compared to predetermined site-specific EILs

Direction	Type	Transect	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Eastern	Impact	CTD01	237	10.5	6	15.5	13
		CTD02	246.5	11.5	6	29.5	13.5
	Control	CTD15	246	19	6.5	30	13.5
Site specific EIL			280	60	470	20	55
Western	Impact	CTD04	205.5	12.5	5.5	18	17.5
	Control	CTD06	175.5	7.5	6	13.5	9.5
		CTD07	170.5	8	5	13	10.5
		CTD10	169.5	8.5	5	13	11
Site specific EIL			280	90	470	20	55
Northeastern	Impact	CTD08	422	16.5	8	22	13.5
		CTD09	286	21	8	27.5	22
	Control	CTD11	298.5	15.5	7.5	18.5	15
Site specific EIL			370	40	480	25	35
Southern	Impact	CTD16	242.5	13	6	20	16.5
		CTD17	177	10.5	5.5	16.5	18
	Control	CTD14	171.5	14	7	20	18.5
Site specific EIL			320	40	480	20	40

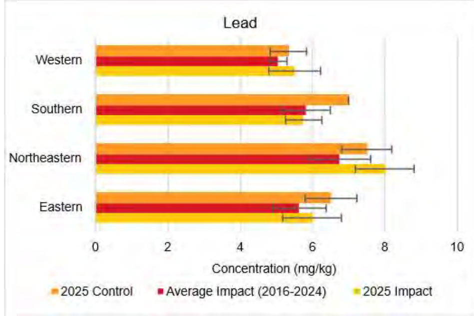
Exceeds the NEPM (2013) EIL for protection of areas of ecological significance (Appendix C).



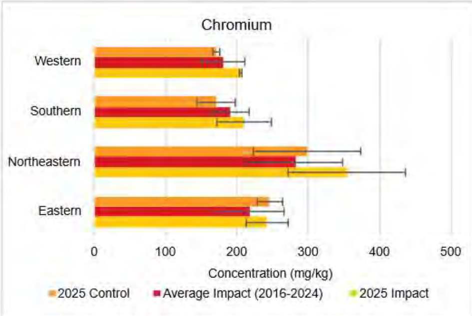
a) **Barium**



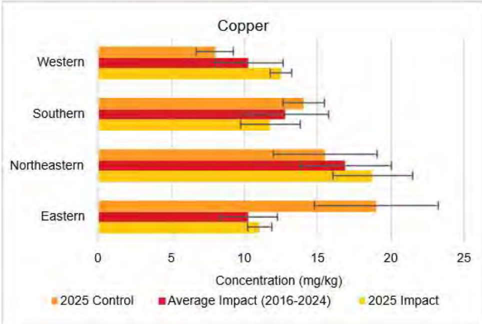
b) **Cobalt**



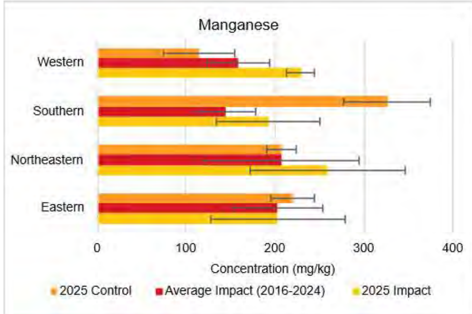
c) **Lead**



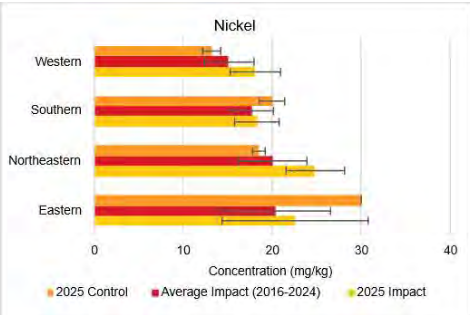
d) **Chromium**



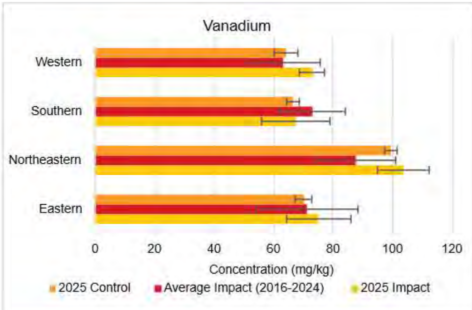
e) **Copper**



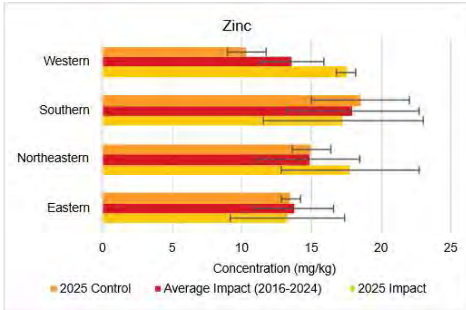
f) **Manganese**



g) **Nickel**



h) **Vanadium**



i) **Zinc**

Figure 4-21: Individual and average total elemental concentrations (mg/kg) in soil of barium (a), cobalt (b), lead (c), chromium (d), copper (e), manganese (f), nickel (g), vanadium (h) and zinc (i) of the impact areas and corresponding control areas in 2025, compared to the long-term average(2016-2024) Barium soil concentration at the impact areas in 2025, compared to the impact areas long-term (2016-2024) average

4.4 Hydrogeological assessment

Changes in groundwater attributes such as static groundwater levels, pH, and salinity, have the potential to impact vegetation health. The CTD TSF is located above a shallow aquifer in the Goldfields groundwater area. Baseline groundwater salinity (beneath and surrounding the CTD TSF) has varied considerably from ‘brackish’ to ‘hypersaline’ (URS 2011). Quarterly groundwater level, pH, and EC (as salinity) data from seven monitoring bores (CTDMB03, CTDMB41A CTDMB29B, CTDMB11A, CTDMB11B, CTDMB16 and CTDMB38A) were collected and provided by AGAA and used to identify changes in groundwater parameters that may be linked to vegetation health in nearby transects (Figure 3-2).

4.4.1 Groundwater level

Groundwater levels at bores surrounding the CTD TSF generally declined in 2025, following the sharp increases observed in early 2024 (Figure 4-22). By October 2025, most bores had receded toward historical ranges, though some remain elevated compared to pre-2023 baselines. Western bores CTDMB11A and CTDMB11B saw decreases in groundwater depth from 2024 highs (approx. -1.7 to – 2.7 m) aligning closely with long-term averages. CTDMB16, however, remains at approx. -3.0 m, notably shallower than historical depths, indicating a sustained rise in the western sector. Eastern bores CTDMB41A and CTDMB29B also declined steadily through 2025, stabilising around -2.8 m and -3.7 m respectively. At CTDMB38A (southern), groundwater deepened slightly from approx. -2.4 m in mid-2024 to approx. -2.6 m by late 2025, yet continues to be shallower than historical levels, suggesting a potential shift in groundwater depth in this area. CTDMB03 (northeastern) shows minimal change, fluctuating near - 5.2 m, consistent with long-term trends. No short-term spikes were recorded in 2025, contrasting with the sudden rise in groundwater depth of early 2024. Overall, 2025 patterns reflect gradual recession from elevated conditions, with localized persistence of higher groundwater levels – particularly at CTDMB16 and CTDMB38A relative to historical baselines.

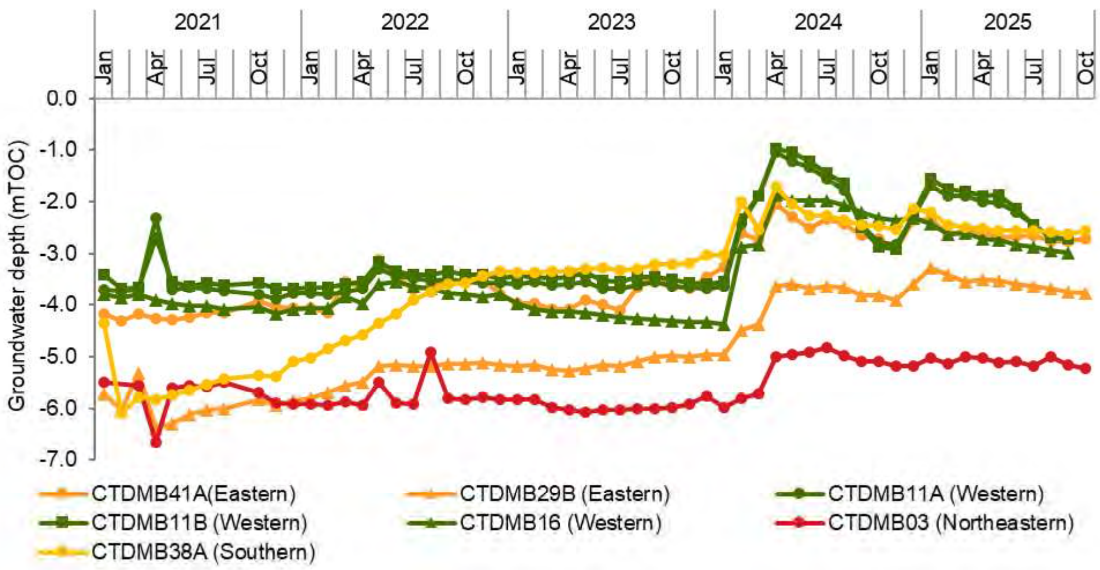


Figure 4-22: Groundwater levels at bores in proximity to the vegetation monitoring sites over the last five years. Direction from the CTD TSF in parentheses

4.4.2 Groundwater pH

Groundwater pH at bores surrounding the CTD TSF remained largely stable through 2025, with most sites recording values consistent with historical ranges (Figure 4-23). Western bores CTDMB11A, CTDMB11B and CTDMB16 maintained values between pH 6.5 and 7.5 throughout the year, reflecting neutral conditions similar to previous years. CTDMB38A (southern) also remained stable at approx. pH 6.5 – 7.0. Eastern bores CTDMB41A and CTDMB29B continued to exhibit slightly lower pH values, generally between pH 5.5 and 6.0, consistent with the mildly acidic conditions observed historically.

The most notable change occurred at CTDMB03 (northeastern), where pH dropped sharply from approx. pH 7.0 in March 2025 to pH 3.0 by October – the lowest recorded value in the monitoring dataset. This extreme decline contrasts with the long-term range (typically pH 6.0–7.0) and may indicate localised acidification. However, given the magnitude and isolation of this change, the result is more likely due to erroneous data or sampling error rather than a true geochemical shift. No similar trends were observed at adjacent bores, supporting the need for data verification before drawing conclusions. Overall, 2025 trends indicate stable pH conditions across most monitoring locations relative to historical data, with the exception of CTDMB03, which requires further investigation to confirm whether the observed drop reflects a genuine environmental change.

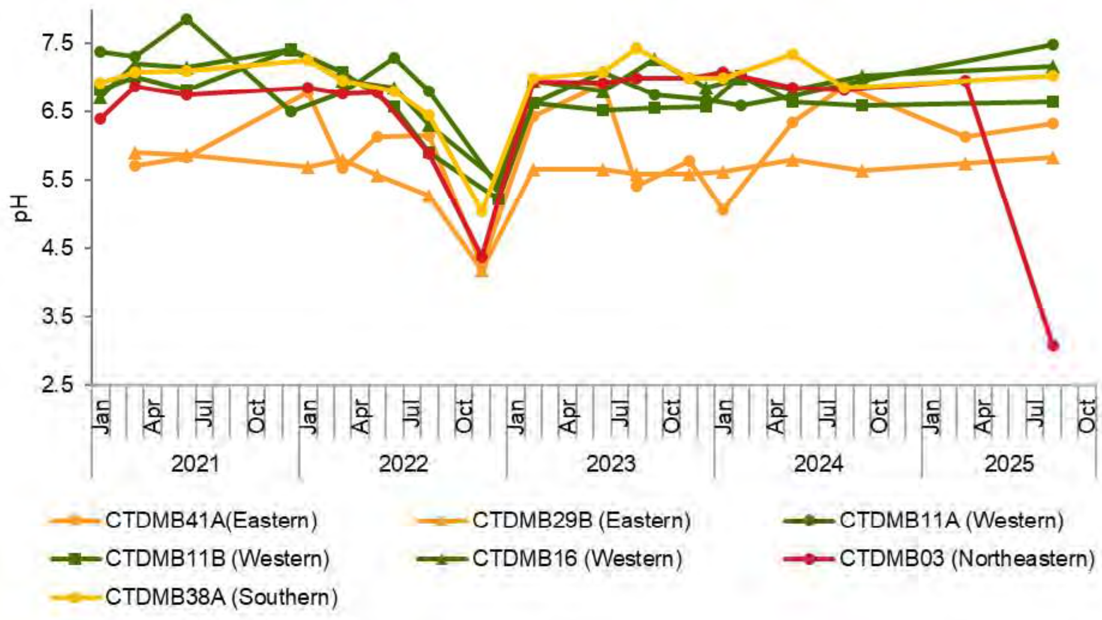


Figure 4-23: Groundwater water pH values at bores in proximity to the vegetation monitoring sites over the last five years. Direction from the CTD TSF in parentheses

4.4.3 Groundwater salinity

Groundwater salinity, represented by electrical conductivity (EC), generally declined across all bores through 2025 following elevated levels observed in 2023–2024 (Figure 4-24). Western bores CTDMB11A, CTDMB11B and CTDMB16 recorded EC values between 90 and 100 dS/m by the end of 2025, trending downward from peaks of 130–140 dS/m in 2023 to early 2024. Eastern bores CTDMB41A and CTDMB29B continued to exhibit lower EC values when compared to 2024 data, although these values are consistent with long-term averages. CTDMB38A (southern) recorded the lowest EC levels of all sites declining steadily from 65 dS/m in late 2024, to 51 dS/m by late 2025, well within historical values. The southern bore was the only site to be classified as 'mesosaline' while the remainder were 'hypersaline'. The northeastern bore CTDMB03 maintained the highest EC values across the monitoring network, though levels decreased from approx. 150 dS/m in early 2024, to 120 dS/m by October 2025. While this represents improvement, salinity at CTDMB03 remains significantly above other sites, but in line with its historical baseline (approx. 120 dS/m), suggesting persistent localised salinity, but not worsening conditions. Overall, 2025 trends indicate a general reduction in groundwater salinity following previous peaks, with most bores returning toward historical ranges.

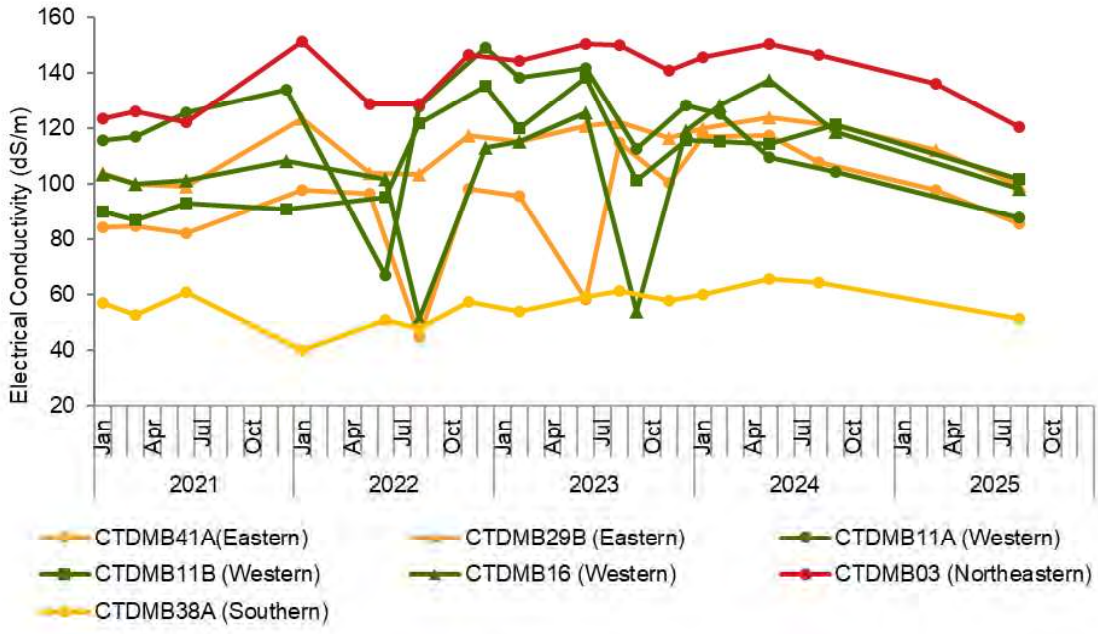


Figure 4-24: Groundwater water salinity (dS/m) at bores in proximity to the vegetation monitoring sites over the last five years. Direction from the CTD TSF in parentheses

5 Conclusions

Overall, between 2024 and 2025, vegetation parameters at the transects typically improved or retained similar features to the previous year (Table 5-1). However, there were some reductions in species richness and salinity. Of the monitored vegetation parameters, lower storey density increased the most across the transects, with eight transects recording a percentage increase of 25% or above, and one (eastern control transect CTD15) recording a percentage decrease of more than 25% since the previous assessment. Lower storey cover generally increased at the transects between 2024 and 2025, with half recording a percentage increase of more than 25%, and the remainder recording similar cover results to the previous monitoring assessment. Species richness, upper storey density and upper storey cover remained relatively stable between assessments at the transects. In 2025, soil salinity (EC) and soil pH results remained relatively consistent (Table 5-1).

Since the last assessment in 2024, vegetation at the eastern impact transects (CTD01 and CTD02) increased in lower storey density and cover due to increased juvenile *Aristida contorta* and growth of established plants. Lower storey density at the eastern impact transects exceeded the corresponding control transect range, while lower storey cover was below the control range in 2025. Photo monitoring revealed vegetation condition at the eastern locations ranged from ‘good’ to ‘completely degraded’. Soil pH_{CaCl2} averaged at the eastern impact area was within the range of the long-term average and 2025 control site and was classed as ‘neutral’. The eastern impact areas soil was categorised as ‘moderately saline’ and was within the range of the control and long-term average recorded at the impact transect. All soil metal concentrations at the eastern impact area were within the range of previous concentrations and most were within the corresponding control range. Concentrations of vanadium at the eastern impact transects in 2025 were above the control range, while nickel, copper, barium and cobalt concentrations were below the 2025 control range. Nickel concentration at CTD02 and CTD15 was above the NEPM (2013) EIL in 2025 for the sixth assessment. Monthly groundwater levels at the eastern bores (CTDMB41A and CTDMB29B) spiked between December 2024 and February 2025 recording some of the highest levels in the past five years. Quarterly groundwater pH recorded very few fluctuations from 2024 monitoring continuing to sit around mildly acidic conditions. Groundwater salinity at the eastern bores was still ‘hypersaline’ in May 2025 but has continued to decrease steadily in salinity between quarterly monitoring events.

Vegetation parameters at the western impact transect (CTD04) improved in 2025, due to increased juvenile/germinative *Frankenia pauciflora* while being bolstered by new species *Eragrostis falcata*. Both lower storey cover and density were within the control range. Photo point monitoring identified the northwestern region of the CTD TSF remained the most impacted with sustained presence of weeds (*Ruby Dock) and introduced fauna (rabbits). At the western impact area soil pH_{CaCl2} was ‘neutral’ in 2025 and was within the range of the control and previous long-term results. The western impact area had the most saline soils of the impact areas in 2025, with ‘extremely saline’ soils that were within the long-term average and above the control range. The western impact area had six metals with concentrations within the long-term (2016-2024) average, two below and one above the upper range. No metal concentrations exceeded EILs in the western area. Monthly groundwater levels at the western bores CTDMB11A and CTDMB11B spiked between December 2024 and January 2025, while CTDMB16 has remained on steady decline with little change since April 2024. Quarterly groundwater pH remained mostly stable in recent monitoring events and was ‘circumneutral’ in August 2025. Groundwater salinity at the western bores was still classified as ‘hypersaline’ but decreased in salinity from 2024.

The northeastern impact area was observed through transects CTD08 and CTD09. Between 2024 and 2025, CTD09 and CTD08 stayed consistent or increased in lower storey density and upper storey cover. Both impact transects were above the control range for lower storey cover while lower storey density, upper storey cover and upper storey density was below the control range. Photo point monitoring identified vegetation northeast of the CTD TDF had the highest rated vegetation, with a rating of 'very good' for the established vegetation, exterior to the CTD TSF boundary at PP26. However, at the same monitoring location, PP26-1 received a condition rating of 'degraded' for the vegetation within the CTD TSF boundary, illustrating the contrast between the CTD TSF interior fenceline and surrounding vegetation.

Soil pH_{CaCl2} at the northeastern impact area was classified as 'strongly acidic' in 2025, which was within the range of the long-term average (2016-2024) values, but below (i.e. more acidic than) the control range. Soil salinity at the northeastern impact area was consistent with previous values, categorised as 'non-saline' in 2025 and were within the control range. Soil metal concentrations in 2025 were within the long-term (2016-2024) average impact range for all metals within the northeastern impact transects. When compared to the 2025 corresponding control, copper, lead, chromium, and barium concentrations at the northeastern impact transects were within the control range while all other metals were above the corresponding control range in 2025 (Appendix H).

Monthly groundwater levels at the northeastern bore (CTDMB03) remained consistent since April 2024 and did not exhibit any spikes. Quarterly groundwater pH was 'neutral' in May 2024 and remained mostly stable and within the bores historical range in 2025. Although, in August 2025 the northeastern bore CTDMB03 recorded a sharp decrease to 'acidic'. Due to the extremity of this result, it is suspected to be an erroneous, however the northeastern transects were also the most acidic so this value needs to be investigated further. No similar trends were observed at adjacent bores, supporting the need for data verification before drawing conclusions. Groundwater salinity at the northeastern bore was categorised 'hypersaline' and continued to have the highest salinity of all the bores. Salinity at the northeastern bore remained mostly stable and within the bores historical range but has seen a slight drop since 2024.

In 2024, tenement access restrictions at the southern impact transects (CTD12 and CTD13) meant that the transects were not monitored using the annual vegetation transect assessment method, instead they were monitored using a qualitative assessment of the proximate surrounding areas. In 2025, two new impact transects (CTD16 and CTD17) were installed in Triodia hummock grassland to measure impact to the south of the CTD TSF in place of the inaccessible sites. Due to the trend in deteriorating vegetation condition at the former southern transects in previous assessments, in 2024 CTD13 was assessed as an impact transect and CTD14 was installed as a new control. Although not comparable to previous years, the new southern impact sites contained some of the highest vegetation values of the 2025 impact transects. Photo point monitoring identified vegetation condition in the area generally remained unchanged between assessments. Soil pH_{CaCl2} at the southern impact area was classified as 'slightly acidic' in 2025. When compared to the 2025 corresponding controls, pH_{CaCl2} at the southern impact areas was more acidic than the control range, but more alkaline than the long-term average values. The southern impact area was 'non-saline' and was within the control range in 2025. When compared to the 2025 corresponding control, metals at the southern impact transects in 2025 were within the control range for cobalt, vanadium and zinc, above the control range for chromium and below the control range for the remaining metals (Appendix H). Overall metal concentrations in the southern impact area were the lowest across all impact areas. Like all other groundwater monitoring bores around the CTD TSF, monthly groundwater levels at the southern bore (CTDMB38A) spiked between December 2024 and January 2025. Groundwater pH at the southern bore was classified as 'neutral' in

August 2025 while groundwater salinity at the southern bore remained ‘mesosaline’ and was stable between 2024 and 2025.

Overall, vegetation condition around the SDGM CTD TSF improved from 2024, seeing reductions in only eight individual parameters across the transect vegetation monitoring assessment (Table 5-1). Patterns of above average rainfall in the months prior to the assessment (August) may have contributed to this boost in vegetation, although due to gaps in rainfall data from BOM, the relationship cannot be determined. Because there is strong relationship between the soil and groundwater parameters with the vegetation data collected during the 2025 assessment, the other influences acting on vegetation condition remain inconclusive.

Table 5-1: Summary of data collected at the CTD TSF vegetation monitoring transects in 2025, with colours representing increases (green), decreases (red), or no change (yellow) in comparison to the 2024 monitoring data

Direction	Type	Transect	Species richness	Lower storey vegetation		Upper storey vegetation		Soil analysis		
				Density (plants/ha)	Cover (%)	Density (plants/ha)	Cover (%)	pH (H_2O)	pH ($CaCl_2$)	EC (dS/m)
Eastern	Impact	CTD01	9	27750	22.9	0	0.0	7.6	6.1	0.85
		CTD02	10	25750	15.5	0	0.0	8.9	6.3	0.15
	Control	CTD15	12	16740	25.6	10	0.0	7.6	6.3	0.81
Western	Impact	CTD04	8	72250	18.8	0	0.0	7.2	6.9	2.31
	Control	CTD06	9	51420	30.6	80	0.0	7.9	6.7	0.02
		CTD07	8	35000	21.6	0	0.0	6.5	6.3	1.93
		CTD10	13	13000	10.1	0	0.0	6.6	5.4	0.34
Northeastern	Impact	CTD08	10	18860	12.1	140	9.5	6.2	4.4	0.02
		CTD09	9	19360	22.8	140	9.5	5.6	4.5	0.03
	Control	CTD11	11	27350	9.3	150	11.0	5.6	4.8	0.08
Southern	Impact	CTD16[1]	11	51940	26.5	60	3.0	6.2	4.8	0.04
		CTD17[1]	20	37690	17.2	60	15.0	6.1	5.1	0.05
	Control	CTD14	12	37530	12.9	220	6.0	6.6	6.1	0.09

Green		Percentage change of ≥ +25%, increased from previous monitoring
Yellow		Percentage change of > -25% and < 25%, consistent with previous monitoring
Red		Percentage change of ≥ -25%, decreased from previous monitoring

[1] Southern impact transects CTD16 and CTD17 were assessed for the first time in 2025 and therefore not compared to 2024 data

6 Recommendations

Recommendations for future work are:

- Continued vegetation monitoring of areas surrounding the CTD TSF through quadrat-based transects, photo point monitoring, soil analysis and hydrogeological analysis.
- The monitoring program could benefit from conducting annual analyses of the chemical properties (total elements, pH and EC) of CTD TSF to compare against soil monitoring at transect locations, to illustrate whether tailings characteristics correspond with local changes in element, pH or salinity concentrations.
- Update or install an additional groundwater monitoring bore in the area south/southwest of the CTD TSF, where monitoring locations have undergone several changes in recent years, specifically near transects CTD07, CTD10, and CTD17. This is recommended to improve data continuity and enable more accurate comparisons between above- and below-ground assessments.
- Due to several recent changes in site location and transect pairing, it is recommended to review the suitability of the current site-specific ecological investigation levels (EILs) and discuss potential to recalculate these values for the entire site in future assessments. For future site assessments, one set of EILs should be calculated for the entire site.

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Appendices

Appendix A Standards and scales

Table A1: Soil pH ratings (Van Gool, Tille and Moore 2005)

	pH rating						
	Very strongly acid (Vsac)	Strongly acid (Sac)	Moderately acid (Mac)	Slightly acid (Slac)	Neutral (N)	Moderately alkaline (Malk)	Strongly alkaline (Salk)
pH_w	< 5.3	5.3 - 5.6	5.6 - 6.0	6.0 - 6.5	6.5 - 8.0	8.0 - 9.0	> 9.0
pH_{Ca}	< 4.2	4.2 - 4.5	4.5 - 5.0	5.0 - 5.5	5.5 - 7.0	7.0 - 8.0	> 8.0

Table A2: Soil salinity classes using electrical conductivity (1:5) (dS/m) (based on standard USDA and CSIRO categories)

EC (1:5) (dS/m)						
Salinity class	**Sand**	**Sandy loam**	**Loam**	**Clay loam**	**Light / medium clay**	**Heavy clay**
Non-saline	<0.13	<0.17	<0.20	<0.22	<0.25	<0.33
Slightly saline	0.13-0.26	0.17-0.33	0.20-0.40	0.22-0.44	0.25-0.50	0.33-0.67
Moderately saline	0.26-0.52	0.33-0.67	0.40-0.80	0.44-0.89	0.50-1.00	0.67-1.33
Very saline	0.52-1.06	0.67-1.33	0.80-1.60	0.89-1.78	1.00-2.00	1.33-2.67
Extremely saline	>1.06	>1.33	>1.60	>1.78	>2.00	>2.67

Table A3: Groundwater assessment classifications for pH (Foged 1978)

pH class	Acidic	Circum-neutral	Alkaline
pH	4.5 – 6.5	6.5 – 7.5	>7.5

Table A4: Groundwater assessment classifications for salinity (Hammer 1986) using electrical conductivity conversions (Williams 1998)

Salinity class	Freshwater	Hyposaline	Mesosaline	Hypersaline
Salinity (g/L or ppt)	< 3	3 – 20	20 – 50	> 50
Electrical conductivity (mS/cm or dS/m)	< 5	5 – 30	30 – 70	> 70

Table A5: Vegetation condition scale (Keighery 1994)

Code	Description
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by some very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, logging and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix B Soil assessment methodology

B.1 Soil pH and salinity

The soil chemical properties were determined using a combination of test work procedures including soil pH in water and calcium chloride, and soil salinity.

The soil pH provides a measure of the activity of hydrogen ions in a soil solution made from a 1:5 soil to liquid suspension. Ratings are assigned from very strongly acidic to strongly alkaline based on the recorded pH measured in deionised water (pH (H2O)) and other solutions (Van Gool et al. 2005). Soil pH is often measured in 0.01 M calcium chloride (pH (CaCl2)), which is considered to be a more accurate measurement of hydrogen ion concentration present in a natural soil solution under similar conditions to soil solution taken up by plants (Hunt and Gilkes 1992). The soil pH measured in CaCl2 is usually lower than pH measured in water; and both measurements are taken for a complete assessment. The ideal pH range for plant growth of most agricultural species is considered to be between 5.0 and 7.5 (Moore 1998). Outside this range, the plant-availability of some nutrients can be affected, while various metal toxicities (e.g. aluminium and manganese) can become limiting to plant growth at low pH. For native species, which are known to be tolerant of wider ranges in soil pH, preferred pH ranges are best inferred from the natural, undisturbed soil in which they are observed to occur.

Soil salinity, or electrical conductivity (EC) is a measure of the amount of readily soluble salts in soil and soil pore water (Moore 1998). The salinity is measured from a soil solution made from a 1:5 soil to deionised water suspension. Soil salinity classes are rated from non-saline to extremely saline based on the measured EC (recorded in dS/m) and the soil texture. The classes used for rating are equivalent to those commonly used by the United States Department of Agriculture (USDA) and Commonwealth Scientific and Industrial Research Organisation (CSIRO). Soil salinity can limit plant growth and impact soil structural stability. The measured salinity of a soil is influenced by natural processes of landscape evolution, hydrological processes and rainfall (Hunt and Gilkes 1992) and may also be affected by anthropogenic processes such as water application for dust suppression, leaching and seepage from water bodies and infrastructure.

B.2 Soil metals

The availability of metals (micronutrients) in soils play a significant role in many biological functions. The majority of metals occur in inert forms in soils and rocks, and only become available to plants and animals if they are chemically altered during oxidation reactions, or if severe weathering events occur (Hazelton and Murphy 2007). Although some metals are essential to support plant growth, high concentrations can be toxic to flora and fauna. The exact sensitivity of different plant types and animal species in the semi-arid region of Australia has not been studied extensively. Assessment of potential toxicology is made through comparison of metal concentrations to site-specific soil and rock elemental concentrations (where available), as well as published guideline criteria. It is noted that this represents a conservative estimate as local soil and groundwater in mineralised areas is likely to contain more naturally elevated concentrations of metals and salts compared to guideline criteria.

Where available, site-specific screening criteria have been developed for assessment of potential impacts using the National Environment Protection Measure (NEPM) (NEPM 2013) Ecological Investigation Levels (EIL) for aged contaminants that apply to 99% protection of areas of ecological significance. It is noted that this represents a conservative approach to screening. It is also noted that for the purposes of this study, soil samples that exceed a trigger value under the guideline does not necessarily indicate a concentration of environment significance, but rather an indication that the natural surface soils are enriched with respect to that element.

The EIL values are determined by the sum of the ambient background concentration (ABC) and added contaminant limits (ACL) for each element (NEPM 2013). Added contaminant limits were derived from reference tables in NEPM (2013).

Appendix C Ecological investigation levels

Table C1: Ambient background concentrations (ABC) calculated at reference sites in 2020 (Stantec 2020)

Element (mg/kg)	CTD13	CTD10	CTD11	CTD07	CTD06
Arsenic	0	0	0	0	0
Chromium	186	165	243	167	151
Copper	9	11	18	8	7
Lead	5	0	7	6	0
Nickel	16	14	18	13	12
Zinc	11	10	14	11	11

Table C2: Soil quality parameters measured at reference sites in 2020 (Stantec 2020)

Parameter	CTD13	CTD10	CTD11	CTD07	CTD06
pH (CaCl2)	5	5.6	4.4	5.7	7.1
CEC (cmolc/kg)	2.2	3	3	2.9	2.3
clay %	14	7	14	8	8

Table C3: Added contaminant limits (ACL) from National Environment Protection Measure 2013 based on measured soil parameters

Element (mg/kg)	CTD13	CTD10	CTD11	CTD07	CTD06
Arsenic	40	40	40	40	40
Chromium	130	115	130	115	115
Copper	33	45	20	55	140
Lead	470	470	470	470	470
Nickel	5	5	5	5	5
Zinc	30	40	20	45	50

Table C4: Site-specific Ecological Investigation Levels (EIL) calculated from the ABCs and ACLs for the reference sites

Element (mg/kg)	CTD13	CTD10	CTD11	CTD07	CTD06
Arsenic	40	40	40	40	40
Chromium	320	280	370	280	270
Copper	45	55	40	65	150
Lead	480	470	480	480	470
Nickel	20	20	25	20	20
Zinc	40	50	35	55	60

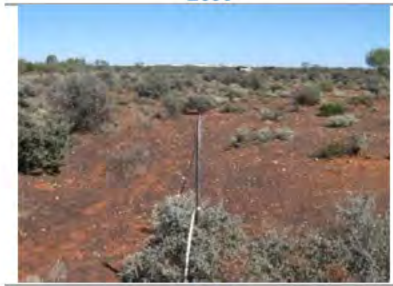
Table C5: Site-specific EILs applied to the corresponding impact transects

Element (mg/kg)	CTD01 & CTD02	CTD04	CTD08 & CTD09	CTD12 & CTD13
Arsenic	40	40	40	40
Chromium	320	280	370	280
Copper	45	55	40	65
Lead	480	470	480	480
Nickel	20	20	25	20
Zinc	40	50	35	55

Appendix D Transect photos 2009 to 2025

CTD01

2009



2010

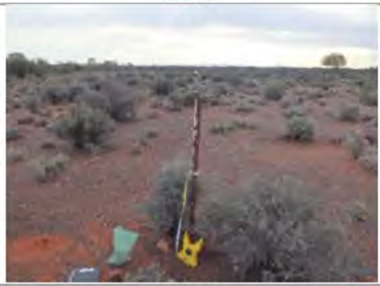
2011

2012

2013

2014

2015



2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

CTD02

2009

2010

2011

2012

2013

2014

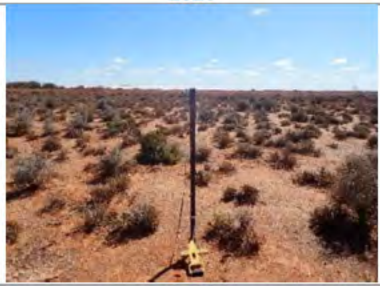
2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

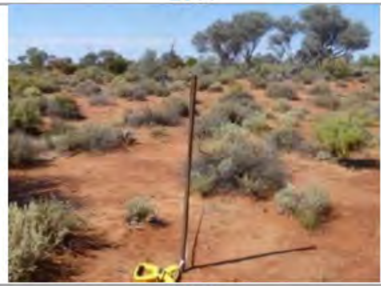

CTD04

2009	2010	2011	2012	2013
				
2014	**2015**	**2016**	**2017**	**2018**
				
2019	**2020**	**2021**	**2022**	**2023**
				
2024	**2025**			
				

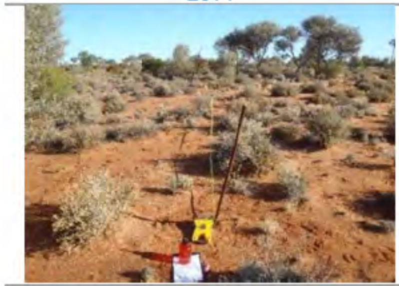
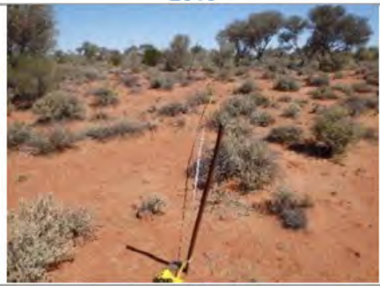
CTD06

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025


CTD07

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

CTD08

2013


2014


2015


2016


2017

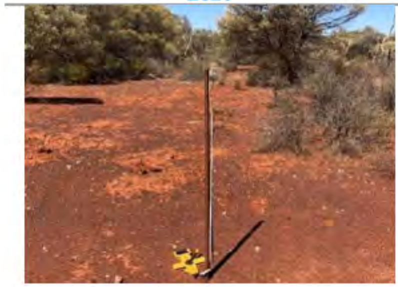

2018


2019


2020


2021


2022


2023


2024


2025


CTD09

<table>
<tr><th>2013</th><th>2014</th><th>2015</th><th>2016</th><th>2017</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>2018</th><th>2019</th><th>2020</th><th>2021</th><th>2022</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>2023</th><th>2024</th><th>2025</th><th></th><th></th></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
</table>

CTD10

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

CTD11

2016	2017	2018	2019	2020
				
2021	**2022**	**2023**	**2024**	**2025**
				

CTD14				
2024	2025			
				

CTD15				
2024	2025			
				

CTD16

2025				
				

CTD17

2025				
				

Appendix E Vegetation data 2025

Table E1 Raw vegetation data for each transect assessed at SDGM in 2025

Type	Transect	Annual Cover (%)	Litter Cover (%)	Lower Cover (%)	Lower Density (plants/ha)	Upper Cover (%)	Upper Density (plants/ha)	Species richness
Impact	CTD01	0	1.8	22.9	27750	0	0	9
	CTD02	0	2.5	15.5	25750	0	0	10
	CTD04	0.4	3.7	18.8	72250	0	0	8
	CTD08	0	15.4	12.1	18860	9.5	140	10
	CTD09	0	17.7	22.8	19360	9.5	140	9
	CTD16	0	17	26.5	51940	3	60	11
	CTD17	0	54	17.2	37690	15	60	20
Control	CTD06	0	6.9	30.6	51420	0	80	9
	CTD07	0.1	1.5	21.6	35000	0	0	8
	CTD10	1	2.4	10.1	13000	0	0	13
	CTD11	0	19	9.31	27350	11	150	11
	CTD14	0.1	25.5	12.92	37530	6	220	12
	CTD15	0	2.7	25.6	16740	0	10	12

Table E2 Native perennial (x) species richness for each transect assessed at SDGM in 2025, as well as total annual (a) species present and additional incidental (i) species

Species	CTD01	CTD02	CTD15	CTD04	CTD06	CTD07	CTD10	CTD08	CTD09	CTD11	CTD14	CTD16	CTD17
Calandrinia eremaea				a	a	a	a				a		a
Dysphania kalpari										a			
Ptilotus exaltatus									a		a		a
Vittadinia eremaea													a
Acacia aneura									i		i		
Acacia aptaneura								x				i	
Acacia burkittii							i						
Acacia caesaneura								i	i	x	x	x	x
Acacia craspedocarpa									i				
Acacia incurvaneura								i		i	x		

Species	CTD01	CTD02	CTD15	CTD04	CTD06	CTD07	CTD10	CTD08	CTD09	CTD11	CTD14	CTD16	CTD17
Acacia pteraneura								i					
Acacia ramulosa var. *ramulosa*								x	x	x	i	i	i
Acacia tetragonophylla								i	x	x	i	i	
Alyogyne pinoniana												i	
Aristida contorta	x				x		x		x		x	i	x
Aristida holathera													x
Aristida latifolia											x		x
Atriplex bunburyana	x	x	x	x	x	x	x						
Atriplex vesicaria				x									
Brunonia australis								i		i			
Cheilanthes sieberi subsp. *Sieberi,*												i	
Chenopodium gaudichaudianum				i									
Cratystylis subspinescens	x	x	x		x	x	i					x	
Enneapogon caerulescens											x	i	x
Enneapogon polyphyllus													x
Eragrostis eriopoda					i			x				x	x
Eragrostis falcata				x		x	x						x
Eremophila decipiens subsp. *decipiens*						i							
Eremophila eriocalyx								x	x	x		x	
Eremophila forrestii subsp. *forrestii*										i			
Eremophila ionantha							i						
Eremophila latrobei					i								
Eremophila latrobei subsp. *glabra*													x
Eremophila latrobei subsp. *latrobei*								i					
Eremophila longifolia		i	x									i	i
Eremophila miniata					i								
Eremophila scoparia		x	i										
Euphorbia tannensis													i
Exocarpos aphyllus			i			i	i						
Frankenia pauciflora	x	x	x	x		x	x				i		
Frankenia setosa			i										
Grevillea sarissa subsp. *sarissa*										i	i	i	i
Gunniopsis quadrifida					x								
Hakea preissii			x		i								i
Lawrencia densiflora							x						

Species	CTD01	CTD02	CTD15	CTD04	CTD06	CTD07	CTD10	CTD08	CTD09	CTD11	CTD14	CTD16	CTD17
Leichhardtia australis													x
Maireana amoena	x	x			x	i							
Maireana carnosa					i	x	x						
Maireana georgei	x	x		i		x	x	x		x		x	i
Maireana glomerifolia			x				x						
Maireana pyramidata			x	x	x	x	x					i	x
Maireana sedifolia							i				i		i
Maireana tomentosa subsp. tomentosa	x	x	x	x			x			x		i	
Maireana triptera				i	i		x			i			x
Minuria leptophylla					i								
Monachather paradoxus								x	x	x	x	x	x
Psydrax suaveolens								i					
Pterocaulon sphacelatum													x
Ptilotus obovatus			x	i	x	i	i	x	x		x	i	x
Roepera reticulata					i								
Santalum spicatum													i
Scaevola spinescens							i						
Sclerolaena cuneata	x	x	x	x			x			x	x	x	i
Sclerolaena eriacantha	x						x	i					x
Sclerolaena eurotioides				x		x	i						
Sclerolaena microcarpa									i	i			
Senna artemisioides subsp. filifolia			x				i				x	i	x
Senna sp. Meekatharra (E. Bailey 1-26)							i						
Sida fibulifera									x			i	
Solanum lasiophyllum								i		x	x	x	x
Solanum nummularium													i
Streptoglossa liatroides		x											
Swainsona purpurea					i								
Tecticornia sp.		x	x										
Triodia basedowii										x	x	x	x
Total incidental perennial species	**0**	**1**	**3**	**4**	**8**	**4**	**8**	**8**	**4**	**6**	**6**	**12**	**9**
Total annual species (incidental and transect)	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**2**	**0**	**3**
Species Richness	**9**	**10**	**12**	**8**	**7**	**8**	**13**	**7**	**7**	**10**	**11**	**9**	**19**

Note: Two new impact transects, CTD16 and CTD17, were installed in 2025 to replace transects CTD12 and CTD13. CTD12 and CTD13 were not assessed in 2024 and 2025 due to access restrictions.

Appendix F Long-term vegetation data

Table F1: Long-term monitoring data collected using the quadrat-based method at the control transects

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
CTD06	2021	6	2.55	0.05	9250	80
	2022	7	3.60	0.00	4500	80
	2023	7	3.17	0.00	5500	80
	2024	8	9.50	0.00	30250	80
	2025	9	30.60	0.00	51420.00	80.00
CTD07	2021	9	18.80	0.00	11750	0
	2022	11	21.20	0.00	11750	0
	2023	10	20.90	0.00	11250	0
	2024	12	19.10	0.00	14500	10
	2025	8	21.60	0.00	35000.00	0.00
CTD10	2021	9	8.50	0.00	11250	0
	2022	10	7.70	0.00	11250	0
	2023	10	7.36	0.00	11000	0
	2024	12	11.40	0.00	13750	0
	2025	13	10.10	0.00	13000.00	0.00
CTD11	2021	5	13.40	0.60	2750	100
	2022	7	14.91	0.60	5000	100
	2023	7	14.91	0.60	4500	100
	2024	8	7.10	11.10	8000	140
	2025	11	18.71	1.00	27350.00	150.00
CTD14	2024	9	6.90	11.00	24500	220
	2025	12	12.92	6.00	37530.00	220.00
CTD15	2024	18	26.10	0.00	23750	0
	2025	12	25.60	0.00	16740.00	10.00

Table F2: Long-term monitoring data collected using the quadrat-based method, averaged at impact transects CTD01 and CTD02, east of the CTD TSF

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
CTD01 and CTD02	2021	10	11.08	0.00	22125	0
	2022	9	12.65	0.00	19125	0
	2023	10	11.63	0.00	21250	0
	2024	11	17.15	0.00	25875	0
	2025	10	19.20	0.00	16740.00	10.00

Table F3: Long-term monitoring data collected using the quadrat-based method at impact transect CTD04, west of the CTD TSF

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
CTD04	2021	8	3.25	0.00	13500	0
	2022	6	4.45	0.00	10750	0
	2023	5	4.45	0.00	10500	0
	2024	9	10.85	0.00	23500	0
	2025	8	18.80	0.00	72250.00	0.00

Table F4: Long-term monitoring data collected using the quadrat-based method, averaged at impact transects CTD08 and CTD09, northeast of the CTD TSF

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
CTD08	2021	9	8.90	7.60	4000	120
	2022	7	10.90	8.00	2750	120
	2023	7	9.50	8.00	2750	120
	2024	9	11.40	10.00	8250	140
	2025	10	12.10	9.50	18860.00	140.00
CTD09	2021	6	17.60	15.00	4000	140
	2022	7	18.10	15.30	3500	140

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
	2023	9	12.80	13.50	7750	140
	2024	8	15.40	9.50	4000	140
	2025	9	22.80	9.50	19360.00	140.00

Table F5: Monitoring data collected using the quadrat-based method, averaged at impact transects CTD16 and CTD17, south of the CTD TSF

Transect	Year	Species richness	Lower Cover (%)	Upper Cover (%)	Lower Density (plants/ha)	Upper Density (plants/ha)
CTD16	2025	11	26.50	3.00	51940.00	60.00
CTD17	2025	20	17.20	15.00	37690.00	60.00

Appendix G CTD TSF photo point monitoring

Table G1: Vegetation condition scores at photo points around the CTD TSF in 2024 and 2025

Photo point ID	2024 Rating	2025 Rating
PP03	Degraded	Degraded
PP04-1	Degraded	Degraded
PP05-1	Degraded	Degraded
PP06-1	Degraded	Degraded
PP06-2	Degraded	Degraded
PP06	Degraded	Degraded
PP07	Degraded	Degraded
PP08-1	Degraded	Degraded
PP08	Degraded	Degraded
PP09	Completely Degraded	Degraded
PP10	Degraded	Degraded
PP10-1	Completely Degraded	Completely Degraded
PP11	Degraded	Degraded
PP12	Degraded	Degraded
PP12-1	Degraded	Degraded
PP13-1	Degraded	Degraded
PP13	Degraded	Degraded
PP14	Completely Degraded	Completely Degraded
PP18	Degraded	Degraded
PP21-2	Degraded	Degraded
PP22	Degraded	Degraded
PP22-1	Degraded	Degraded
PP23	Completely Degraded	Completely Degraded
PP24	Degraded	Degraded
PP24-1	Degraded	Degraded
PP25	Degraded	Degraded
PP26-1	Degraded	Degraded
PP26	Very Good	Very Good

Photo point ID	2024 Rating	2025 Rating
PP27-1	Good	Good
PP27	Degraded	Degraded
PP28-1	Good	Good
PP28	Good	Good
PP38	Degraded	Degraded
PP38-1	Not Applicable	Completely Degraded
PP39-2	Degraded	Degraded
PP40-2	Degraded	Degraded
PP41-1	Good	Good
PP41-2	Degraded	Degraded
PP42	Completely Degraded	Completely Degraded
PP43	Degraded	Completely Degraded
PP44	Good	Good

PP03: Facing away from CTD TSF. Extensive shrub deaths - remaining *Maireana* & *Atriplex* shrubs in 'very poor' health. Mid & upper storey vegetation dead. Overall vegetation condition is 'degraded'.

2012	2013	2014	2015
			
2016	2017	2018	2019
			Photo not taken
2020	2021	2022	2023
			
2024	2025		
			

PP04-1: Facing CTD TSF along drain. Salt crusting evident but reduced. Vegetation condition rated as 'degraded'.

2012

2013

2014

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2016

2017

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2019

2020

2021

2022

2023

2024

2025

PP05-1: Facing away from CTD TSF. Upper storey dead, & *Maireana* dominant mid storey in 'poor' to 'very poor' health with high number of deaths noted. No salt crusting evident on soil surface. Overall vegetation condition was 'degraded'.

2012

2013

2014

2015

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2020

2021

2022

2023

2024

2025

PP06: Facing away from CTD TSF. Basic vegetation structure significantly altered so overall condition is rated as 'degraded'. Health of individual plants rated as 'moderate' to 'poor'. No visible salt crusting.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP06-1: Facing CTD TSF along drain. Salt crusting evident. Plant health stable since 2024. Vegetation condition rated as 'degraded'.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
		Photo not taken	
2024	2025		
			

PP06-2: Facing CTD TSF along drain. Salt crusting evident. Plant health stable since 2024. Vegetation condition rated as 'degraded'.

2012

2013

2014

2015

2016

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2018

2019

2020

2021

2022

2023

2024

2025

PP07: Facing CTD TSF along drain. Vegetation in 'degraded' condition with plants in 'poor' health, continuing to decline. No salt scalding on soil surface. *Maireana* dominant.

2012

2013

2014

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2017

2018

2019

2020

2021

2022

2023

2024

2025

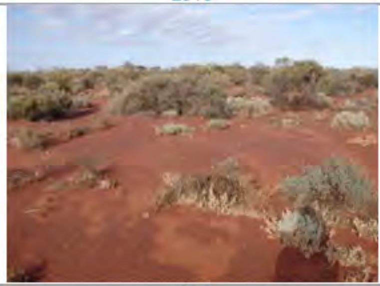
PP08: Facing CTD TSF along drain. Overall condition of area rated as 'degraded' & health of individual plants on the CTD TSF side of drain are rated as 'moderate'. Salt crusting & evidence of ponding on soil surface present.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022 Photo not taken	2023
			
2024	2025		
			

PP08-1: Facing away from CTD TSF. Vegetation in 'degraded' condition, & health of individual plants rated as 'poor'. Visible salt crusting. Some clearing of vegetation had occurred due to activities in the area.

2012

2013



2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP09: Facing away from CTD TSF. Overall vegetation condition rated as 'degraded' due to moderate vegetation death & the health of individual plants being 'poor'. Some pockets of small shrubs appear in better health. Extensive salt crusting on soil surface near boundary present, with evidence of ponding also in the area.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP10: Facing CTD TSF along drain. Salt crusting on soil surface remains steady. Overall vegetation condition rated as 'degraded' & individual plant health rated as 'poor'. Plants in drain remain very few.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
		Photo not taken	
2024	2025		
			

PP10-1: Facing away from CTD TSF along drain. Individual plant health is poor with plant deaths observed. Since 2024, vegetation close to fence line had declined & was rated 'very poor' health, overall condition of area is 'completely degraded'. Area has seen regression in plant health since 2024. Visible salt crusting on soil surface.

2012

2013

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2015

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2017

2018

2019

2020

2021

2022

2023

2024

2025

PP11: Facing CTD TSF along drain. Water level in drain lower than 2024 with significantly increased salt crusting on soil surface. Individual plant health rated as 'poor' but looks to have seen improvements since 2024. Overall vegetation condition rated as 'degraded'.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
		Photo not taken	
2024	2025		
			

PP12: Facing away from CTD TSF along drain. Overall condition of area remains at a rating of 'degraded' with individual plant health rated as 'poor'. Little change from 2024, pockets of recruitment for some annual species.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP13: Facing away from CTD TSF. Overall area rated as 'degraded' vegetation condition, & individual plant health rated as 'poor'. Vegetation appears to have made subtle improvements in cover and health. Visible salt crusting.

2012	2013	2014	2015
			
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP13-1: Facing away from CTD TSF. Overall area in 'completely degraded' condition, with individual plant health rated as 'poor'. Extensive recent vegetation deaths in area. Less salt crusting in area than 2024, soil boggy with moisture.

2012

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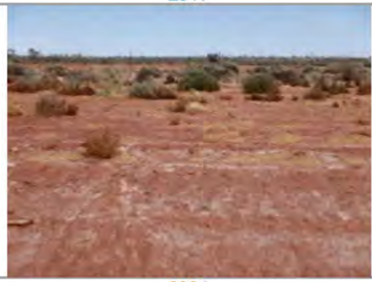
2014

2015

2016

2017



2018

2019

2020

2021

2022

2023

2024

2025

PP14: Facing CTD TSF along drain. Drain water level lower than in 2024. Visible salt crusting on soil surface. Most plants observed dead, with few remaining in 'poor' health, therefore overall vegetation condition is 'completely degraded'. Appeared to be some minor improvement in density & colour on the TSF side of the drain.

2012

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2018

2019

2020

2021

2022

Photo not taken

2023

2024

2025

PP18: Facing away from CTD TSF, toward pipe bunding. Overall vegetation condition of area was 'degraded'. No mid or upper storey present, *Maireana* dominant lower storey in 'good' health. Area is adjacent to a heavy vehicle & lay down area.

2012

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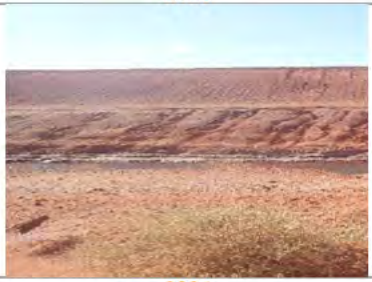
2024

2025

PP21-2: Facing CTD TSF. Erosion on batter appears unchanged since 2024. No visible salt crusting. Individual plant health rated 'moderate' with some deaths of *Acacia* shrubs. TSF slope over the drain, seeing improved recruitment of low-lying shrubs since 2024. Overall vegetation condition of area rated as 'degraded'.

2012	2013	2014	2015
Photo not taken	Photo not taken	Photo not taken	
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP22: Facing CTD TSF between fence line & drain. Individual plant health of annual species inside the boundary are rated as 'poor', while individual plant health of salt tolerant shrubs & *Acacia* trees outside of boundary is 'good'. Overall vegetation condition of area rated as 'degraded' although has seen a decline in health across the batter.

2012

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2023

2024

2025

PP22-1: Facing away from CTD TSF between fence line & drain. Lower storey shrub cover in 'poor' health, although showing signs of regeneration. Upper storey *Acacias* in 'excellent' health. Layer of deposited silt with salt crusting within toe drain. No change in erosion. Vegetation on TSF batter is mostly annuals. Overall condition rated as 'degraded'.

2012

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2023

2024

2025

PP23: Facing CTD TSF across end of drain. No change in erosion. Almost all perennial shrubs have died, with few remaining in 'moderate' health. Cover mostly annual in 2025. Overall condition of area rated as 'completely degraded'. Layer of deposited silt with salt crusting within toe drain.

2012

2013

2014

2015

2016

2017

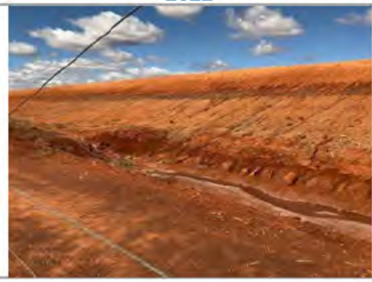
2018

2019

2020

2021

2022



2023

2024

2025

PP24: Facing away from CTD TSF along fence line. Vegetation around rocks in 'poor' health with evidence of water ponding and sheeting along the boundary line. Cover of annuals higher than perennials. Plants looking very dry. Overall condition of area within boundary fence rated as 'degraded'.

2012

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2019

2020

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2023

2024

2025

PP24-1: Facing away from CTD TSF toward start of drain. *Acacia* on the outside of the CTD TSF boundary in 'good-excellent' health. Perennial shrubs on the inside of the boundary in 'poor' health with signs of recent deaths. Cover of annuals higher than perennials. Evidence of water ponding & sheeting along the boundary line. Overall vegetation condition rating of 'degraded'.

2012	2013	2014	2015
Photo not taken	Photo not taken	Photo not taken	
2016	2017	2018	2019
			
2020	2021	2022	2023
			
2024	2025		
			

PP25: Facing along fence line. Within boundary overall vegetation condition is 'degraded' with most perennials in 'good' health. Vegetation outside of boundary in 'good' health with minimal individual deaths. No change in run off drain.

2012

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2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP26: Facing away from CTD TSF toward topsoil pile. No salt crusting. Individual plant health rated as 'excellent' for all vegetation storeys. Overall vegetation condition of area rated as 'very good'.

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP26-1: Facing CTD TSF along fence line. Individual plant health of plants inside boundary in 'moderate' health. Signs of recent plant deaths & dust related decline, vegetation condition of area rated 'degraded'. Increase in sediment loss within runoff/overflow drain with potential for erosion & sheeting to increase with rainfall events.

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP27: Facing CTD TSF from fence line. No water in drain. Vegetation on drain batters in 'degraded' condition, with individual plant health rated as 'moderate'.

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP27-1: Facing away from CTD TSF along fence line. No salt crusting. Individual plant health rated as 'good' for mid-upper storeys. Some vegetation along road edge showing potential dust impacts. Recent signs of vegetation clearing present around site infrastructure. Overall vegetation condition of area rated as 'good'.

2012

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2017

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2019

2020

2021

2022

2023

2024

2025

PP28: Facing CTD TSF along inside of fence line. Vegetation cover increased inside fence line, & individual plants in 'good' health. Vegetation outside of fence recently cleared & earthworks have taken place. Despite additional vegetation clearing, the overall condition of the area remains 'good'.

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

PP28-1: Facing away from CTD TSF toward fence line. Vegetation in 'good' health and condition, showing signs of dust impacts. Evidence of sheet erosion from large rainfall events. Very little change.

2012

2013

2014

2015

2016

2017

2018

2019

Photo not taken

2020

2021

2022

2023

2024

2025

PP38: Facing away from CTD TSF. Vegetation outside of boundary showing decline with extensive deaths & health decline in mid & upper storey plants. Vegetation in overall 'very poor' health & 'degraded' condition. Significant increase in salt crusting on surface. Soil very wet, slippery clay.

2024

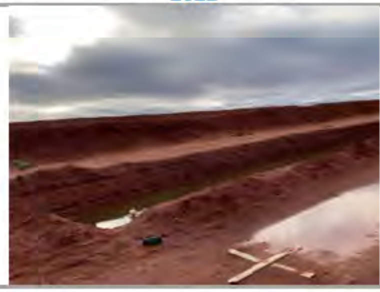
2025

PP38-1: Facing CTD TSF along drain. Water level in drain decreased. Significant increase in soil surface salt crusting. Active clearing in area due to pump and toe drain access. Very little vegetation present and little to no healthy vegetation therefore a rating of 'completely degraded'

2020

2021

2022



2023

2024

2025

PP39-2: Facing CTD TSF along drain. High annual cover with few perennials all in 'good' health. No salt crusting. Toe drain has slight stagnant water odour. Erosion increased slightly along toe drain batter. Overall vegetation condition rating is 'degraded'.

2020	2021	2022	2023
			
2024	2025		
			

PP40-2: Facing CTD TSF across cleared area. Vegetation in 'good' health. With some mid storey shrub deaths. Slight increase in individual perennial plant cover. Increase in *Maireana* spp. growth on the mound. Decrease in annual cover around base of cleared vegetation pile. No salt crusting. Overall vegetation condition rating is 'degraded'.

2020	2021	2022	2023
			
2024	2025		
			

PP41-1: Facing CTD TSF along fence line and cleared area. Vegetation in 'very good' health and increasing in cover with moderate annual cover. No visible salt crusting. Evidence of moist soils in the area. Overall vegetation condition rating is 'good'.

2020	2021	2022	2023
			
2024	2025		
			

PP41-2: Facing CTD TSF along fence line and cleared area. Vegetation in 'moderate-good' health mainly mid storey plants, with evidence of some shrub decline. No visible salt crusting. Overall vegetation condition rating is 'degraded'.

2020	2021	2022	2023
			
2024	2025		
			

PP42: Facing CTD TSF from fence line. No increase in vegetation cover, mostly annuals, in 'good' health. Showing signs of regeneration post clearing. No salt crusting. Overall vegetation condition rating is 'completely degraded'.

2020	2021	2022	2023
			
2024	2025		
			

PP43: Facing CTD TSF across cleared area. Previous vegetation regrowth almost entirely dead. Discoloured soil from subsurface moisture. Salt crusting on soil surface and toe of CTD TSF batter. Overall vegetation condition rating is 'completely degraded'.

2020

2021

2022

2023

2024

2025

PP44: Facing topsoil stockpiles inside CTD TSF boundary. All plants in 'good' health, including Acacia shrubs and Triodia grasses. Solanum and Triodia flowering/ seeding, with increased cover from 2024. Remains stable. No visible salt crusting. Overall vegetation condition rating of area is 'good'.

2020	2021	2022	2023
			
2024	2025		
			

Appendix H Soil chemistry data 2025

Table H1: Raw soil pH and electrical conductivity data supplied by ALS (2025) for each transect assessed at SDGM in 2025

Transect	Replicate	Type	pH H2O (LOR 0.1)	pH CaCl2 (LOR 0.1)	EC (dS/m) (LOR 0.001)
CTD01	A	Impact	8.4	6.1	0.111
CTD01	B	Impact	6.7	6.1	1.590
CTD02	A	Impact	9.3	6.3	0.124
CTD02	B	Impact	8.5	6.3	0.176
CTD04	A	Impact	7.2	6.9	3.680
CTD04	B	Impact	7.1	6.8	0.936
CTD06	A	Control	7.9	6.7	0.029
CTD06	B	Control	7.9	6.6	0.009
CTD07	A	Control	6.4	6.3	3.000
CTD07	B	Control	6.5	6.2	0.866
CTD08	A	Impact	6.7	4.5	0.013
CTD08	B	Impact	5.7	4.2	0.019
CTD09	A	Impact	5.6	4.3	0.016
CTD09	B	Impact	5.6	4.7	0.035
CTD10	A	Control	5.9	5.3	0.677
CTD10	B	Control	7.2	5.5	0.007
CTD11	A	Control	5.4	5.0	0.147
CTD11	B	Control	5.8	4.6	0.017
CTD14	A	Control	6.6	6.0	0.016
CTD14	B	Control	6.6	6.1	0.158
CTD15	A	Control	7.7	6.1	0.370
CTD15	B	Control	7.5	6.5	1.250
CTD16	A	Impact	6.4	5.1	0.044
CTD16	B	Impact	6.0	4.5	0.042
CTD17	A	Impact	6.0	5.2	0.058
CTD17	B	Impact	6.1	5.0	0.032

Table H2: Raw soil heavy metal data supplied by ALS (2025) for each transect assessed at SDGM in 2025

Transect	Replicate	Type	Total element concentration (mg/kg)														
			Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Nickel	Selenium	Vanadium	Zinc	Mercury
		LOR	5	10	1	50	1	2	2	5	5	5	2	5	5	5	0.1
CTD01	A	Impact	<5	20	<1	<50	<1	264	5	11	7	258	17	<5	90	18	<0.1
	B		<5	10	<1	<50	<1	210	3	10	5	93	14	<5	68	8	<0.1
CTD02	A	Impact	<5	20	<1	<50	<1	269	5	11	6	246	29	<5	76	13	<0.1
	B		<5	20	<1	<50	<1	224	6	12	6	215	30	<5	66	14	<0.1
CTD04	A	Impact	<5	30	<1	<50	<1	204	4	12	5	217	16	<5	70	18	<0.1
	B		<5	50	<1	<50	<1	207	6	13	6	240	20	<5	76	17	<0.1
CTD06	A	Control	<5	80	<1	<50	<1	178	4	8	6	182	14	<5	68	11	<0.1
	B		<5	140	<1	<50	<1	173	3	7	6	140	13	<5	69	8	<0.1
CTD07	A	Control	<5	40	<1	<50	<1	174	4	9	5	78	14	<5	65	10	<0.1
	B		<5	30	<1	<50	<1	167	3	7	5	101	12	<5	60	11	<0.1
CTD08	A	Impact	<5	10	<1	<50	<1	444	6	17	9	218	21	<5	114	14	<0.1
	B		<5	10	<1	<50	<1	400	6	16	7	188	23	<5	95	13	<0.1
CTD09	A	Impact	<5	10	<1	<50	<1	308	7	22	8	245	27	<5	107	22	<0.1
	B		<5	10	<1	<50	<1	264	8	20	8	385	28	<5	98	22	<0.1
CTD10	A	Control	<5	10	<1	<50	<1	165	3	10	5	83	14	<5	59	10	<0.1
	B		<5	20	<1	<50	<1	174	3	7	5	103	12	<5	63	12	<0.1
CTD11	A	Control	<5	10	<1	<50	<1	245	6	18	8	219	19	<5	101	16	<0.1
	B		<5	10	<1	<50	<1	352	4	13	7	195	18	<5	98	14	<0.1
CTD14	A	Impact	<5	30	<1	<50	<1	153	7	15	7	361	21	<5	65	21	<0.1
	B		<5	20	<1	<50	<1	190	5	13	7	292	19	<5	68	16	<0.1
CTD15	A	Impact	<5	30	<1	<50	<1	259	5	16	6	203	30	<5	68	13	<0.1
	B		<5	40	<1	<50	<1	233	6	22	7	237	30	<5	72	14	<0.1
CTD16	A	Control	<5	10	<1	<50	<1	233	6	14	6	178	21	<5	79	20	<0.1
	B		<5	10	<1	<50	<1	252	5	12	6	169	19	<5	75	13	<0.1
CTD17	A	Control	<5	20	<1	<50	<1	172	5	12	6	278	18	<5	59	24	<0.1
	B		<5	10	<1	<50	<1	182	3	9	5	145	15	<5	56	12	<0.1

Appendix I Groundwater data 2025

Table I1: Raw groundwater data supplied by AGAA (2025b) for monitoring bores in proximity to vegetation transects at SDGM in 2025

Parameter	Monitoring bore (area)	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25	Mar 25	Apr 25	May 25	Jun 25	Jul 25	Aug 25	Sep 25
pH	CTDMB41A (Eastern)	6.88							6.13					6.33	
	CTDMB29B (Eastern)		5.65						5.75					5.84	
	CTDMB11A (Western)		6.97											7.48	
	CTDMB11B (Western)		6.59											6.65	
	CTDMB16 (Western)		7.03											7.18	
	CTDMB03 (Northeastern)	6.83							6.96					3.08	
	CTDMB38A (Southern)	6.86												7.03	
EC (dS/m)	CTDMB41A (Eastern)	107.74							97.98					85.49	
	CTDMB29B (Eastern)		120.81						112.29					99.55	
	CTDMB11A (Western)		104.21											87.87	
	CTDMB11B (Western)		121.27											101.83	
	CTDMB16 (Western)		118.73											98.04	
	CTDMB03 (Northeastern)	146.44							136.00					120.31	
	CTDMB38A (Southern)	64.53												51.42	
Level (mTOC)	CTDMB41A (Eastern)	2.43	2.64	2.72	2.91	2.37	2.34	2.62	2.55	2.58	2.69	2.68	2.65	2.76	2.77
	CTDMB29B (Eastern)	3.65	3.81	3.82	3.91	3.58	3.28	3.41	3.54	3.5	3.52	3.59	3.64	3.68	3.74
	CTDMB11A (Western)	1.77	2.44	2.79	2.84	2.29	1.69	1.88	1.9	2	2.03	2.21	2.45	2.69	2.71
	CTDMB11B (Western)	1.65	2.49	2.87	2.91	2.24	1.56	1.76	1.81	1.88	1.86	2.13	2.44	2.7	2.71
	CTDMB16 (Western)	2.07	2.21	2.31	2.37	2.32	2.42	2.62	2.61	2.71	2.75	2.82	2.87	2.94	2.99
	CTDMB03 (Northeastern)	4.98	5.09	5.1	5.17	5.17	5.02	5.13	5.01	5.02	5.11	5.1	5.18	5	5.15
	CTDMB38A (Southern)	2.35	2.45	2.48	2.53	2.13	2.2	2.44	2.49	2.52	2.57	2.57	2.55	2.59	2.63

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Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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