ENGENY

CONCRUSH PTY LTD

Discharge Verification and Mitigation Report

Modification 1

BNTL00160_0004-REP-001-0

22 APRIL 2026

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Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	22 April 2026	Client Issue	Darcy Wilkinson	Chris Bonomini	Chris Bonomini	Adam Wyatt
Signatures:						

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1. INTRODUCTION

Concrush Pty Ltd (Concrush) received state significant development (SSD 8753) consent (the Consent) to increase the processing and storage capacity of the resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, New South Wales (NSW) on 27 March 2020 under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), for which the Minister for Planning is the consent authority. In 2025, Concrush was received approval for a modification to the Consent (Modification 1) which included an increase in processing and storage of garden and wood waste as well as changes to the hours of operation, lighting and site layout.

Concrush was established in 2002 after recognising the need for a construction and demolition recycling facility in the Lake Macquarie region. Concrush is a locally owned and operated business based at Teralba.

The Concrush facility provides cost effective options for recycling of concrete, asphalt, bricks, pavers, roof tiles, wall and floor tiles, rock, sand, plasterboard and green waste for domestic households and commercial industry. These materials are then recycled into specification and non-specification quality products such as road base, drainage aggregates, pipe bedding and haunch, packing fines, decorative aggregates and mulches. These products are used within the civil and construction industries or for commercial, domestic and household applications.

The Project Approval allows Concrush to increase the process up to 250,000 tonnes per annum (tpa) and store up to 150,000 tonnes onsite, consisting of processing and storage of up to 10,000 tonnes per annum and 2,000 tonnes per annum of garden and wood waste respectively.

Given the potential impacts to surface water resources associated with the Project, the original Project Approval required Concrush to prepare a number of management plans including a Discharge Verification and Mitigation Plan (DVMP) prior to the commencement of Stage 1 operations. The DVMP details the monitoring that will be undertaken to verify the predicted discharge water quality and quantity, the management triggers to be applied to monitoring results, the mitigation measures that will be considered to address any exceedances of water quality management triggers and a timeframe to implement the appropriate mitigation measures.

Further to the requirement for a DVMP, the Consent required Concrush to prepare a Discharge Verification and Mitigation Report (DVMR) within 12 months of the commencement of Stage 1 operations. The DVMR prepared within 12 months of the commencement of Stage 1 operations was completed by Engeny in April 2025. Condition B19 of the consolidated Consent for the Project, inclusive of Modification 1, requires Concrush to prepare a DVMR within 6 months of commencement of Modification 1 as follows:

> *B19. Discharge Verification and Mitigation Report. Within 12 months of commencement of Stage 1 operations and six months following commencement of the operation of SSD-8753-Mod-1, the Applicant must prepare a Discharge Verification and Mitigation Report (DVMR) to the satisfaction of the Planning Secretary. The DMVR must:*
>
> *(a) be prepared by a suitably qualified and experienced person(s) in consultation with the EPA; whose appointment has been endorsed by the Planning Secretary.*
>
> *(b) be prepared consistent with the methodology in condition B14(a); and*
>
> *(c) detail where management triggers have been exceeded and associated mitigation measures implemented.*

This DVMR has been prepared to satisfy the requirements of condition B19 of the consolidated Consent.

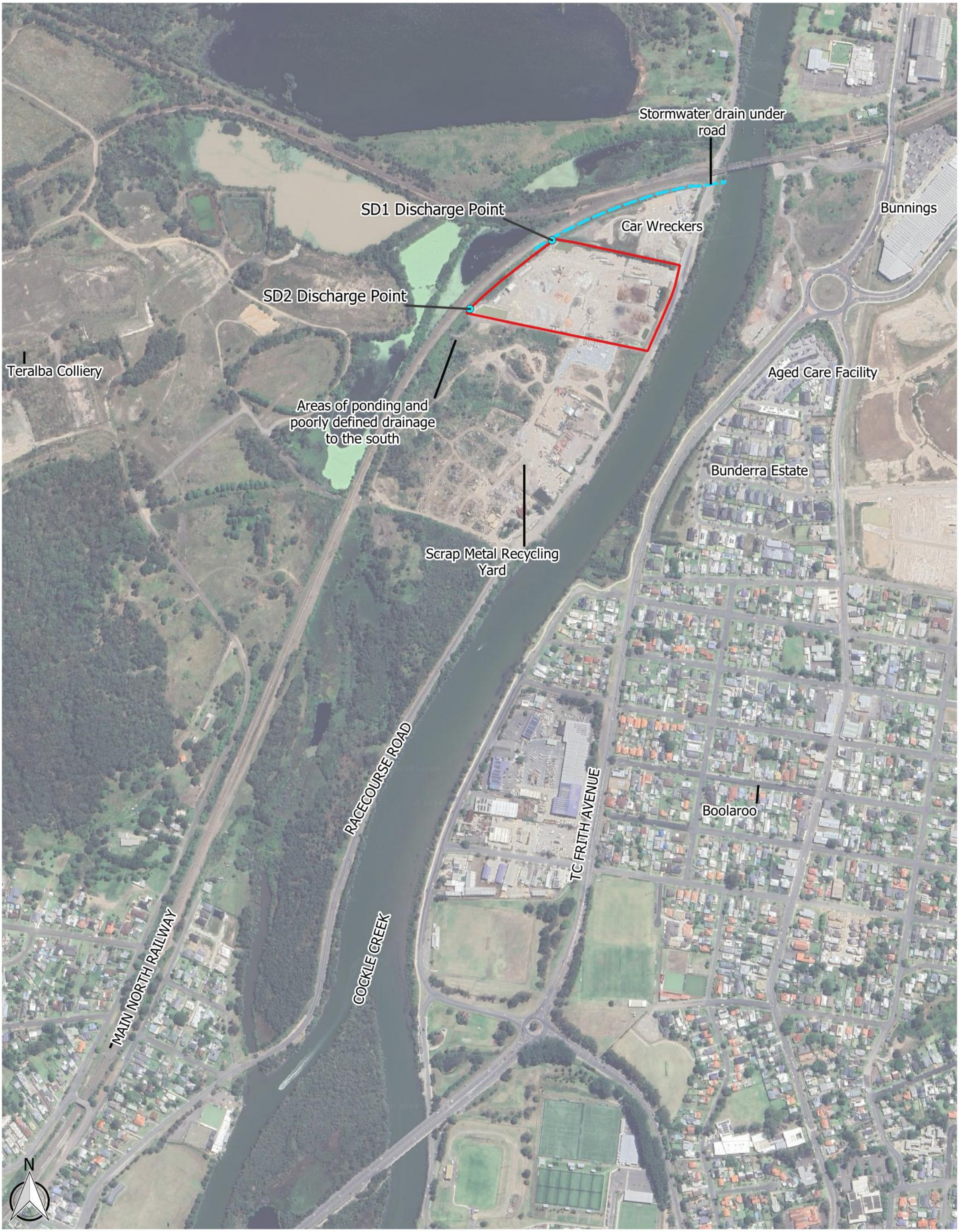
2. SURFACE WATER CONTEXT

The Project site is situated in the suburb of Teralba, within the Lake Macquarie LGA covering an area of approximately 4.8 ha. The Project site is bound to the west by the Main North Rail Line and to the east by Racecourse Road and Cockle Creek. The land uses surrounding the Project site include a wrecker's yard, a scrap metal recycling yard to the south and Teralba Colliery and Macquarie Coal Preparation Plant to the west. The Bunderra residential estate is located approximately 200 m to the east of the Project site on the opposite side of Cockle Creek. Access to the Project site is via a driveway on Racecourse Road.

2.1 Surface Hydrology

The Project site is located in the Cockle Creek Estuary catchment that forms part of the broader Lake Macquarie catchment and is classified as having a high flood risk based on Lake Macquarie City Council (LMCC) flood risk mapping. Specifically, the Project site is situated in the Lower Cockle Creek Floodplain (the Floodplain) with lower portions of the Project site within the 1% Average Exceedance Probability (AEP) flood extent as determined by the Winding Creek and Lower Cockle Creek Floodplain Risk Management Study and Plan (BMT WBM, 2016).

All surface runoff (excluding the Green Waste catchment) drains to sediment basins at the northwestern and southwestern corners of the site. Any spills from the sediment basin in the north western corner of the site, (Sediment Dam 1) will drain to the north prior to discharging into Cockle Creek approximately 250 m downstream (refer to Figure 2.1). Any spills from the sediment basin in the southwestern corner of the site (Sediment Basin 2) will drain to the south prior to discharging into Cockle Creek approximately 1.5 km downstream (refer to Figure 2.1). Further detail regarding the Project WMS is presented Section .



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Legend

- Project Site
- Stormwater Drainage
- Discharge Points (Sediment Dam Spillways)

150 0 150 m

Scale in metres (1:6,000 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 56

Figure 2.1

Surface Water Context

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2.2 Climate

Lake Macquarie has a humid subtropical climate typical of the eastern Australia coastline. Summers are typically warm and humid with occasional periods of very hot and dry weather resulting from hot westerly and north westerly winds. Rainfall is highest in late autumn to early winter with the second half of the year typically drier. Winters are cool and on average drier than Summer. The region can also experience east coast lows with extremely high rainfall and winds in excess of 100 km/h.

Average monthly rainfall data sourced from the SILO Climate Database is presented in Table 2.1 statistics for the SILO grid point (-32.95 S and 151.60 E) nearest to the Project site.

TABLE 2.1: AVERAGE MONTHLY AND ANNUAL RAINFALL FROM SILO POINT 2 KM FROM SITE

Month	Average Rainfall (mm)
January	99
February	124
March	131
April	116
May	92
June	110
July	66
August	62
September	65
October	72
November	80
December	87
Annual	**1,105**

2.3 Baseline Water Quality and Management Triggers

2.3.1 Baseline Water Quality

2.3.1.1 Receiving Environment

Prior to approval and implementation of SSD 8753 baseline water quality monitoring was undertaken at RW1 in the drainage depression which is immediately to the west of the site but not considered to be influenced by stormwater runoff discharging from the site at the time (refer to Figure 2.2).

TABLE 2.2: BASELINE RECEIVING ENVIRONMENT WATER QUALITY DATA FROM RW1 PRE-EXPANSION

Parameter	Limit of Reporting (LOR)	Units	No. Results > LOR	Minimum	Maximum
pH	0.1	-	7	6.9	8
Electrical Conductivity (EC)	1	µS/cm	7	140	920
Total Suspended Solids (TSS)	5	mg/L	7	8	75
Total Recoverable Hydrocarbons (TRH)	0.1	mg/L	0	<0.1	<0.1
Nitrate as N	0.02	mg/L	6	<0.2	13.8
Oxides of Nitrogen (NOx) as N	0.05	mg/L	7	0.09	1.2
Total Nitrogen (TN) as N	0.2	mg/L	5	<0.02	9.4
Total Phosphorus (TP)	0.01	mg/L	4	<0.05	9.6
Ammonia as N	0.01	mg/L	5	<0.01	0.5
Aluminium[1]	0.05	mg/L	1	<0.05	1.3
Arsenic[1]	0.001	mg/L	6	<0.001	0.006
Boron[1]	0.05	mg/L	5	<0.05	0.14
Cadmium[1]	0.0002	mg/L	1	<0.0002	0.0003
Chromium III[1]	0.0052/0.0013	mg/L	1	0.002	0.002
Chromium VI[1]	0.0052/0.00053	mg/L	3	<0.0005	0.002
Cobalt[1]	0.001	mg/L	2	<0.001	0.001
Copper[1]	0.001	mg/L	7	0.003	0.036
Lead[1]	0.001	mg/L	5	<0.001	0.004
Nickel[1]	0.001	mg/L	6	<0.001	0.009
Selenium[1]	0.001	mg/L	1	<0.001	0.001

Parameter	Limit of Reporting (LOR)	Units	No. Results > LOR	Minimum	Maximum
Zinc[1]	0.005	mg/L	7	0.009	0.26

[1]Results are for dissolved concentrations

[2] Limit of Detection applied for analysis of the first round of the expanded water quality monitoring program

[3]Limit of Detection applied for analysis of the additional rounds of the expanded water quality monitoring program

2.3.1.2 Site Pre-Expansion

The site water quality measured pre-expansion (before commencing of stage 1) is presented in Table 2.3.

TABLE 2.3: PRE-EXPANSION SITE WATER QUALITY

Parameter	Limit of Reporting (LOR)	Units	No. Results > LOR	Minimum	Average	80th Percentile	Maximum
pH	0.1	-	13	7	8.1	8.4	8.5
EC	1	µS/cm	13	188	847	1035	1500
TSS	5	mg/L	13	3	90	116	608
TRH	0.1	mg/L	5	0.05	0.06	0.06	0.1
Nitrate as N	0.02	mg/L	13	1	8.8	12.8	20
NOx as N	0.05	mg/L	13	0.07	0.23	0.32	0.56
TN as N	0.2	mg/L	12	0.06	5.97	8.98	16
TP	0.01	mg/L	12	0.06	6.67	10.51	18
Ammonia as N	0.01	mg/L	13	0.01	0.36	0.13	3
Aluminium[1]	0.05	mg/L	10	0.025	0.056	0.092	0.1
Arsenic[1]	0.001	mg/L	10	0.001	0.007	0.008	0.021
Boron[1]	0.05	mg/L	10	0.025	0.089	0.112	0.21
Cadmium[1]	0.0002	mg/L	10	0.0001	0.0001	0.0001	0.0001
Chromium III[1]	0.005[2]/0.001[3]	mg/L	10	0.001	0.005	0.004	0.022
Chromium VI[1]	0.005[2]/0.0005[3]	mg/L	10	0.0025	0.0479	0.0924	0.16
Cobalt[1]	0.001	mg/L	10	0.001	0.003	0.003	0.015
Copper[1]	0.001	mg/L	10	0.005	0.018	0.027	0.043
Lead[1]	0.001	mg/L	10	0.001	0.002	0.002	0.004

Parameter	Limit of Reporting (LOR)	Units	No. Results > LOR	Minimum	Average	80th Percentile	Maximum
Nickel[1]	0.001	mg/L	10	0.001	0.008	0.007	0.052
Selenium[1]	0.001	mg/L	9	0.001	0.002	0.003	0.004
Zinc[1]	0.005	mg/L	10	0.003	0.03	0.06	0.096

[1]Results are for dissolved concentrations

[2] Limit of Detection applied for analysis of the first round of the expanded water quality monitoring program

[3]Limit of Detection applied for analysis of the additional rounds of the expanded water quality monitoring program

2.3.2 Discharge Management Triggers

Water quality management triggers for discharges from the Project were developed for the DVMP, to satisfy condition B19.(c) of SSD-8753, with reference to the NSW Water Quality Objectives (WQOs) for the Lake Macquarie and Tuggerah Lakes catchment, the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia, 2018), baseline receiving water quality monitoring and water balance modelling results.

The discharge management triggers are presented in Table 2.4 and when discharge water quality results indicate exceedance of any of the trigger values/ranges, implementation of the Trigger Action Response Plan (TARP) presented in Table 2.5 is initiated.

TABLE 2.4: DISCHARGE MANAGEMENT TRIGGERS

Parameter	Units	Trigger Value/Range	Trigger Value/Range Basis
pH	-	6.5 - 8.5	NSW Water Quality Objectives (WQOs) for the Lake Macquarie and Tuggerah Lakes catchment
EC	µS/cm	125 – 2,200	NSW Water Quality Objectives (WQOs) for the Lake Macquarie and Tuggerah Lakes catchment
TSS	mg/L	-	No concentration trigger proposed as TSS concentrations are expected to be elevated during rainfall events that result in runoff volumes in excess of sediment basin capacity resulting in discharges.
TRH	mg/L	10	Typical NSW Environment Protection Licence limit
Ammonia as N	mg/L	0.0264	Maximum predicted discharge concentration
Nitrate as N	mg/L	0.440	
NOx as N	mg/L	0.491	
TN as N	mg/L	0.645	
TP	mg/L	0.0168	
Aluminium[1]	mg/L	0.080	ANZG 2018, 90% species protection default guideline value
Arsenic[1]	mg/L	0.094	

Parameter	Units	Trigger Value/Range	Trigger Value/Range Basis
Boron[1]	mg/L	0.68	
Cadmium[1]	mg/L	0.0004	
Chromium III[1]	mg/L	0.0033	ANZG 2018 unknown species protection default guideline value
Chromium VI[1]	mg/L	0.02	Less than the lowest acute toxicity concentration of 0.023 mg/L for animal species (cladoceran) presented in the ANZG 2018 technical brief and 50% of the ANZG 2018, 80% species protection guideline value
Cobalt[1]	mg/L	0.015	Maximum recorded discharge concentration which is significantly below the minimum acute toxicity concentration of 1.1 mg/L (for Daphnia magna) presented in ANZG 2018 technical brief
Copper[1]	mg/L	0.02	50% of the lower range of acute toxicity of 0.04 mg/L for Australian species presented in the ANZG Copper technical brief
Lead[1]	mg/L	0.0056	ANZG 2018, 90% species protection default guideline value
Nickel[1]	mg/L	0.013	
Selenium[1]	mg/L	0.018	
Zinc[1]	mg/L	0.015	

[1]Trigger values are for dissolved concentrations

TABLE 2.5: DISCHARGE WATER QUALITY TARP

Observation	Strategy for Mitigation	Monitoring	Monitoring Action	Response
Discharge water quality exceeds one or more management trigger values presented in Table 2.4.	Sediment basins, Leachate Dam, and Wetland/Bioswale treatment of leachate. Reuse of captured runoff.	Discharge water quality and volume monitoring. Routine site and receiving water quality monitoring.	Continue monitoring as per Section 5.1 of DVMP.	• Compare discharge water quality results with historical site and receiving water quality data. • Review sediment basin storage volume data and site rainfall leading up to the discharge event. • Document details of exceedance, the volume of water stored in the sediment basin that discharged for the five days preceding the discharge and site measured rainfall depths for the five days preceding the discharge.
Discharge water quality exceeds one or more management trigger values presented in Table 2.4 on two occasions within a 12-month period.	Sediment basins, Leachate Dam, and Wetland/Bioswale treatment of leachate. Reuse of captured runoff.	Discharge water quality and volume monitoring. Routine site and receiving water quality monitoring.	Continue monitoring as per Section 5.1 of DVMP.	• Compare discharge water quality results with historical site and receiving water quality data. • Review sediment basin storage volume data and site rainfall leading up to the discharge event. • Document details of exceedance, the volume of water stored in the sediment basin that discharged for the five days preceding the discharge and site measured rainfall depths for the five days preceding the discharge. • Commence preparation of a detailed options analysis for the management of discharge water quality with respect to the water quality parameter(s) that exceeded the discharge management trigger values.

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45 0 45 m

Scale in metres (1:2000 @ A4)

Map Projection: Universal Transverse Mercator (UTM)
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: GDA2020 / MGA zone 56

Figure 2.2

Surface Water Monitoring Locations

Job Number: BNTL00160_004
Revision: 0
Drawn: DW
Checked: CB
Date: 20/4/2026

3. WATER MANAGEMENT

3.1 Water Management System

Plan and original design schematic drawings of the Project WMS are presented in Figure 3.1 and Figure 3.2 respectively. Figure 3.3 presents a schematic of how the WMS currently being operated which differs in some areas from the original design. The overall water management strategy is to retain as much runoff from catchments with a higher likelihood of elevated contaminants in runoff for on-site reuse in material processing and dust suppression. Primary controls on site will comprise sediment dams, a Leachate Dam and a wet channel/bioswale leachate treatment system (hereafter referred to as the Wetland).

In addition to the three primary catchments, the Project has two small, isolated catchments; the Concrete Agitator Washout Bay and the Wheel Wash. Concrete agitator washout is received as a relatively dry solid product but has a high proportion of fine solids and an elevated pH. Wheel Wash water will have a high concentration of sediment. Any runoff in the Concrete Agitator Washout Bay and used Wheel Wash water is contained on site and used as a first priority for operational demands.

Runoff and seepage from the green waste catchment is captured in the Leachate Dam which is lined with a flexible membrane liner with a permeability of less than 10-14 m/s and was designed with capacity to accommodate green waste catchment runoff from a 1 in 10 year, 24 hour duration storm event in accordance with the Environmental Guidelines for Composting and Related Organics Processing Facilities (NSW Department of Conservation, 2004). The original WMS design intended for water captured in the Leachate Dam to be transferred by pump to the Constructed Wetland. Subsequently 224 kL of tank capacity was provided to receive the first flush of runoff from the Green Waste catchment to the Leachate Dam and treated leachate from the Wetland outlet for reuse. While runoff captured in the Leachate Dam can still be transferred to the Wetland, at present, water from the Leachate Dam is being reused directly to maintain moisture content in the mulch undergoing pasteurisation.

The majority of runoff from the Northern Catchment (i.e. the existing portion of the site) drains to the existing vegetated swale running east to west along the northern site boundary to Sediment Dam 1 (SD1). A small section of the Northern Catchment in the northeast corner of the site (approximately 250 m2, primarily sealed roadway for site vehicle access/egress) drains to a sump constructed in the northeast corner to capture runoff from this area. The sump is equipped with a level switch enabled/disabled pump to transfer captured runoff to SD1.

Runoff from the Southern Catchment (i.e. the southern site extension) will drain to a vegetated swale running east to west along the southern site boundary to Sediment Dam 2 (SD2). Excess water discharging from the Wetland during high rainfall events will also drain to the southern vegetated swale and into SD2 and be diluted by runoff from the Southern Catchment. As such SD2 was sized to accommodate runoff from the Green Waste catchment.

SD1 and SD2 were designed as Type D sediment basins to accommodate runoff from the 5 days 90th percentile rainfall event in accordance with Managing Urban Stormwater – Soils and Construction Volume 1 (Landcom, 2004). SD1 and SD2 are lined consistent with the design specifications for leachate dams recommended by Environmental Guidelines Solid Waste Landfills (EPA, 2016). SD1 is dewatered to SD2, and SD2 is dewatered to the site water storage tanks for reuse.

Table 3.1 presents the design and as surveyed as constructed capacities for the Leachate Dam, SD1 and SD2. It is noted that due to the shallow groundwater on site, the constructed capacity of SD1 is below the design capacity, however, SD2 has been constructed with more than double the design capacity. The constructed Leachate Dam is also slightly below the design capacity.

TABLE 3.1: DAM CAPACITIES

Dam	Design Capacity (kL)	Constructed Capacity (kL)	Difference (kL)
SD 1	936	616	-320
SD 2	913	1,970	+1,057
Leachate Dam	254	224	-30

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Map Projection: Universal Transverse Mercator (UTM)
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Grid: GDA2020 / MGA zone 56

Figure 3.1

WMS Plan

Job Number: BNTL00160_004
Revision: 0
Drawn: DW
Checked: CB
Date: 21/4/2026

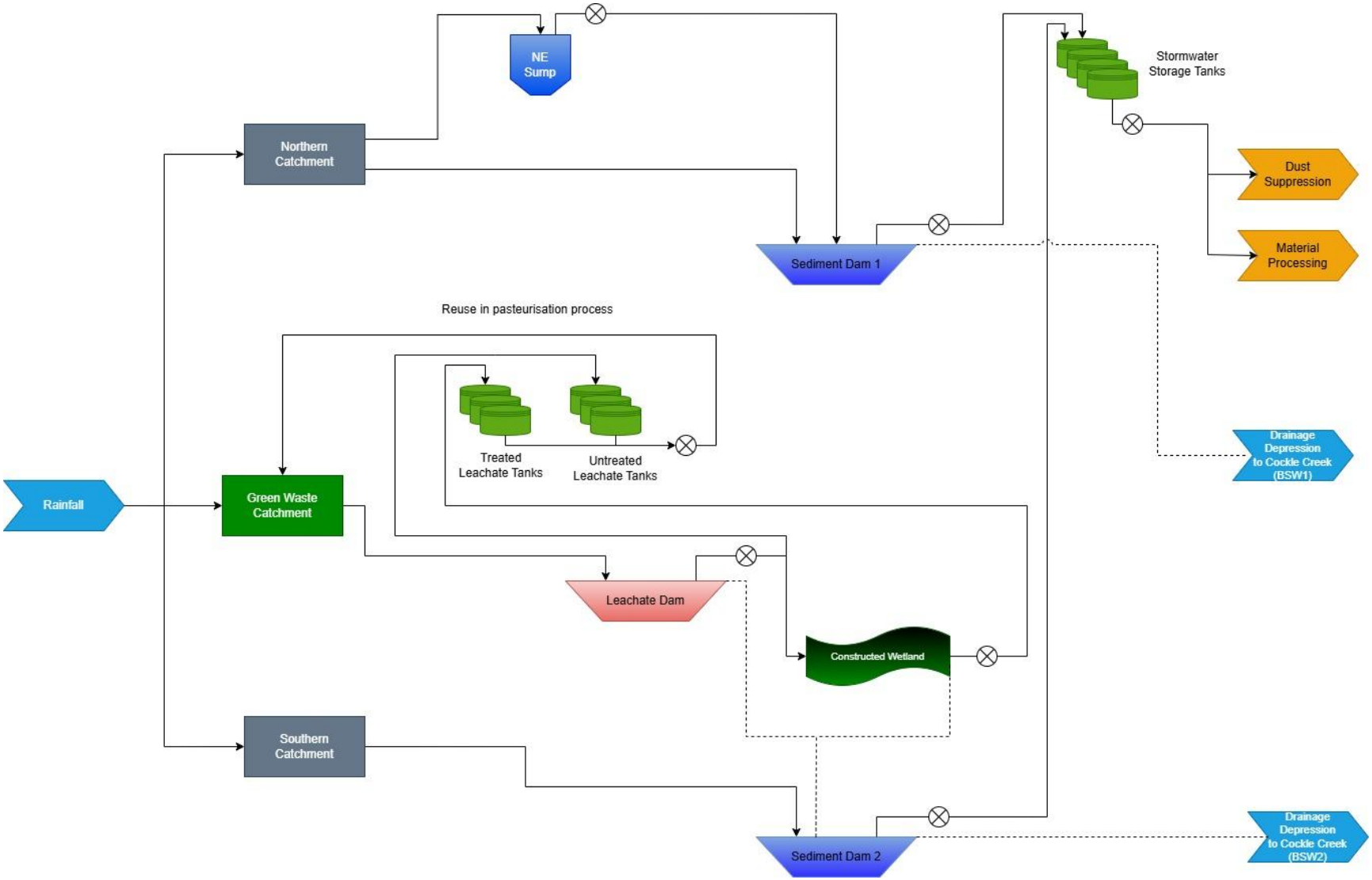

FIGURE 3.2: DESIGN WMS SCHEMATIC

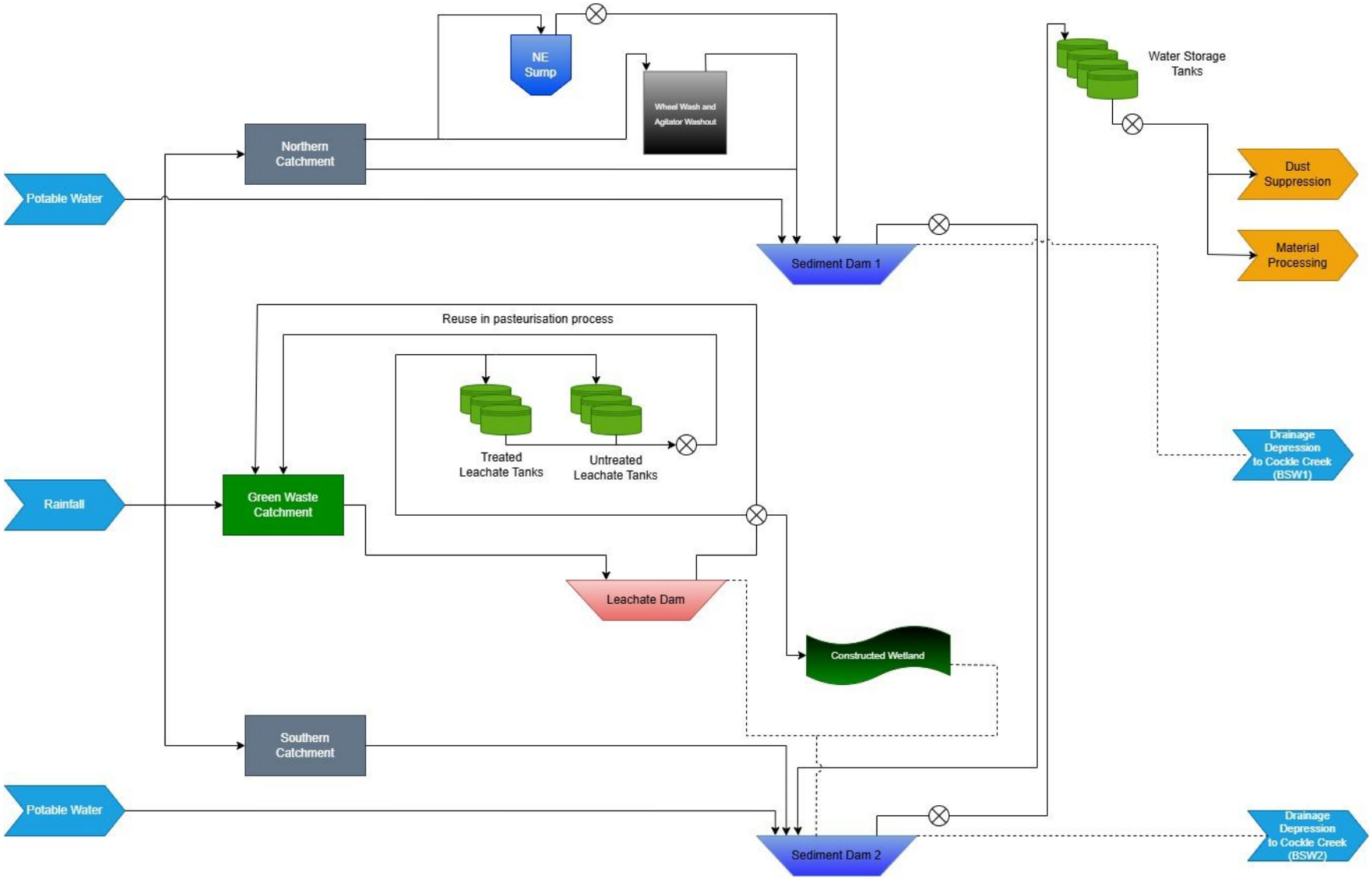

FIGURE 3.3: CURRENT OPERATION WMS SCHEMATIC

4. POST EXPANSION OPERATIONS

4.1 Water Quality

4.1.1 Receiving Environment

Following expansion of the site, routine water quality monitoring has been undertaken at two locations downstream of SD 1 (monitoring location BSW1) and SD 2 (monitoring location BSW2) as shown in Figure 2.2. Water quality statistics for BSW1 and BSW2 are presented in Table 4.1: Comparision of BSW1 and BSW2 Water Quality Statistics (2021 - 2025) against pre expansion RW1

, along with the maximum value found at RW1 during pre-expansion monitoring. Where there were results recorded below the LOR, data analysis to determine the average values was undertaken by substituting these results with the corresponding LOR. Comparison of the pre-expansion receiving water statistics with the post expansion receiving environment water quality statistics indicates:

- The average pH at BSW1 and BSW2 are below the maximum pH recorded at RW1, however, maximum pH results at both BSW1 and BSW2 exceed the RW1 maximum. It is noted that the maximum pH results at BSW1 and BSW 2 are within the *Australian and New Zealand Guidelines from Fresh and Marine Water Quality* (ANZECC, 2000) default trigger value upper limit for lowland river systems and estuarine in southeast Australia.
- The average EC at BSW1 and BSW2 are below the maximum pH recorded at RW1, however, maximum EC results at both BSW1 and BSW2 exceed the RW1 maximum. It is noted that the maximum EC results at BSW1 and BSW 2 are within the *Australian and New Zealand Guidelines from Fresh and Marine Water Quality* (ANZECC, 2000) default trigger value upper limit for lowland river systems in southeast Australia.
- Maximum TSS concentrations post expansion is significantly higher than the maximum recorded at RW1, however, it is noted that the 80th percentile results of 98 mg/L for BSW1 and 162 mg/L for BSW2 are significantly below the maximum recorded values of 2,840 mg/L and 4,570 mg/L respectively.
- Maximum post expansion TRH concentrations are elevated compared to pre-expansion concentrations. The maximum result at BSW2 of 2.17 mg/L is not reflective of site water quality results (i.e. is an order of magnitude higher) and is likely to be indicative of impacts from the Main Northern Railway line and/or possibly the upslope West Wallsend Colliery.
- Maximum post expansion Ammonia concentrations are elevated compared to pre-expansion concentrations. However, it is noted that no discharges were recorded from the site for at least 15 months prior to the maximum recorded Ammonia result at BSW1 of 2.49 mg/L (30 May 2022). The maximum result at BSW2 of 1.00 mg/L (27 November 2025) was recorded approximately six months after the previous site discharge was recorded. As such it is considered that the broader range in receiving environment Ammonia concentrations is not indicative of a site impact.
- Maximum post expansion TN, NO_x, and TP concentrations at BSW1 and BSW2 remained below the pre-expansion maximum results recorded at RW1.
- The concentration of metals and metalloids at BSW 1 and BSW2 were typically higher than pre-expansion concentrations with the exception of aluminium, copper, and zinc. Maximum receiving water concentration increases for Cadmium and Lead are marginal and the following observations are made with respect to other species:
  - Arsenic concentration is up to approximately three times higher at BSW1 but only marginal increase at BSW2 (+0.004 mg/L).
  - Chromium concentrations (un-speciated) up to three times higher at BSW1 but only a marginal increase at BSW2 (+0.001 mg/L).
  - Chromium VI concentrations up to approximately six times higher at BSW2 but only a marginal increase at BSW2 (+0.001 mg/L). It is noted that the Chromium VI concentrations are higher than the un-speciated Chromium concentrations which is not physically possible and such, the Chromium results are questionable. Further, the maximum recorded BSW2 Chromium VI concentration is higher than the maximum concentration recorded in SD2.
  - Selenium concentrations up to approximately 8 times higher.

TABLE 4.1: COMPARISION OF BSW1 AND BSW2 WATER QUALITY STATISTICS (2021 - 2025) AGAINST PRE EXPANSION RW1

Parameter	Units	Monitoring Location	BWS1 & BSW2 #Results	BSW1 & BSW2 Range	BSW1 & BSW2 Average	RW1 #Results	RW1 Maximum Result
pH	-	BSW1	40	5.8 to 8.2	7.5	7	8
		BSW2	44	6.8 to 8.3	7.6		
EC	µS/cm	BSW1	40	389 to 1,520	877	7	920
		BSW2	44	300 to 1,460	763		
TSS	mg/L	BSW1	38	<5 to 2,840	141	7	75
		BSW2	43	5 to 4,570	228		
TRH	mg/L	BSW1	39	0.13 to 0.27	0.16	0	0.1
		BSW2	43	0.13 to 2.17	0.23		
Ammonia as N	mg/L	BSW1	40	<0.005 to 2.49	0.315	6	0.5
		BSW2	44	<0.005 to 1.00	0.121		
Nitrate as N	mg/L	BSW1	40	<0.005 to 2.41	0.226	7	13.8
		BSW2	44	<0.005 to 2.06	0.134		
NOx as N	mg/L	BSW1	40	<0.005 to 3.88	0.294	5	1.2
		BSW2	44	<0.005 to 2.16	0.14		
TN as N	mg/L	BSW1	40	0.4 to 12.4	2.1	4	9.4
		BSW2	44	0.6 to 21.4	2.39		
TP	mg/L	BSW1	40	0.02 to 6.74	0.68	5	9.6
		BSW2	44	0.05 to 2.61	0.55		
Boron[1]	mg/L	BSW1	40	<0.05 to 0.31	0.11	1	0.14
		BSW2	44	<0.05 to 0.36	0.1		
Aluminium[1]	mg/L	BSW1	38	<0.01 to 1.09	0.05	6	1.3
		BSW2	44	<0.01 to 0.15	0.03		
Arsenic[1]	mg/L	BSW1	40	<0.001 to 0.017	0.004	5	0.006
		BSW2	44	<0.001 to 0.010	0.003		
Cadmium[1]	mg/L	BSW1	40	<0.0001 to 0.0004	0.0001	1	0.0003
		BSW2	44	<0.0001 to 0.0002	0.0001		
Chromium[1]	mg/L	BSW1	40	<0.001 to 0.006	0.002	1	0.002
		BSW2	44	<0.001 to 0.003	0.001		
Chromium VI[1]	mg/L	BSW1	40	<0.001 to 0.011	0.008	3	0.002
		BSW2	44	<0.001 to 0.100	0.01		
Cobalt[1]	mg/L	BSW1	40	<0.001 to 0.006	0.001	2	0.001
		BSW2	44	<0.001 to 0.002	0.001		
Copper[1]	mg/L	BSW1	40	<0.001 to 0.013	0.003	7	0.036
		BSW2	44	<0.001 to 0.014	0.002		
Lead[1]	mg/L	BSW1	40	<0.001 to 0.005	0.001	5	0.004
		BSW2	44	<0.001 to 0.002	0.001		

Parameter	Units	Monitoring Location	BWS1 & BSW2 #Results	BSW1 & BSW2 Range	BSW1 & BSW2 Average	RW1 #Results	RW1 Maximum Result
Nickel[1]	mg/L	BSW1	40	<0.001 to 0.006	0.002	6	0.009
		BSW2	44	<0.001 to 0.01	0.002		
Selenium[1]	mg/L	BSW1	40	<0.001 to 0.01	0.008	1	0.001
		BSW2	44	<0.001 to 0.011	0.007		
Zinc[1]	mg/L	BSW1	40	<0.005 to 0.129	0.024	7	0.26
		BSW2	44	<0.002 to 0.142	0.019		

[1] *Results are for dissolved concentrations*

4.1.2 Site

Routine water quality monitoring has been undertaken following expansion of the site in SD 1, SD 2, the Leachate Dam and treated leachate discharging from the Wetland. Water quality statistics in SD 1, SD 2, the Leachate Dam and treated leachate discharging from the Wetland and Table 4.2 and Table 4.3 respectively.

Comparison of the pre-expansion site water statistics with the post expansion sediment dam water quality statistics indicates:

- The maximum pH values in SD1 and SD2 are approximately 2 and 3 points higher respectively than the pre-expansion maximum value while the average SD1 and SD2 pH is 1 point higher than the pre-expansion average value.
- The maximum pH in the Leachate dam was approximately 1.5 points higher than the pre-expansion maximum whilst the average was 1 point higher than the pre-expansion average. The pH of the Wetland remained neutral.
- The EC results for SD1 and SD2 are comparable with pre-expansion EC results.
- Maximum TRH concentrations inSD1 and SD2 are approximately three times higher than maximum pre-expansion result.
- SD1 and SD2 maximum and average nutrient concentrations (i.e. Ammonia, Nitrate, TN, and TP) in SD1 and SD2 are below the comparable maximum and average pre-expansion nutrient concentrations.
- The post expansion Wetland and Leachate Pond nutrient concentrations were below pre-expansion results with the exception of:
  - The maximum Ammonia concentration in the Wetland was 3.3 mg/L higher than the pre-expansion maximum result. However, the average post expansion Ammonia is below the pre-expansion average concentration.
  - The maximum TN concentration in the Wetland was approximately 2 mg/L higher than the pre-expansion maximum, with the average for the Wetland and the Leachate Pond being approximately 0.7 mg/L and 2.4 mg/L higher than pre-expansion average respectively.
- SD1 and SD2 maximum and average metal and metalloid concentrations were below the maximum and average concentrations in the pre-expansion results for Chromium (un-speciated), Cobalt, Nickel and Zinc.
- Metal and metalloid results in SD1 and SD2 that exceeded pre-expansion results are summarised as follows:
  - The maximum concentration for Boron was 0.02 mg/L and 0.08 mg/L higher than the pre-expansion maximum result. However, the average concentration for both SD 1 and SD 2 were below the pre-expansion average.
  - The maximum concentration for Aluminium was 1.3 mg/L and 0.25 mg/L higher in SD1 and SD2 respectively and the average concentrations was approximately 0.2 mg/L and 0.1 mg/L higher in SD1 and SD2 respectively, when compared to pre-expansion concentrations.
  - The maximum Chromium VI concentration in SD1 was marginally above the maximum pre-expansion concentration.
  - The maximum concentration for Arsenic in SD2 was approximately 0.02 mg/L higher than the maximum pre-expansion concentration and the average was marginally higher in SD2 than pre-expansion testing.
  - Maximum Selenium concentrations in SD2 indicate an increase over pre-expansion concentrations, however, all results were below the LOR and at times, the laboratory LOR was an order of magnitude above the required LOR. As such, replacement of the results recorded as less than LOR may have artificially increased the Selenium reported concentrations in SD2. The maximum selenium concentrations in SD1 are, however, ten times higher than the pre-expansion maximum.

TABLE 4.2: SITE WATER STATISTICS MEASURED IN SD1 AND SD2

Parameter	Limits of Reporting (LOR)	Units	Sediment Dam 1			Sediment Dam 2			Pre-Expansion Water Quality		
			No. Results > LOR	Range	Average	No. Results > LOR	Range	Average	No. of Samples	Maximum	Average
pH	0.1	-	34	7.16 to 10.4	9.1	39	7.4 to 11.3	9.1	13	8.5	8.1
EC	1	µS/cm	34	280 to 1,260	565	39	290 to 1110	541	13	1500	847
TSS	5	mg/L	30	5 to 460	51	39	5 to 626	69	13	608	90
TRH	0.1	mg/L	33	0.13 to 0.29	0.15	38	0.13 to 0.33	0.16		0.1	0.06
Ammonia as N	0.005	mg/L	35	0.005 to 0.83	0.11	40	0.005 to 0.34	0.09	13	3	0.36
Nitrate as N	0.01	mg/L	36	<0.005 to 3.95	0.74	36	0.005 to 6.04	1.42	13	20	8.8
NOx as N	0.01	mg/L	36	<0.01 to 4.62	1.01	36	0.005 to 6.17	1.75	12	0.56	0.23
TN as N	0.01	mg/L	34	0.5 to 5.5	2.0	38	0.3 to 8.2	3.3	12	16	5.97
TP	0.01	mg/L	31	<0.01 to 0.4	0.08	41	0.03 to 0.62	0.19	13	18	6.67
Aluminium[1]	0.01	mg/L	33	0.04 to 1.4	0.25	37	<0.01 to 0.35	0.14	10	0.1	0.056
Arsenic[1]	0.001	mg/L	33	0.002 to 0.015	0.006	38	<0.001 to 0.04	0.009	10	0.021	0.007
Boron[1]	0.0001	mg/L	29	0.03 to 0.23	0.08	33	0.04 to 0.29	0.07	10	0.21	0.089

Parameter	Limits of Reporting (LOR)	Units	Sediment Dam 1			Sediment Dam 2			Pre-Expansion Water Quality		
			No. Results > LOR	Range	Average	No. Results > LOR	Range	Average	No. of Samples	Maximum	Average
Cadmium[1]	0.001	mg/L	2	<0.0001 to 0.0002	0.0001	0	<0.0001	0.0001	10	0.0001	0.0001
Chromium	0.01	mg/L	32	<0.001 to 0.051	0.019	35	0.001 to 0.035	0.017	10	0.18	0.053
Chromium VI[1]	0.001	mg/L	24	<0.001 to 0.055	0.020	32	0.001 to 0.037	0.018	10	0.16	0.048
Cobalt[1]	0.001	mg/L	6	<0.001 to 0.002	0.001	6	<0.001 to 0.002	0.001	10	0.015	0.003
Copper[1]	0.001	mg/L	33	0.002 to 0.013	0.006	38	0.002 to 0.017	0.006	10	0.043	0.018
Lead[1]	0.001	mg/L	4	<0.001 to 0.005	0.001	0	<0.001	0.001	10	0.004	0.002
Nickel[1]	0.001	mg/L	23	<0.001 to 0.008	0.002	28	<0.001 to 0.003	0.001	10	0.052	0.008
Selenium[1]	0.012/0.001	mg/L	4	<0.001 to 0.02	0.01	02	<0.001 to <0.01	0.007	9	0.004	0.002
Zinc[1]	0.001	mg/L	14	<0.001 to 0.022	0.006	17	<0.001 to 0.009	0.005	10	0.096	0.03

[1]Results are for dissolved concentrations

[2] Early Characterisation measurements had a lower LOR

TABLE 4.3: SITE WATER QUALITY VALUES FROM LEACHATE POND AND CONSTRUCTED WETLAND

Parameter	Limits of Reporting (LOR)	Units	Leachate Pond			Constructed Wetland			Pre-Expansion Water Quality at RW1	
			# Results > LOR	Maximum	Average	# Results > LOR	Maximum	Average	Maximum	Average
pH	0.1	-	37	10.1	9.1	33	7.5	7.3	8.5	8.1
EC	1	µS/cm	37	3200	1280	33	2800	1160	1500	847
TSS	5	mg/L	28	2200	36	26	784	161	608	90
Ammonia as N	0.01	mg/L	35	0.96	0.08	32	6.6	0.27	0.1	0.06
Nitrate as N	0.01	mg/L	12	3.2	0.02	10	0.18	0.02	3	0.36
NOx as N	0.01	mg/L	13	3.4	0.02	10	0.3	0.02	20	8.8
TN as N	0.01	mg/L	37	13.0	6.7	33	18.2	8.34	0.56	0.23
TP	0.1	mg/L	38	5.5	1.28	35	8.0	1.9	16.0	5.97

4.2 Green Waste Inventory

Figure 4.1 presents approximate green waste inventory held on site on a monthly basis covering the period of the assessment being undertaken for the DVMR and indicates green waste inventories consistently above the 200 tonnes approved under SSD 8753 in March 2020, but at all times below the 2,000-tonne limit approved under Modification 1.

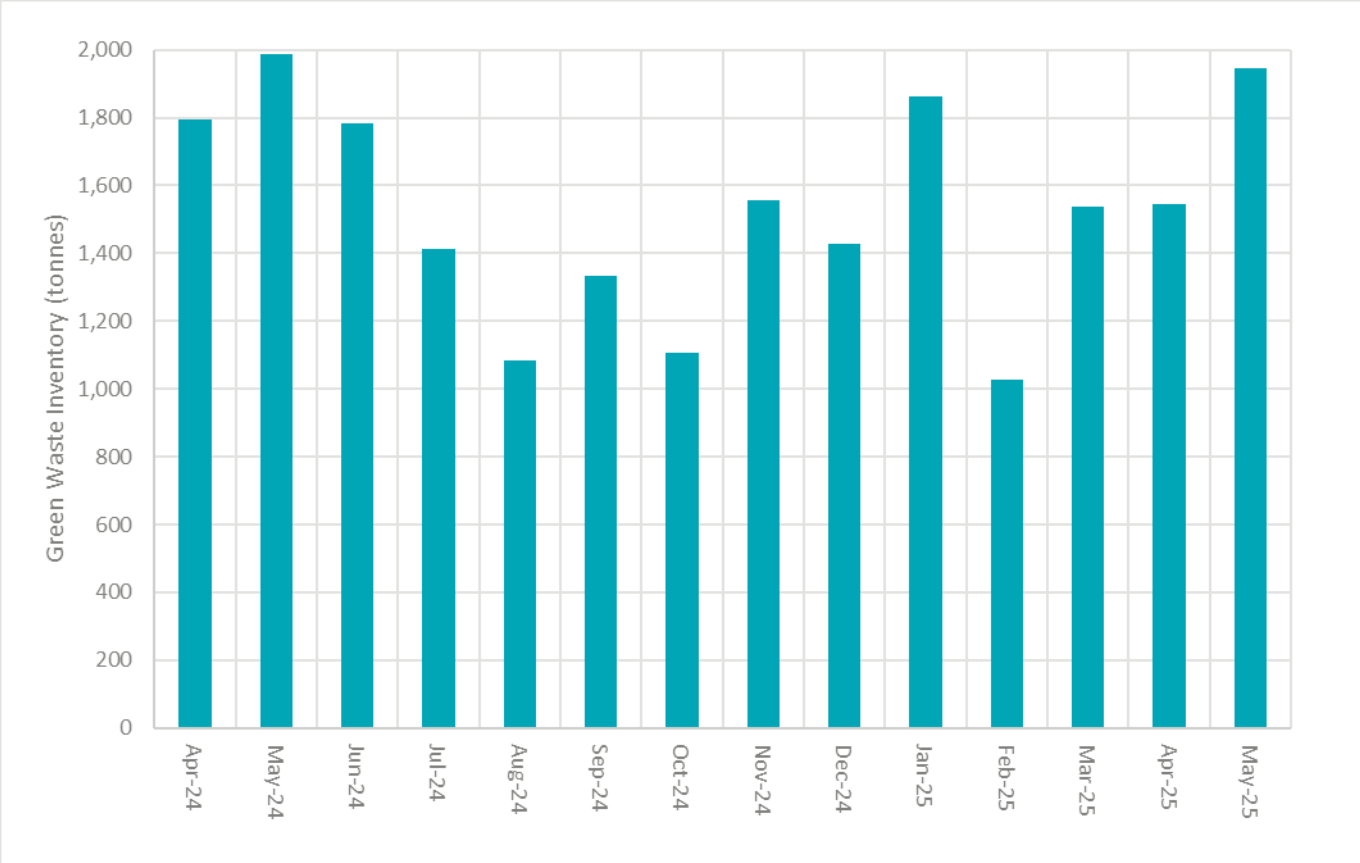

FIGURE 4.1:GREEN WASTE INVENTORY, APRIL 2024 TO MAY 2025

4.3 Discharges

There have been 6 discharge events since preparation of the previous DVMR that have occurred at the Concrush site between January 2024 and December 2025, with SD1 discharging on 3 occasions and SD2 discharging on 5 occasions (i.e. some of the discharge events included discharges from both SD1 and SD2 on the same day). Table 4.4: Summary of Rainfall Preceding and on Day of Discharge Events from SILO database

presents a summary of the rainfall preceding the discharge event (including the rainfall on the day of discharge) and on the rainfall on the day of discharge.

TABLE 4.4: SUMMARY OF RAINFALL PRECEDING AND ON DAY OF DISCHARGE EVENTS FROM SILO DATABASE

Discharge Date	Rainfall (mm)				Comments
	Discharge day	5 days prior	14 days prior	28 days prior	
6/04/2024	89.9	149.0	149.3	165.9	The volume of rain in the 5 days preceding the discharge event exceeded the 90th percentile rain event depth of 38.9 mm that the dam was designed to contain.
3/05/2024	1.4	80.7	225.9	337.3	The volume of rain in the 5 days preceding the discharge greatly exceeded the 90th percentile rain event that the dams were designed to contain.
6/05/2024	11.6	49.6	111.1	277.8	The volume of rain in the 5 days preceding the discharge greatly exceeded the 90th percentile event that the dams were designed for. Inventory management for the dams would have remained difficult due to extended elevated rainfall.
3/07/2024	46.1	72.1	91.4	121.7	The volume of rain in the 5 days preceding the discharge exceeded the 90th percentile event that the dams were designed to contain.
10/07/2024	0.2	18.5	99.1	130.0	The volume of rainfall on the day of the discharge event was minimal and the 5-day rainfall preceding the discharge was below 90th percentile event that the dams were designed to contain. However, almost 100 mm of rainfall was recorded for the 14-day period preceding the discharge event.
20/05/2025	17.1	147.1	182.3	400.1	The volume of rain in the 5 days preceding the discharge exceeded the 90th percentile event that the dams were designed to contain. Very high rainfall was experienced in the 14 day and 28-day periods preceding the discharge event.

Water quality monitoring was completed for each of the discharge events on the day of discharge or the next business day if the event occurred when the site was unstaffed, with samples taken from the actively flowing spill section (wherever possible). However, the volume of discharge from the dams was not recorded. Water quality monitoring of discharges from SD1 and SD2 was undertaken in accordance with the site Water Discharge Management Plan (WDMP) (Umwelt, 2020) for each of the discharge events. Water quality results are presented Table 4.5: Water Quality Results for Discharge Event from Sediment Dam 1 on 6 April 2024

to Table 4.12 along with comparisons of the results to management triggers (refer to Table 2.4). A summary of each of the 6 discharge events is provided in Sections 4.3.1 to 4.3.4 with commentary on:

- Background receiving environment water quality and water quality in site storages.
- Potential impacts on the receiving environment.

4.3.1 April 2024 Discharge Event

A water quality sample was collected from the spillway of Sediment Dam 1 (SD1) during a discharge event on the 6 April 2024 and is presented in Table 4.5: Water Quality Results for Discharge Event from Sediment Dam 1 on 6 April 2024

. No receiving environment sample was collected at the time of the discharge, however, routine receiving water quality results are available prior to the discharge event (28 February 2024) and after the discharge event (26 April 2024) at location BSW1 (refer to Figure 3.1). Discharge water quality results for TN, TP, and Zinc exceeded their respective management triggers during the discharge event on 6 April 2024.

Rainfall depths on the day of the discharge event and preceding the discharge event were:

- 89.9 mm on the day of discharge.
- 149.0 mm 5 days preceding the discharge, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.

The TN concentrations recorded at BSW1 have ranged from 0.05 mg/L to 12.4 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. The discharge water TN concentration of 1.7 mg/L was within the recorded BSW1 and RW1 range, and the TN concentration recorded at BSW1 following the discharge event on 26 April 2024 was 0.4 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TN concentrations.

TP concentrations recorded at BSW1 have ranged from 0.02 mg/L and 6.74 mg/L for the period of monitoring indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. The discharge TP exceedance of 0.27 mg/L recorded on 6 April 2024 is significantly below the maximum historical TP at BSW1 and RW1 and as such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TP concentrations.

The discharge Zinc concentration of 0.016 mg/L on 6 April 2024 marginally exceeded the trigger value of 0.015 mg/L. Zinc concentrations recorded at BSW1 have ranged from 0.0005 mg/L to 0.129 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Zinc concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 0.29 mg/L. Further, the discharge Zinc concentration was below the 80% level of species protection (LOSP) default guideline value (DGV) of 0.031 mg/L published in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments, 2018) (ANZG 2018). As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to Zinc concentrations.

TABLE 4.5: WATER QUALITY RESULTS FOR DISCHARGE EVENT FROM SEDIMENT DAM 1 ON 6 APRIL 2024

Parameter	Units	Trigger Value/Range	SD1 Discharge	Trigger Value Exceeded
pH	-	6.5 - 8.5	7.07	No
EC	µS/cm	125 – 2,200	807	No
TSS	mg/L	-	26	NA
TRH	mg/L	10	<1.0	No
Ammonia as N	mg/L	0.0264	0.02	No
Nitrate as N	mg/L	0.440	0.31	No
NOx as N	mg/L	0.491	0.37	No
TN as N	mg/L	0.645	1.7	Yes
TP	mg/L	0.0168	0.27	Yes
Aluminium[1]	mg/L	0.080	0.05	No

Parameter	Units	Trigger Value/Range	SD1 Discharge	Trigger Value Exceeded
Arsenic[1]	mg/L	0.094	0.004	No
Boron[1]	mg/L	0.68	0.24	No
Cadmium[1]	mg/L	0.0004	<0.0001	No
Chromium III	mg/L	0.0033	0.003	No
Chromium VI[1]	mg/L	0.02	<0.01	No
Cobalt[1]	mg/L	0.015	<0.001	No
Copper[1]	mg/L	0.02	0.01	No
Lead[1]	mg/L	0.0056	<0.001	No
Nickel[1]	mg/L	0.013	0.001	No
Selenium[1]	mg/L	0.018	<0.01	No
Zinc[1]	mg/L	0.015	0.016	Yes

[1] Results are for dissolved concentrations.

[2] Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration.

[3] Result on 30/05/2025 <0.05 which represented the limit of reporting for the test but is higher than the assigned trigger value.

4.3.2 May 2024 Discharge Events

Water quality samples were collected for discharge events occurring on 3 May 2024 from SD2 and 3 days later on 6 May 2024 from SD1, SD2 and at BSW1 (downstream of SD1) and the results are presented in Table 4.6: Water Quality Results for Discharge Event from Sediment Dam 1 on 6/05/2024

, Table 4.7 and Table 4.8. Rainfall depths on the day of the discharge event and preceding the discharge event were:

- 1.4 mm on 3 May 2024 the day of discharge.
- 80.7 mm 5 days preceding the discharge on 3 May 2024, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.
- 11.6 mm on 6 May 2024, the day of discharge.
- 49.6 mm 5 days preceding the discharge on 6 May 2024, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.

The 28-days prior to the discharge on 3 May 2024 recorded and extremely high rainfall depth of 337.3 mm.

4.3.2.1 SD1

Discharge water quality results for Ammonia, Nitrate, NOx, TN, and TP exceeded their respective management triggers during the discharge from SD1 on 6 May 2024 (refer to Table 4.6).

The Ammonia concentrations recorded at BSW1 range from <0.005 mg/L to 2.49 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background ammonia concentrations, that were also evident in the pre-expansion monitoring dataset for RW1 which had

a maximum of 0.05 mg/L. Routine monitoring results for Ammonia at SD1 range from <0.005mg/L to 0.83 mg/L (refer to Table 4.2). The Ammonia discharge exceedance of 0.04 mg/L recorded and the recorded concentration at BSW1 on 3 May 2024 were below the pre-expansion maximum and routine monitoring maximum result. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to Ammonia concentrations.

The Nitrate concentrations recorded at BSW1 range between 0.005 mg/L to 2.41 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 13.8 mg/L. Routine monitoring results for Nitrate at SD1 range from <0.005 mg/L to 3.95 mg/L for the monitoring period (refer to Table 4.2).

The Nitrate discharge of 1.03 mg/L recorded in the discharge from SD1 and 1.14 mg/L recorded in BSW1 on 6 May 2024 were below both the pre-expansion maximum and routine monitoring maximum results. Routine monitoring results at BSW1 on 28 May 2024 had Nitrate concentrations of 0.05 mg/L which indicates the discharge event did not result in an increase in baseline Nitrate concentrations at BSW1. The NOx concentrations recorded during the discharge event are predominantly made up of Nitrate. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW1 have range from 0.4 mg/L to 12.4 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD1 range from 0.5 mg/L to 5.5 mg/L for the monitoring period (refer to Table 4.2). The discharge TN concentration on 6 May 2024 was 2.6 mg/L which is below the both the pre-expansion maximum and routine monitoring maximum value. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TN concentrations.

TP concentrations recorded at BSW1 range from 0.02 mg/L and 6.74 mg/L for the period of monitoring indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring results for TP at SD1 range from 0.5 mg/L to 5.5 mg/L for the monitoring period (refer to Table 4.2). The discharge TP result of 0.17 mg/L recorded on 6 May 2024 is below the maximum recorded values in both the pre-expansion and routine monitoring datasets. The subsequent routine monitoring result at BSW1 on 28 May 2024 of 0.6 mg/L indicates the discharge event did not result in an increase in baseline TP concentrations at BSW1. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TP concentrations.

TABLE 4.6: WATER QUALITY RESULTS FOR DISCHARGE EVENT FROM SEDIMENT DAM 1 ON 6/05/2024

Parameter	Units	Trigger Value	SD1 Discharge	BSW1	Trigger Value Exceeded
pH	-	6.5 - 8.5	7.76	7.82	No
EC	µS/cm	125 – 2,200	506	519	No
TSS	mg/L	-	36	18	NA
TRH	mg/L	10	<1.0	<1.0	No
Ammonia as N	mg/L	0.0264	0.04	0.04	Yes
Nitrate as N	mg/L	0.44	1.03	1.14	Yes
NOx as N	mg/L	0.491	1.36	1.49	Yes
TN as N	mg/L	0.645	2.6	2.5	Yes
TP	mg/L	0.0168	0.17	0.15	Yes

Parameter	Units	Trigger Value	SD1 Discharge	BSW1	Trigger Value Exceeded
Aluminium[1]	mg/L	0.08	0.02	0.06	No
Arsenic[1]	mg/L	0.094	0.003	0.003	No
Boron[1]	mg/L	0.68	0.09	0.08	No
Cadmium[1]	mg/L	0.0004	<0.0001	<0.0001	No
Chromium III[1,2]	mg/L	0.0033	<0.01	<0.01	No
Chromium VI[1]	mg/L	0.02	<0.01	<0.01	No
Cobalt[1]	mg/L	0.015	<0.001	<0.001	No
Copper[1]	mg/L	0.02	0.008	0.006	No
Lead[1]	mg/L	0.0056	<0.001	<0.001	No
Nickel[1]	mg/L	0.013	<0.001	0.001	No
Selenium[1]	mg/L	0.018	<0.01	<0.01	No
Zinc[1]	mg/L	0.015	0.008	0.023	Yes

[1] *Results are for dissolved concentrations*

[2] *Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration*

4.3.2.2 SD2

4.3.2.2.1 3 May 2024

Discharge water quality results for pH, TSS, Ammonia, Nitrate, NOx, TN, TP, Aluminium, and Chromium exceeded their respective management triggers during the discharge from SD2 on 3 May 2024 (refer to Table 4.7).

The pH recorded at BSW2 ranges from 6.8 to 8.3 for the period of monitoring which is generally consistent with the pH range of 6.9 to 8.0 record at RW1. Routine monitoring results for pH at SD2 range from 7.4 to 11.3 for the monitoring period with an average value of 9.1 (refer to Table 4.2) which are both higher than the maximum recorded pre-expansion site pH results (Table 2.3). The pH during the discharge event on 3 May 2024 was 9.93, which was higher than the pre-expansion monitoring and regular characterisation monitoring at BSW2. No monitoring was undertaken of the BSW2 location during discharge.

The Ammonia concentrations recorded at BSW2 have ranged from <0.005 mg/L to 1.00 mg/L with an average concentration of 0.12 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Ammonia concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 0.5 mg/L. Routine monitoring results for Ammonia at SD2 range from <0.005mg/L and 0.34 mg/L for the monitoring period with an average value of 0.09 mg/L. The discharge Ammonia concentration of 0.04 mg/L on 3 May 2024 was below both the pre-expansion maximum and routine monitoring results at BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Ammonia concentrations.

The Nitrate concentrations recorded at BSW2 range from <0.005 mg/L to 2.06 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum

of 13.8 mg/L. Routine monitoring results for Nitrate at SD2 range from <0.005 mg/L to 6.04 mg/L for the monitoring period with an average of 1.42 mg/L (refer to Table 4.2).

Routine monitoring results for Nitrate at the Leachate Pond indicate a maximum Nitrate concentration of 3.2 mg/L while the Wetland discharge has a maximum of 0.18 mg/L. The discharge NOx concentration of 3.49 mg/L was higher than the maximum concentrations of 2.16 mg/L recorded at BSW2, however, lower than the historically recorded RW1 Nitrate concentration of 13.8 mg/L with Nitrate comprising the majority of the discharged NOx with a Nitrate concentration of 2.61 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW2 have ranged from 0.6 mg/L to 21.4 mg/L with an average concentration of 2.39 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD2 range from 0.3 mg/L to 8.2 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for TN for the Wetland discharge indicate a maximum concentration of 18.2 mg/L while maximum TN result recorded at the Leachate Pond was 13.0 mg/L (refer to Table 4.3).

The discharge TN concentration on 3 May 2024 was 3.5 mg/L was below both the RW1 and BSW2 maximum results. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TN concentrations.

TP concentrations recorded at BSW2 have ranged from 0.05 mg/L and 2.61mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring for TP at SD2 ranges from 0.03 mg/L to 0.62 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for the Wetland discharge indicate a maximum concentration of 8.0 mg/L while maximum TP result recorded at the Leachate Pond was 5.5 mg/L (refer to Table 4.3).

The LOR (0.10 mg/L) for TP for the discharge sample was greater than the TP trigger value of concentration of 0.0168 mg/L recorded on 3 May 2024 and therefore, it is unclear of the trigger values was actually exceeded. It is noted that a TP concentration of 0.10 mg/L is below the maximum recorded values at both RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TP concentrations.

The discharge Aluminium concentration of 0.23 mg/L on 3 May 2024 exceeded the trigger value of 0.08 mg/L. Aluminium concentrations recorded at BSW2 have ranged from <0.01 mg/L to 0.15 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Aluminium concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 1.3 mg/L. Routine monitoring results for Aluminium at SD2 range from <0.01 mg/L to 0.35 mg/L for the monitoring period (refer to Table 4.2).

The discharge Aluminium concentration was below the maximum concentration recorded at RW1 and marginally above the maximum concentration recorded BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Aluminium concentrations.

The discharge Chromium VI concentration of 0.03 mg/L on 3 May 2024 marginally exceeded the trigger value of 0.02 mg/L. Chromium VI concentrations recorded at BSW2 have ranged from <0.001 mg/L to 0.100 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Chromium VI concentrations in the receiving environment, however, elevated Chromium VI concentrations were not evident in the pre-expansion monitoring results for RW1 which had a maximum result 0.002 mg/L. Routine monitoring results for Chromium VI at SD2 range from <0.001 mg/L to 0.037 mg/L for the monitoring period (refer to Table 4.2).

The discharge Chromium VI concentration was below the maximum concentrations recorded at RW1 and BSW2. Further, the discharge Chromium VI concentration was below the 80% LOSP DGV of 0.04 mg/L published in ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Chromium VI concentrations.

TABLE 4.7: WATER QUALITY SUMMARY FOR DISCHARGE EVENTS FROM SEDIMENT DAM 2 ON 3 MAY 2024

Parameter	Units	Trigger Value	SD2 Discharge	Trigger Value Exceeded
pH	-	6.5 - 8.5	9.93	Yes
EC	µS/cm	125 – 2,200	419	No
TSS	mg/L	-	32	NA
TRH	mg/L	10	<1.0	No
Ammonia as N	mg/L	0.0264	0.04	Yes
Nitrate as N	mg/L	0.44	2.61	Yes
NOx as N	mg/L	0.491	3.49	Yes
TN as N	mg/L	0.645	3.5	Yes
TP	mg/L	0.0168	<0.10	Yes
Aluminium[1]	mg/L	0.08	0.23	Yes
Arsenic[1]	mg/L	0.094	0.004	No
Boron[1]	mg/L	0.68	0.05	No
Cadmium[1]	mg/L	0.0004	<0.0001	No
Chromium III[1,2]	mg/L	0.0033	<0.01	No
Chromium VI[1]	mg/L	0.02	0.03	Yes
Cobalt[1]	mg/L	0.015	<0.001	No
Copper[1]	mg/L	0.02	0.007	No
Lead[1]	mg/L	0.0056	<0.0001	No
Nickel[1]	mg/L	0.013	0.001	No
Selenium[1]	mg/L	0.018	<0.01	No
Zinc[1]	mg/L	0.015	0.005	No

[1] *Results are for dissolved concentrations*

[2] *Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration*

4.3.2.2.2 6 May 2024

Discharge water quality results for pH, TSS, Ammonia, Nitrate, NOx, TN, TP, Aluminium, Chromium exceeded their respective management triggers during the discharge during the discharge from SD2 on 6 May 2024 (refer to Table 4.8).

The pH recorded at BSW2 ranged between 6.8 to 8.3 for the period of monitoring which is generally consistent with the pH range of 6.9 to 8.0 record at RW1. Routine monitoring results for pH at SD2 range from 7.4 to 11.3 for the monitoring period with an average value of 9.1 (refer to Table 4.2) which are both higher than the maximum recorded pre-expansion site pH results (Table 2.3). The pH during the discharge event on 6 May 2024 was 9.96 was higher than pH recorded at both RW1 and BSW2. No monitoring was undertaken of the BSW2 location during the discharge.

The TSS concentrations at BSW2 range from 5 mg/L to 4,570 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TSS concentrations, in the pre-expansion monitoring dataset for RW1 had a maximum of 75 mg/L. Routine monitoring results for TSS at SD2 range from 5 mg/L to 626 mg/L for the monitoring period with an average value of 69 mg/L (refer to Table 4.2).

The discharge TSS concentration of 90 mg/L on 3 May 2024 is marginally above the recorded maximum result at RW1 but below the maximum result at BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TSS concentrations.

The Ammonia concentrations recorded at BSW2 have ranged from <0.005 mg/L to 1.00 mg/L with an average concentration of 0.12 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background ammonia concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 0.05 mg/L. Routine monitoring results for Ammonia at SD2 recorded range from <0.005mg/L to 0.34 mg/L with an average value of 0.09 mg/L. The discharge Ammonia of 0.04 mg/L on 6 May 2024 was below the maximum concentrations recorded at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Ammonia concentrations.

The Nitrate concentrations recorded at BSW2 ranged between <0.005 mg/L to 2.06 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 13.8 mg/L. Routine monitoring results for Nitrate at SD2 range from <0.005 mg/L to 6.04 mg/L for the monitoring period with an average of 1.42 mg/L (refer to Table 4.2).

Routine monitoring results for Nitrate at the Leachate Pond indicate a maximum Nitrate concentration of 3.2 mg/L while the Wetland discharge has a maximum of 0.18 mg/L. The discharge NOx concentration of 3.13 mg/L on 6 May 2024 was higher than the maximum concentration of 2.16 mg/L recorded at BSW2, however, lower than the historically recorded RW1 Nitrate concentration of 13.8 mg/L, with Nitrate comprising the majority of the discharged NOx with a Nitrate concentration of 2.33 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW2 have ranged from 0.6 mg/L to 21.4 mg/L with an average concentration of 2.39 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD2 range from 0.3 mg/L to 8.2 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for TN for the Wetland discharge indicate a maximum concentration of 18.2 mg/L while maximum TN result recorded at the Leachate Pond was 13.0 mg/L (refer to Table 4.3).

The discharge TN concentration on 6 May 2024 was 4.5 mg/L was below both the RW1 and BSW2 maximum results. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TN concentrations.

TP concentrations recorded at BSW2 have ranged from 0.05 mg/L and 2.61mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring for TP at SD2 ranges from 0.03 mg/L to 0.62 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for the Wetland discharge indicate a maximum concentration of 8.0 mg/L while maximum TP result recorded at the Leachate Pond was 5.5 mg/L (refer to Table 4.3).

The discharge TP concentration of 0.15 mg/L on 6 May 2024 is below the maximum results at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TP concentrations.

The discharge Aluminium concentration of 0.21 mg/L on 3 May 2024 exceeded the trigger value of 0.08 mg/L. Aluminium concentrations recorded at BSW2 have ranged from <0.01 mg/L to 0.15 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Aluminium concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 1.3 mg/L. Routine monitoring results for Aluminium at SD2 range from <0.01 mg/L to 0.35 mg/L for the monitoring period (refer to Table 4.2).

The discharge Aluminium concentration was below the maximum concentration recorded at RW1 and marginally above the maximum concentration recorded BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Aluminium concentrations.

TABLE 4.8: WATER QUALITY SUMMARY FOR DISCHARGE EVENTS FROM SEDIMENT DAM 2 ON 6 MAY 2024

Parameter	Units	Trigger Value	SD2 Discharge	Trigger Value Exceeded
pH	-	6.5 - 8.5	9.96	Yes
EC	µS/cm	125 – 2,200	400	No
TSS	mg/L	-	90	NA
TRH	mg/L	10	<1.0	No
Ammonia as N	mg/L	0.0264	0.04	Yes
Nitrate as N	mg/L	0.44	2.33	Yes
NOx as N	mg/L	0.491	3.13	Yes
TN as N	mg/L	0.645	4.5	Yes
TP	mg/L	0.0168	0.19	Yes
Aluminium[1]	mg/L	0.08	0.21	Yes
Arsenic[1]	mg/L	0.094	0.005	No
Boron[1]	mg/L	0.68	<0.05	No
Cadmium[1]	mg/L	0.0004	<0.0001	No
Chromium III[1,2]	mg/L	0.0033	<0.01	No
Chromium VI[1]	mg/L	0.02	0.03	Yes
Cobalt[1]	mg/L	0.015	<0.001	No
Copper[1]	mg/L	0.02	0.007	No
Lead[1]	mg/L	0.0056	<0.001	No
Nickel[1]	mg/L	0.013	0.001	No
Selenium[1]	mg/L	0.018	<0.01	No

Parameter	Units	Trigger Value	SD2 Discharge	Trigger Value Exceeded
Zinc[1]	mg/L	0.015	<0.005	No

[1] *Results are for dissolved concentrations*

[2] *Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration*

4.3.3 Discharges in July 2024

Water quality samples were collected for discharge events occurring on 3 July 2024 from SD2 and 7 days later on 10 July 2024 from SD2 and the results are presented in Table 4.9 and Table 4.10. Rainfall depths on the day of the discharge event and preceding the discharge event were:

- 46.1 mm on 3 July 2024 the day of discharge.
- 72.1 mm 5 days preceding the discharge on 3 July 2024, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.
- 18.5 mm on 10 July 2024, the day of discharge.
- 99.1 mm 5 days preceding the discharge on 10 July 2024, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.

4.3.3.1 3 July 2024

Discharge water quality results for pH, TSS, Ammonia, Nitrate, NOx, TN, Aluminium, and Chromium exceeded their respective management triggers during the discharge during the discharge from SD2 on 3 July 2024 (refer to Table 4.9). No monitoring was undertaken of the downstream BSW2 location in July 2024.

The pH recorded at BSW2 ranged between 6.8 to 8.3 for the period of monitoring which is generally consistent with the pH range of 6.9 to 8.0 record at RW1. Routine monitoring results for pH at SD2 range from 7.4 to 11.3 for the monitoring period with an average value of 9.1 (refer to Table 4.2) which are both higher than the maximum recorded pre-expansion site pH results (Table 2.3). The pH during the discharge event on 3 July 2024 was 9.91 was higher than pH recorded at both RW1 and BSW2. No monitoring was undertaken of the BSW2 location during the discharge.

The TSS concentrations at BSW2 range from 5 mg/L to 4,570 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TSS concentrations, in the pre-expansion monitoring dataset for RW1 had a maximum of 75 mg/L. Routine monitoring results for TSS at SD2 range from 5 mg/L to 626 mg/L for the monitoring period with an average value of 69 mg/L (refer to Table 4.2).

The discharge TSS concentration of 279 mg/L on 3 July 2024 is above the recorded maximum result at RW1 but below the maximum result at BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TSS concentrations.

The Ammonia concentrations recorded at BSW2 have ranged from <0.005 mg/L to 1.00 mg/L with an average concentration of 0.12 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background ammonia concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 0.05 mg/L. Routine monitoring results for Ammonia at SD2 recorded range from <0.005mg/L to 0.34 mg/L with an average value of 0.09 mg/L. The discharge Ammonia of 0.04 mg/L on 3 July 2024 was below the maximum concentrations recorded at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Ammonia concentrations.

The Nitrate concentrations recorded at BSW2 ranged between <0.005 mg/L to 2.06 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 13.8 mg/L. Routine monitoring results for Nitrate at SD2 range from <0.005 mg/L to 6.04 mg/L for the monitoring period with an average of 1.42 mg/L (refer to Table 4.2). Routine monitoring results for Nitrate at the Leachate Pond indicate a maximum Nitrate concentration of 3.2 mg/L while the Wetland discharge has a maximum of 0.18 mg/L. The discharge NOx concentration of 4.10 mg/L on 3 July 2024 was higher than the maximum concentration of 2.16 mg/L recorded at BSW2, however, lower than the historically recorded RW1 Nitrate concentration of 13.8 mg/L, with Nitrate comprising the majority of the discharged NOx with a Nitrate concentration of 3.57 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW2 have ranged from 0.6 mg/L to 21.4 mg/L with an average concentration of 2.39 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring

dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD2 range from 0.3 mg/L to 8.2 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for TN for the Wetland discharge indicate a maximum concentration of 18.2 mg/L while maximum TN result recorded at the Leachate Pond was 13.0 mg/L (refer to Table 4.3).

The discharge TN concentration on 3 July 2024 was 8.8 mg/L was below both the RW1 and BSW2 maximum results. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TN concentrations.

TP concentrations recorded at BSW2 have ranged from 0.05 mg/L and 2.61mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring for TP at SD2 ranges from 0.03 mg/L to 0.62 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for the Wetland discharge indicate a maximum concentration of 8.0 mg/L while maximum TP result recorded at the Leachate Pond was 5.5 mg/L (refer to Table 4.3).

The LOR (0.20 mg/L) for TP for the discharge sample on 3 July 2024 was greater than the TP trigger value of concentration of 0.0168 mg/L and therefore, it is unclear of the trigger values was actually exceeded. It is noted that a TP concentration of 0.20 mg/L is below the maximum recorded values at both RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TP concentrations.

The discharge Aluminium concentration of 0.11 mg/L on 3 July 2024 exceeded the trigger value of 0.08 mg/L. Aluminium concentrations recorded at BSW2 have ranged from <0.01 mg/L to 0.15 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Aluminium concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 1.3 mg/L. Routine monitoring results for Aluminium at SD2 range from <0.01 mg/L to 0.35 mg/L for the monitoring period (refer to Table 4.2).

The discharge Aluminium concentration was below the maximum concentrations recorded at RW1 and BSW2. Further, the discharge Aluminium concentration was below the 80% LOSP DGV of 0.15 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Aluminium concentrations.

The discharge Chromium VI concentration of 0.03 mg/L on 3 July 2024 marginally exceeded the trigger value of 0.02 mg/L. Chromium VI concentrations recorded at BSW2 have ranged from <0.001 mg/L to 0.100 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Chromium IV concentrations in the receiving environment, however, elevated Chromium VI concentrations were not evident in the pre-expansion monitoring results for RW1 which had a maximum result 0.002 mg/L. Routine monitoring results for Chromium VI at SD2 range from <0.001 mg/L to 0.037 mg/L for the monitoring period (refer to Table 4.2).

The discharge Chromium VI concentration was below the maximum concentrations recorded at BSW2. Further, the discharge Chromium VI concentration was below the 80% LOSP DGV of 0.04 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Chromium VI concentrations.

TABLE 4.9: WATER QUALITY SUMMARY FOR DISCHARGE EVENT FROM SEDIMENT DAM 2 ON 3 JULY 2024

Parameter	Units	Trigger Value/Range	SD2 Discharge	Trigger Value Exceeded
pH	-	6.5 - 8.5	9.91	Yes
EC	µS/cm	125 – 2,200	440	No
TSS	mg/L	-	279	NA
TRH	mg/L	10	<1.0	No
Ammonia as N	mg/L	0.0264	0.04	Yes
Nitrate as N	mg/L	0.440	3.57	Yes

Parameter	Units	Trigger Value/Range	SD2 Discharge	Trigger Value Exceeded
NOx as N	mg/L	0.491	4.1	Yes
TN as N	mg/L	0.645	8.8	Yes
TP	mg/L	0.0168	<0.20	Yes
Aluminium[1]	mg/L	0.080	0.11	Yes
Arsenic[1]	mg/L	0.094	0.01	No
Boron[1]	mg/L	0.68	0.05	No
Cadmium[1]	mg/L	0.0004	<0.0001	No
Chromium III[1]	mg/L	0.0033	0.002	No
Chromium VI[1]	mg/L	0.02	0.03	Yes
Cobalt[1]	mg/L	0.015	0.001	No
Copper[1]	mg/L	0.02	0.007	No
Lead[1]	mg/L	0.0056	<0.001	No
Nickel[1]	mg/L	0.013	0.002	No
Selenium[1]	mg/L	0.018	<0.01	No
Zinc[1]	mg/L	0.015	<0.005	No

[1] *Results are for dissolved concentrations*

[2] *Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration*

4.3.3.2 10 July 2024

Discharge water quality results for pH, TSS, Ammonia, Nitrate, NOx, TN, TP, and Chromium exceeded their respective management triggers during the discharge from SD2 on 10 July 2024 (refer to Table 4.10).

The pH recorded at BSW2 ranged between 6.8 to 8.3 for the period of monitoring which is generally consistent with the pH range of 6.9 to 8.0 record at RW1. Routine monitoring results for pH at SD2 range from 7.4 to 11.3 for the monitoring period with an average value of 9.1 (refer to Table 4.2) which are both higher than the maximum recorded pre-expansion site pH results (refer to Table 2.3). The pH during the discharge event on 6 May 2024 was 9.96 was higher than pH recorded at both RW1 and BSW2. No monitoring was undertaken of the BSW2 location during the discharge. The discharge pH of 8.89 was approximately 10 times lower (pH is a logarithmic scale) on 10 July 2024 compared to the discharge 7 days earlier indicating the effects of dilution from ongoing rainfall but was higher than the maximum pH recorded at RW1 and BSW2.

The TSS concentrations at BSW2 range from 5 mg/L to 4,570 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TSS concentrations, in the pre-expansion monitoring dataset for RW1 had a maximum of 75 mg/L. Routine monitoring results for TSS at SD2 range from 5 mg/L to 626 mg/L for the monitoring period with an average value of 69 mg/L (refer to Table 4.2).

The discharge TSS concentration of 65 mg/L on 10 July 2024 was below the maximum result at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TSS concentrations.

The Ammonia concentrations recorded at BSW2 have ranged from <0.005 mg/L to 1.00 mg/L with an average concentration of 0.12 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background ammonia concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 0.05 mg/L. Routine monitoring results for Ammonia at SD2 recorded range from <0.005mg/L to 0.34 mg/L with an average value of 0.09 mg/L.

The discharge Ammonia of 0.19 mg/L on 10 July 2024 was below the maximum concentrations recorded at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Ammonia concentrations.

The Nitrate concentrations recorded at BSW2 ranged between <0.005 mg/L to 2.06 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 13.8 mg/L. Routine monitoring results for Nitrate at SD2 range from <0.005 mg/L to 6.04 mg/L for the monitoring period with an average of 1.42 mg/L (refer to Table 4.2).

Routine monitoring results for Nitrate at the Leachate Pond indicate a maximum Nitrate concentration of 3.2 mg/L while the Wetland discharge has a maximum of 0.18 mg/L. The discharge NOx concentration of 3.52 mg/L on 10 July 2024 was higher than the maximum concentration of 2.16 mg/L recorded at BSW2, however, lower than the historically recorded RW1 Nitrate concentration of 13.8 mg/L, with Nitrate comprising the majority of the discharged NOx with a Nitrate concentration of 2.88 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW2 have ranged from 0.6 mg/L to 21.4 mg/L with an average concentration of 2.39 mg/L for the period of monitoring (refer Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD2 range from 0.3 mg/L to 8.2 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for TN for the Wetland discharge indicate a maximum concentration of 18.2 mg/L while maximum TN result recorded at the Leachate Pond was 13.0 mg/L (refer to Table 4.3).

The discharge TN concentration on 10 July 2024 was 5.2 mg/L was below both the RW1 and BSW2 maximum results. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TN concentrations.

TP concentrations recorded at BSW2 have ranged from 0.05 mg/L and 2.61mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring for TP at SD2 ranges from 0.03 mg/L to 0.62 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for the Wetland discharge indicate a maximum concentration of 8.0 mg/L while maximum TP result recorded at the Leachate Pond was 5.5 mg/L (refer to Table 4.3).

The discharge TP concentration of 0.28 mg/L on 10 July 2024 is below the maximum results at RW1 and BSW2. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TP concentrations.

The discharge Chromium VI concentration of 0.03 mg/L on 10 July 2024 marginally exceeded the trigger value of 0.02 mg/L. Chromium VI concentrations recorded at BSW2 have ranged from <0.001 mg/L to 0.100 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Chromium IV concentrations in the receiving environment, however, elevated Chromium VI concentrations were not evident in the pre-expansion monitoring results for RW1 which had a maximum result 0.002 mg/L. Routine monitoring results for Chromium VI at SD2 range from <0.001 mg/L to 0.037 mg/L for the monitoring period (refer to Table 4.2).

The discharge Chromium VI concentration was below the maximum concentrations recorded at BSW2. Further, the discharge Chromium VI concentration was below the 80% LOSP DGV of 0.04 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Chromium VI concentrations.

TABLE 4.10: WATER QUALITY SUMMARY FOR DISCHARGE EVENT FROM SEDIMENT DAM 2 ON 10 JULY 2024

Parameter	Units	Trigger Value/Range	SD2 Discharge	Comments
pH	-	6.5 - 8.5	8.89	Yes
EC	µS/cm	125 – 2,200	529	No
TSS	mg/L	-	65	NA
TRH	mg/L	10	<1.0	No
Ammonia as N	mg/L	0.0264	0.19	Yes
Nitrate as N	mg/L	0.440	2.88	Yes
NOx as N	mg/L	0.491	3.52	Yes
TN as N	mg/L	0.645	5.2	Yes
TP	mg/L	0.0168	0.28	Yes
Aluminium[1]	mg/L	0.080	0.06	Yes
Arsenic[1]	mg/L	0.094	0.01	No
Boron[1]	mg/L	0.68	<0.05	No
Cadmium[1]	mg/L	0.0004	<0.0001	No
Chromium III[1]	mg/L	0.0033	0.003	No
Chromium VI[1]	mg/L	0.02	0.03	Yes
Cobalt[1]	mg/L	0.015	0.001	No
Copper[1]	mg/L	0.02	0.006	No
Lead[1]	mg/L	0.0056	<0.001	No
Nickel[1]	mg/L	0.013	<0.001	No
Selenium[1]	mg/L	0.018	<0.01	No
Zinc[1]	mg/L	0.015	<0.005	No

[1] Results are for dissolved concentrations

[2] Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration

4.3.4 Discharges in May 2025

Water quality samples were collected for discharge events occurring on 20 May 2025 from SD1, SD2, BSW1 (downstream receiving environment of SD1) and BSW2 (downstream receiving environment for SD2) and the results are presented in Table 4.11 and Table 4.12. Rainfall depths on the day of the discharge event and preceding the discharge event were:

- 17.1 mm on 20 May 2025, the day of discharge.
- 147.1 mm 5 days preceding the discharge on 20 May 2025, exceeding the 90th percentile event of 38.9 mm that the dam was designed to contain.

The 28-days prior to the discharge on 20 May 2025 recorded an extremely high rainfall depth of 400.1 mm.

4.3.4.1 SD1

Discharge water quality results for TN, TP, and Aluminium exceeded their respective management triggers during the discharge during the discharge from SD1 on 20 May 2025 (refer to Table 4.11).

The TN concentrations recorded at BSW1 have ranged from 0.05 mg/L to 12.4 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. The discharge water TN concentration of 1.1 mg/L was within the recorded BSW1 and RW1 range, and the TN concentration recorded at BSW1 on the same day was also 1.1 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TN concentrations.

TP concentrations recorded at BSW1 have ranged from 0.02 mg/L and 6.74 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. The discharge TP exceedance of 0.20 mg/L recorded on 6 April 2024 is significantly below the maximum historical TP at BSW1 and RW1 and as such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW1 with respect to TP concentrations.

The Aluminium concentration of 0.17 mg/L measured in the SD1 spillway and 0.14 mg/L measured at BSW1 during the discharge on 3 July 2024 exceeded the trigger value of 0.08 mg/L. Aluminium concentrations recorded at BSW1 have ranged from <0.01 mg/L to 1.09 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background aluminium concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 1.3 mg/L. Routine monitoring results for Aluminium at SD1 range from 0.04 mg/L to 1.4 mg/L for the monitoring period (refer to Table 4.2).

While the discharge concentration exceeded the management trigger; was below the maximum concentrations recorded at RW1 and BSW1 and only marginally above the 80% LOSP DGV of 0.15 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Aluminium concentrations.

TABLE 4.11: WATER QUALITY SUMMARY FOR DISCHARGE EVENT FROM SEDIMENT DAM 1 ON 20 MAY 2025

Parameter	Units	Trigger Value/Range	SD1 Discharge	BSW1	Trigger value Exceeded
pH	-	6.5 - 8.5	7.8	7.9	No
EC	µS/cm	125 – 2,200	500	480	No
TSS	mg/L	-	84	85	NA
TRH	mg/L	10	0.13	0.13	No
Ammonia as N	mg/L	0.0264	0.008	0.006	No
Nitrate as N	mg/L	0.440	0.17	0.13	No

Parameter	Units	Trigger Value/Range	SD1 Discharge	BSW1	Trigger value Exceeded
NOx as N	mg/L	0.491	0.18	0.17	No
TN as N	mg/L	0.645	1.1	1.1	Yes
TP	mg/L	0.0168	0.2	0.2	Yes
Aluminium[1]	mg/L	0.080	0.17	0.14	Yes
Arsenic[1]	mg/L	0.094	0.003	0.004	No
Boron[1]	mg/L	0.68	0.23	0.23	No
Cadmium[1]	mg/L	0.0004	<0.0001	<0.0001	No
Chromium III[1 2]	mg/L	0.0033	0.003	0.004	No
Chromium VI[1]	mg/L	0.02	<0.005	<0.005	No
Cobalt[1]	mg/L	0.015	<0.001	<0.001	No
Copper[1]	mg/L	0.02	0.006	0.013	No
Lead[1]	mg/L	0.0056	<0.001	0.005	No
Nickel[1]	mg/L	0.013	0.001	0.001	No
Selenium[1]	mg/L	0.018	0.002	0.002	No
Zinc[1]	mg/L	0.015	0.014	0.023	No

[1] *Results are for dissolved concentrations*

[2] *Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration*

4.3.4.2 SD2

Discharge water quality results for pH, TSS, Nitrate, NOx, TN, TP, Aluminium, and Chromium (VI) exceeded their respective management triggers during the discharge during the discharge from SD2 on 20 May 2025 (refer to Table 4.12).

The pH recorded at BSW2 ranged between 6.8 to 8.3 for the period of monitoring which is generally consistent with the pH range of 6.9 to 8.0 record at RW1. Routine monitoring results for pH at SD2 range from 7.4 to 11.3 for the monitoring period with an average value of 9.1 (refer to Table 4.2) which are both higher than the maximum recorded pre-expansion site pH results (Table 2.3). The pH during the discharge event on 6 May 2024 was 9.96 was higher than pH recorded at both RW1 and BSW2. No monitoring was undertaken of the BSW2 location during the discharge. Monitoring of BSW2 was undertaken during the discharge event indicated a pH of 7.6. The discharge pH of 10.0 was on 20 May 2025 was higher than the maximum pH recorded RW1 and BSW2.

The TSS concentrations at BSW2 range from 5 mg/L to 4,570 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TSS concentrations, in the pre-expansion monitoring dataset for RW1 had a maximum of 75 mg/L. Routine monitoring results for TSS at SD2 range from 5 mg/L to 626 mg/L for the monitoring period with an average value of 69 mg/L (refer to Table 4.2).

The discharge TSS concentration of 100 mg/L on 20 May 2025 was above the maximum result at RW1 but below the maximum result at BSW2 with a BSW2 TSS concentration of 75 mg/L during the discharge. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TSS concentrations.

The Nitrate concentrations recorded at BSW2 ranged between <0.005 mg/L to 2.06 mg/L for the period of monitoring (refer Table 4.1) indicating elevated background Nitrate concentrations, that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 13.8 mg/L. Routine monitoring results for Nitrate at SD2 range from <0.005 mg/L to 6.04 mg/L for the monitoring period with an average of 1.42 mg/L (refer to Table 4.2).

Routine monitoring results for Nitrate at the Leachate Pond indicate a maximum Nitrate concentration of 3.2 mg/L while the Wetland discharge has a maximum of 0.18 mg/L. The discharge NOx concentration of 2.50 mg/L on 20 May 2025 was higher than the maximum concentration of 2.16 mg/L recorded at BSW2, however, lower than the historically recorded RW1 Nitrate concentration of 13.8 mg/L, with Nitrate comprising the majority of the discharged NOx with a Nitrate concentration of 1.70 mg/L. The Nitrate and NOx concentrations at BSW2 were 0.096 mg/L and 0.11 mg/L during the discharge event As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Nitrate and NOx concentrations.

The TN concentrations recorded at BSW2 have ranged from 0.6 mg/L to 21.4 mg/L with an average concentration of 2.39 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TN concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.4 mg/L. Routine monitoring results for TN at SD2 range from 0.3 mg/L to 8.2 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for TN for the Wetland discharge indicate a maximum concentration of 18.2 mg/L while maximum TN result recorded at the Leachate Pond was 13.0 mg/L (refer to Table 4.3).

The discharge TN concentration on 20 May 2024 was 3.0 mg/L was below both the RW1 and BSW2 maximum results. The TN concentration at BSW2 during discharge was 1.0 mg/L. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TN concentrations.

TP concentrations recorded at BSW2 have ranged from 0.05 mg/L and 2.61mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background TP concentrations that was also evident in the pre-expansion monitoring dataset for RW1 which had a maximum of 9.6 mg/L. Routine monitoring for TP at SD2 ranges from 0.03 mg/L to 0.62 mg/L for the monitoring period (refer to Table 4.2).

Routine monitoring results for the Wetland discharge indicate a maximum concentration of 8.0 mg/L while maximum TP result recorded at the Leachate Pond was 5.5 mg/L (refer to Table 4.3).

The discharge TP concentration of 0.40 mg/L on 20 May 2025 was below the maximum results at RW1 and BSW2 with a TP concentration of 0.20 mg/L during the discharge. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to TP concentrations.

The discharge Aluminium concentration of 0.15 mg/L on 20 May 2025 exceeded the trigger value of 0.08 mg/L. Aluminium concentrations recorded at BSW2 have ranged from <0.01 mg/L to 0.15 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Aluminium concentrations that were also evident in the pre-expansion monitoring dataset for RW1 which had a maximum result 1.3 mg/L. Routine monitoring results for Aluminium at SD2 range from <0.01 mg/L to 0.35 mg/L for the monitoring period (refer to Table 4.2).

The discharge Aluminium concentration was below the maximum concentrations recorded at RW1 and BSW2 with a BSW2 Aluminium concentration of 0.15 mg/L during the discharge. Further, the discharge Aluminium concentration was equal to the 80% LOSP DGV of 0.15 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Aluminium concentrations.

The discharge Chromium VI concentration of 0.03 mg/L on 20 May 2025 marginally exceeded the trigger value of 0.02 mg/L. Chromium VI concentrations recorded at BSW2 have ranged from <0.001 mg/L to 0.100 mg/L for the period of monitoring (refer to Table 4.1) indicating elevated background Chromium IV concentrations in the receiving environment, however, elevated Chromium VI concentrations were not evident in the pre-expansion monitoring results for RW1 which had a maximum result 0.002 mg/L. Routine monitoring results for Chromium VI at SD2 range from <0.001 mg/L to 0.037 mg/L for the monitoring period (refer to Table 4.2).

The discharge Chromium VI concentration was below the maximum concentrations recorded at BSW2 with a BSW2 concentration of <0.005 mg/L. Further, the discharge Chromium VI concentration was below the 80% LOSP DGV of 0.04 mg/L published in the ANZG 2018. As such, it is considered that the discharge did not result in adverse impacts to receiving waters at BSW2 with respect to Chromium VI concentrations.

TABLE 4.12: WATER QUALITY RESULTS FOR DISCHARGE EVENT FROM SEDIMENT DAM 2 ON 20 MAY 2025

Parameter	Units	Trigger Value/Range	SD2 spillway	BSW2	Trigger Value Exceeded
pH	-	6.5 - 8.5	10	7.6	Yes
EC	µS/cm	125 – 2,200	520	520	No
TSS	mg/L	-	180	100	No
TRH	mg/L	10	0.13	0.13	No
Ammonia as N	mg/L	0.0264	<0.005	0.01	No
Nitrate as N	mg/L	0.440	1.7	0.096	No
NOx as N	mg/L	0.491	2.5	0.11	Yes
TN as N	mg/L	0.645	3.0	1.0	Yes
TP	mg/L	0.0168	0.4	0.2	Yes
Aluminium[1]	mg/L	0.080	0.15	0.15	Yes
Arsenic[1]	mg/L	0.094	0.008	0.003	No
Boron[1]	mg/L	0.68	0.08	0.21	No
Cadmium[1]	mg/L	0.0004	<0.0001	<0.0001	No
Chromium III[1 2]	mg/L	0.0033	<0.001	<0.001	No
Chromium VI[1]	mg/L	0.02	0.03	<0.005	Yes
Cobalt[1]	mg/L	0.015	<0.001	<0.001	No
Copper[1]	mg/L	0.02	0.025	0.014	No
Lead[1]	mg/L	0.0056	0.001	<0.001	No
Nickel[1]	mg/L	0.013	0.003	0.002	No
Selenium[1]	mg/L	0.018	<0.001	0.002	No
Zinc[1]	mg/L	0.015	0.004	0.036	No

[1] Results are for dissolved concentrations

[2] Chromium III speciation was not undertaken, un-speciated Chromium and Chromium VI results have been used to estimate Chromium III concentration

4.4 Discussion

4.4.1 Elevated pH in Discharge

Elevated pH results have been recorded on site in SD1 and SD2 as well as in the discharge water quality results when compared to the pre-expansion baseline water quality data. The following factors are considered as likely contributors to the increase in site water pH:

- Increase in storage and processing of waste concrete.
- Recirculation of runoff from stockpiles of concrete waste and products containing processed concrete waste resulting on cycling up of dissolved species concentrations. Prior to expansion, the site had very limited water storage capacity with the majority of runoff discharging directly off-site.
- Concrete agitators return concrete and washout is not being undertaken in an isolated bunded area resulting in high pH runoff draining directly to sediment dams. The WMS design required concrete agitator washout to occur in an isolated bunded area with reuse of of surplus high pH water to be used directly in products.
- Site personnel indicated that concrete dust may have been used in the construction of SD1 which could contribute to the elevated pH levels.

4.4.2 Elevated Metals in Discharge

Elevated concentrations of dissolved metals were recorded in pre-expansion site water quality results. Ongoing monitoring of dissolved metals in SD1 and SD2 indicates higher concentrations of some dissolved metal species, in particular Aluminium and Chromium VI which were also found to exceed the management triggers in many of the discharges reviewed in this DVMR, i.e.

- Aluminium exceedances were recorded one of the three SD1 discharges and four of five SD2 discharges. Four of the Aluminium exceedances had results equal to or less than the 80% LOSP DGV of 0.15 mg/L published in the ANZG 2018 while the other results were marginally higher.
- Chromium VI exceedances were recorded for all five discharges from SD2 albeit, the exceedances were marginal and the discharge Chromium VI concentrations were below the 80% LOSP DGV of 0.04 mg/L published in the ANZG 2018.

Selenium was also identified as a metal exhibiting a significant increase in concentration when compared to ore-expansion water quality, however, was not found to exceed its respective management trigger during any of the discharges.

The presence of elevated dissolved metals concentrations in the site water is expected given the nature of operations. The increased concentrations of some species may be a consequence of:

- Increase in storage and processing of waste concrete.
- Recirculation of runoff from stockpiles of concrete waste and products containing processed concrete waste resulting on cycling up of dissolved species concentrations. Prior to expansion, the site had very limited water storage capacity with the majority of runoff discharging directly off-site.
- The introduction of a new material known as “Mix 3” (contains approximately 70% steel slag, 25% granulated blast furnace slag and 5% fly ash) for processing may contribute to elevated Chromium VI. While “Mix 3” analysis indicates Chromium content is predominantly Chromium III (i.e. <1.0 mg/kg and Chromium (III) of up to approximately 910 mg/kg), oxidation of Chromium III could result in increased Chromium VI concentrations.
- An increased site water quality dataset exhibiting a broader range of metals concentrations not identified in pre-expansion monitoring.

4.4.3 Elevated Nutrients in Discharge and Green Wastewater Management System

Monitoring records indicate that samples were not collected from the Wetland outlet as the monitoring location was dry on a number of occasions. Ideally the Wetland should be supplied with consistent flows to maintain Wetland health and nutrient removal capacity. The practice of irrigating mulched green waste with runoff captured directly from the Leachate Dam may be the cause, at times, of the drying out of the Wetland rather than climatic conditions.

Further, the WMS design intended for outflows from the Wetland to be transferred to Green Waste area tanks for reuse, therefore limiting the volume of treated leachate draining to SD2. Presently, all treated leachate is draining from the Wetland outlet to SD2 which will contribute to elevated nutrient concentrations in SD2 and subsequently, elevated nutrient concentrations in any discharges from SD2. Given water from SD2 is reused across the site, elevated nutrient concentrations in SD2 are likely to result in runoff with elevated nutrient concentrations draining to SD1.

4.4.4 Sediment Dam Inventory Management

Presently SD inventory is not being managed as per the intent of the WMS design. It has been identified that the import of potable water into SDs is undertaken to ensure supply is available during hot and dry conditions to assist with maintaining environmental controls. However, SDs must be dewatered following rainfall generating rainfall to restore the settling zone capacity for subsequent rainfall events, i.e. the 5 days 90th percentile rainfall event. Maintaining high water inventories in the SDs may have contributed to the frequency and volume of discharges that have occurred to date, however, it is noted that only one discharge occurred where the 5 day rainfall did not exceed the 5 day 90th percentile rainfall event (i.e. on 10 July 2025).

Further, SD1 could not be constructed to achieve the required design capacity for containment of the 5 days 90th percentile rainfall event due to the high groundwater table underlying the site. Captured runoff in SD1 is dewatered to SD2 as there is no direct transfer of water into site water tanks from SD1 and this may have contributed to the more frequent discharges from SD2 for the period that this DVMR has covered.

4.4.5 Monitoring

Section 7.0 of the site WDMP (Umwelt, 2020) has a range of monitoring requirements including the monitoring of water quality (site and receiving waters) dam volumes, reuse volumes and discharge volumes. Presently, thew following monitoring is not being undertaken:

- SD1, SD2 and Leachate dam volume post rainfall event. It is noted that dam staff gauges do not indicate the maximum sediment storage level or freeboard level to maintain to ensure containment of the 5 days 90th percentile rainfall event. While photographs of dam level staff gauges are taken on a monthly the level indicated on the gauge is not used to estimate the volume of water stored on the dam using a stage storage relationship.
- Monthly treated leachate reuse volumes (noting that presently treated leachate drains directly to SD2 rather than being returned to storage tanks for reuse).
- SD1 and SD2 discharge volumes.
- Leachate Dam spill volumes to SD2.

4.4.6 Management Triggers

The management triggers were established for the site are based on the RW1 dataset as well as ANZG 2018 and water quality objectives WQOs from the Lake Macquarie and Tuggerah Lakes catchment. The dataset from RW1 was limited with 7 samples taken, compared to the monitoring of BSW1 and BSW2 having approximately 40 samples. Given downstream receiving water quality has not appreciably changed since the Concrush expansion, and the extensive site and receiving environment dataset now available, a review of the discharge management triggers is considered appropriate.

4.4.7 Management Actions Undertaken

Given there have been exceedances management triggers for more than one parameter on more than one occasion within a 12 month period, implementation of management actions in response to the exceedances was required (refer to Table 2.5). To date the only action Concrush has implemented is to investigate options to increase SD1 storage capacity.

4.5 Recommendations

It is considered that adjusting site water management practices to align with the intended WMS design could assist in limiting the frequency of discharges from SDs, the number of parameters exceeding management triggers and the magnitude of the exceedances. The following recommendations are made with respect to water management:

- Maintain flows through Wetland wherever possible to maintain Wetland health and treatment efficiency.
- Transfer treated leachate from the Wetland outlet to Green Waste area storage tanks for reuse in the green waste processing to limit the amount of elevated nutrient water draining to SD2.
- Mark dam level staff gauges with maximum sediment storage and required freeboard levels.
- Implement spillway level monitoring to enable discharge/spill volume monitoring.
- Manage SD inventory to maintain freeboard to contain runoff from the 5 days 90th percentile rainfall event. This includes limiting imports of potable water into the SDs to ensure freeboard is maintained.
- Complete the investigation into SD1 capacity increase options.
- Isolate concrete agitator washout within a bund and reuse water captured in product as a priority over other water sources.
- Investigate material used in construction of SD1 and whether this is contributing to elevated pH
- Ensure accessibility to monitoring location BSW2 to allow for measurement of the receiving environment during discharge, to quantify effect on the receiving environment

Further to the above recommendations with respect to water management, a review of management trigger values should be undertaken given the extensive receiving water and site water dataset that has been developed since expansion. The review should consider:

- Site water usage and water balance.
- Site water quality.
- Receiving water quality and the existing level of disturbance associated with other operations including the Main Northern Railway and upslope West Wallsend Colliery.

5. QUALIFICATIONS

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