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Tomago Resource Recovery Facility and Truck Parking Depot Water Management Plan

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Contents

1.0 Introduction

1.1 Background

REMONDIS Australia Pty Ltd (REMONDIS) plan to operate a Resource Recovery Facility (RRF) at 21D and 21F School Drive, Tomago, NSW (the Site) in the Port Stephens local government area (LGA). The RRF shall operate under EPL 21636 (NSW EPA, 2022) conditions.

The RRF shall process up to 98,201 tonnes per annum (tpa) of solid and liquid wastes from domestic, commercial, industrial and construction sources (REMONDIS, 2022). As per the Waste Management Plan (Jackson Environment and Planning, 2021), the main waste streams shall include:

- Dry non-putrescible waste materials from commercial and industrial sources;
- Dry mixed building waste (construction waste only) from residential and commercial construction, including office fitouts (no demolition waste);
- Putrescible waste materials from the de-packaging of food, such as drinks and packaged food items; and
- Liquid wastes such as drill muds from hydro-excavation and oily wastes from mining and industrial activities across the region.

A State Significant Development (SSD) application (hereby referred to as 'SSD-10447') for the RRF was approved by the NSW Minister for Planning and Public Spaces and Minister for Transport and Roads on 12 October 2021 (DPIE, 2021). The approved RRF and surrounding context are shown in Figure 1 and Figure 2.

Under the SSD-10477 Development Consent conditions REMONDIS is required to prepare a Water Management Plan (WMP) for the RRF in consultation with the Port Stephens Council (Council) and the NSW Environment Protection Authority (EPA) and to the satisfaction of the Secretary of the Department of Planning and Environment (DP&E). The WMP is required to include a Surface Water Management Plan and a Groundwater Management Plan.

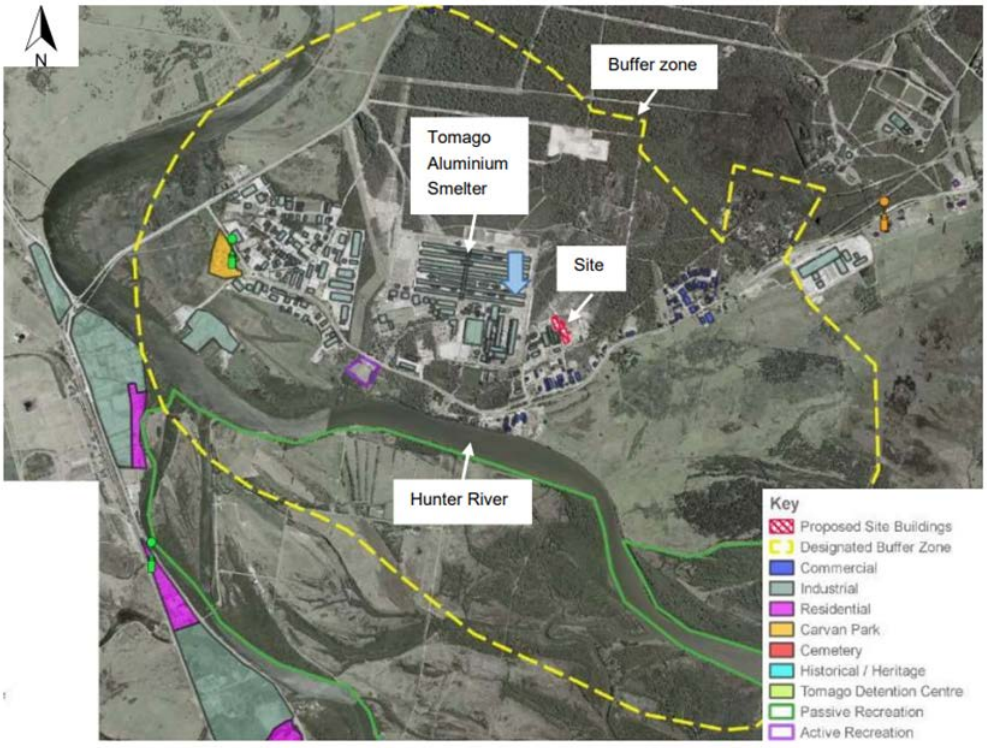

Figure 1 - The Site and surrounding land uses (Source DPIE SSD Assessment SSD-10447)

Figure 2 - The Site (Source DPIE SSD Assessment SSD-10447)

1.2 Purpose and Scope

The purpose of this WMP is to describe the water management strategies, procedures, controls and the monitoring programs that shall be implemented as part of the continued operations at the RRF in accordance with the Environmental Impact Statement (EIS) (Jackson Environment and Planning, 2020), SSD-10447 (DPIE, 2021) and EPL 21636 (NSW EPA, 2022).

The relevant SSD-10477 Development Consent conditions are provided in Table 1. This WMP also outlines the control measures to be implemented as part of the continued operations at the RRF to minimise the potential impacts to the local community from impacts on surface water or groundwater.

1.3 Objectives

The objectives of this WMP include the following:

- Review and summarise background general water management on-site including:
  - Water use, metering and disposal;
  - Number and location of piezometers on site;
  - Water licence requirements; and
  - Wastewater streams;
- Surface water:
  - Based off EPL requirements, develop a surface water impact assessment criterion and identify trigger levels for investigating any potentially adverse surface water impacts;
  - Provide a mechanism to assess monitoring results against the EPL to evaluate compliance;

- Detail the requirement for reporting water quality criteria exceedances to the relevant stakeholders; and
- Review and summarise baseline surface water data and assess impacts on surrounding sensitive receivers and performance against the assessment criteria;

- Develop a program to monitor:
  - Surface water flow and quality;
  - Surface water storage and use; and
  - Detention basin operation;
- Groundwater:
  - Based off EPL requirements, develop a groundwater impact assessment criterion and identify trigger levels for investigating any potentially adverse groundwater impacts;
  - Provide a mechanism to assess monitoring results against the EPL to evaluate compliance;
  - Detail the requirement for reporting water quality criteria exceedances to the relevant stakeholders;
  - Review and summarise baseline groundwater water data and assess impacts on surrounding sensitive receivers and performance against the assessment criteria;
  - Develop a program to monitor (on a monthly basis) groundwater levels and quality on a monthly basis; and
  - Develop a protocol for the investigation and mitigation of identified exceedances of the groundwater impact assessment criteria.

2.0 Regulatory Requirements

2.1 Development Consent

The Development Consent for the Project was granted by the Minister on 12 October 2021. The approved development is described in Schedule 1, the EIS and Response to Submissions (RTS), including the works and activities comprising construction and operation of a resource recovery facility, as modified by the Development Consent conditions of SSD-10477.

The requirement for this WMP arises from Condition 26 of Schedule 2 Part B of SSD-10477. The requirements of the Development Consent relating to the WMP, and where these requirements are addressed within this document, are provided in Table 1.

2.2 Project Description

REMONDIS plan to use the existing industrial buildings and workshop for an RRF and the adjacent vacant lot (Lot 8, DP 270328) for an overnight truck parking depot. The development is located on 4.08 hectares of industrial zoned land and includes:

- On-going groundwater monitoring;
- Remediation as per Section E2.1 of the EPL 21636 (NSW EPA, 2022) for contaminated soil hotspots (see Section 14.4 of the EIS (Jackson Environment and Planning, 2020)) on the Site:
  - Removal of stockpiled wastes and lead impacted soils;
  - Consolidation of zinc impacted soils; and
  - Installation of a geotextile membrane over the truck parking area and implementation of a long-term environmental management plan;
- Installation of waste processing equipment inside the two buildings and construction of a weighbridge, truck parking area, storage tanks and a truck washdown bay; and
- Operation of a resource recovery facility processing mixed recyclable materials, cardboard, drill muds, packaged food, garden organics, hazardous materials, copper and other metals.

Table 1 - SSD-10477 Development Consent Conditions

Development Consent Conditions	Section Addressed
Part B Specific Environmental Conditions Water Management Plan B26 – Prior to the commencement of operation of the development, the Applicant must prepare a Water Management Plan to the satisfaction of the Planning Secretary. The Water Management Plan must form part of the OEMP required by condition C5 and must: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with Council and EPA; (not relevant) (c) provide details of:	Entire WMP Prepared by Eric Wingate, SMEC
(i) water use, metering, disposal and management on-site;	Section 3.2
(ii) the number and location of piezometers on-site;	Section 5.1
(iii) the water licence requirements for the development; and	Section 2.3
(iv) the management of wastewater streams on-site including leachate and fire water;	Section 3.3.1
d) contain a Surface Water Management Plan, including:	Section 4
(i) a program to monitor: - surface water flows and quality; - surface water storage and use; and - detention basin operation;	Section 4.2, 6.1 and 6.3.1, 6.4
(e) contain a Groundwater Management Plan, including:	Section 5
(i) baseline data on groundwater levels and quality;	Section 5.1
(ii) a program to monitor groundwater levels and quality on a monthly basis;	Section 5.2 and 6.2, 6.3.3, 6.4
(iii) groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts; and	Section 6, 6.3.3, 6.4
(iv) a protocol for the investigation and mitigation of identified exceedances of the groundwater impact assessment criteria.	Section 6, 6.2, 6.3.3, 6.4

2.3 Water Licensing

The SSD-10477 Development Consent conditions state:

"B22 – The Applicant must obtain relevant water access licence/s in accordance with the Water Management Act 2000, if the development will intercept groundwater."

REMONDIS does not currently intend to extract groundwater or surface water, therefore do not seek a water licence for this Site. Following a review of previous groundwater contamination assessment reports, groundwater wells in the general vicinity of the main earthworks yielded the provided in Table 2.

Table 2 - Historical Groundwater Well Data (JME, 2021)

Well ID	Top of Case Elevation (mAHD)	Groundwater Depth (mbTOC)	Calculated Groundwater Elevation (mAHD)
MW4	5.07	1.534 – 1.822	3.188 – 3.536
MW6	7.05	2.667 – 3.055	3.995 – 4.383
MW7	6.04	2.199 – 2.542	3.498 – 3.841
MW8	6.13	2.241 – 2.548	3.546 – 3.889
MW9	7.22	2.904 – 3.205	4.015 – 4.316

Note: JME completed two investigations (April 2021 & June 2021), hence the data range for groundwater depth and calculated groundwater elevation. Top of case elevation remains unchanged between investigations.

Based on the works-as-executed (WAE) drawings from the Soil and Water Management Plan (SWMP) (Northrop, 2020) and the data provided in Table 2 that the development does not intercept groundwater and therefore does not trigger condition B22 of SSD-10477 Development Consent conditions.

The Environment Protection Authority (EPA) issues environment protection licences (EPL) to the owners or operators of various industrial premises under the Protection of the Environment Operations Act 1997 (POEO Act).

The Development Consent conditions state:

"B21 - The development must comply with section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an EPL."

REMONDIS applied for an Environmental Protection Licence (EPL) No. 21636, submitting a draft on 14 Dec 2021. The EPL application was approved by the NSW EPA on 24 March 2022.

The application is for, as per Section A1.1 of the EPL (NSW EPA, 2022), the "Construction of a resource recovery facility in accordance with the conditions of consent for SSD-10447 approved by the Director, Industry Assessment for Department of Planning and Environment on 12 October 2021". Section A3 of the EPL states that the licence also applies to waste processing (operational phase).

Groundwater monitoring conditions required by the EPL are provided in Section 5.2.

2.4 Monitoring Standards

Surface and groundwater monitoring at the Site will be undertaken in accordance with the relevant Australian Standards, legislation and EPA approved methods for sampling, including:

- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004);
- AS/NZS 5667.1:1998 Water Quality – Sampling – Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples; and
- AS/NZS 5667.10:1998 Water Quality – Sampling – Guidance on Sampling of Waste Waters.

3.0 General Water Management

3.1 Local Catchments

As per the EIS (Jackson Environment and Planning, 2020), there is no indication that the Site is located in the vicinity of a riparian corridor. Figure 3 shows the nearest riparian corridor approximately 450m south-east of the Site.

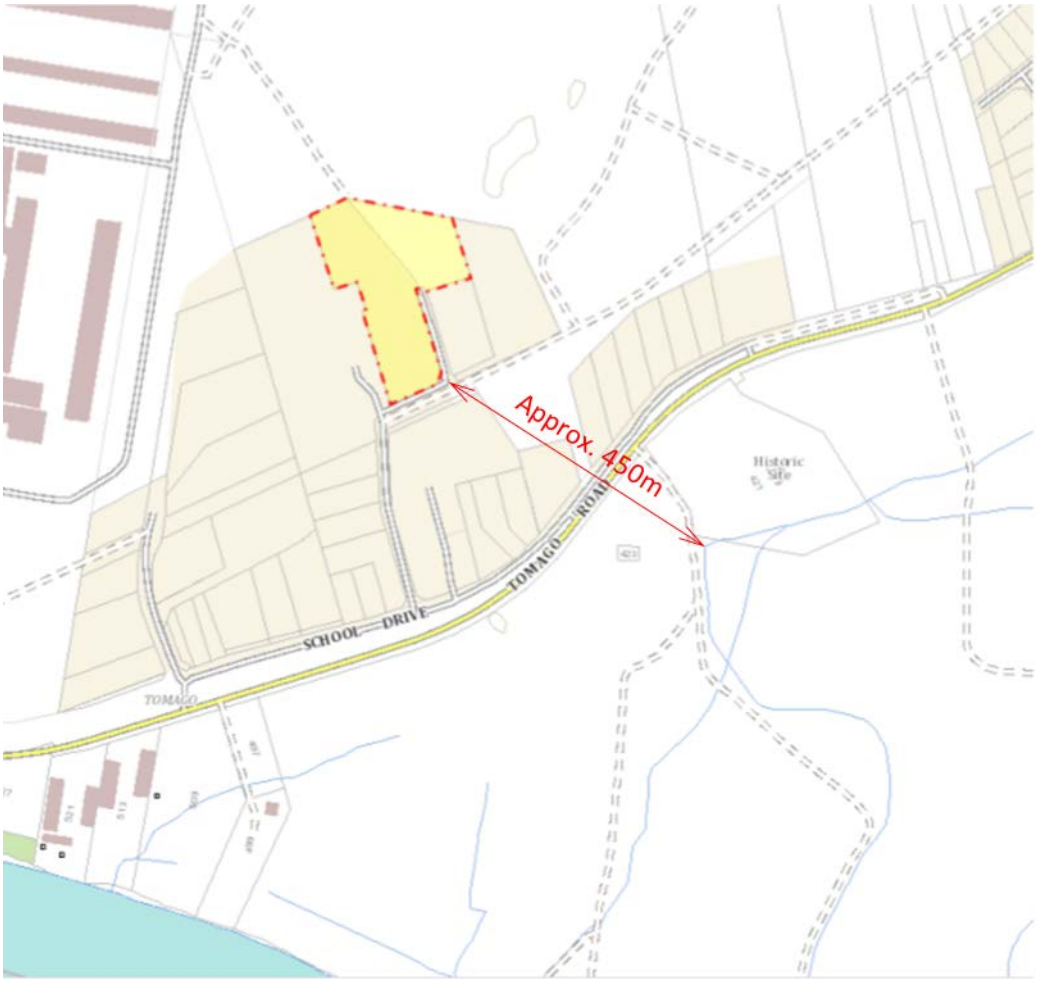

Figure 3 - Screenshot from SIX Maps showing general features around Site (Northrop, 2020)

3.1.1 Tomago Sandbeds Groundwater Catchment

According to Hunter Water's Guidelines for Developing in the Drinking Water Catchments (Hunter Water, 2017), the Tomago Sandbeds catchment supplies up to 20% of the Lower Hunter's total annual consumption, and is also used to:

- Supplement local dams during times of drought or water quality issues;
- Defence facilities;
- Agriculture; and
- Urban areas.

A significant proportion of this area is protected land, the majority comprising formally gazetted reserves managed by the NSW National Parks and Wildlife Service.

As per Section 11.2 in the EIS (Jackson Environment and Planning, 2020), the RRF Site is located 650m from the nearest Tomago Sandbeds groundwater catchment. Figure 4 illustrates the location of the RRF in relation to the Tomago Sandbeds.

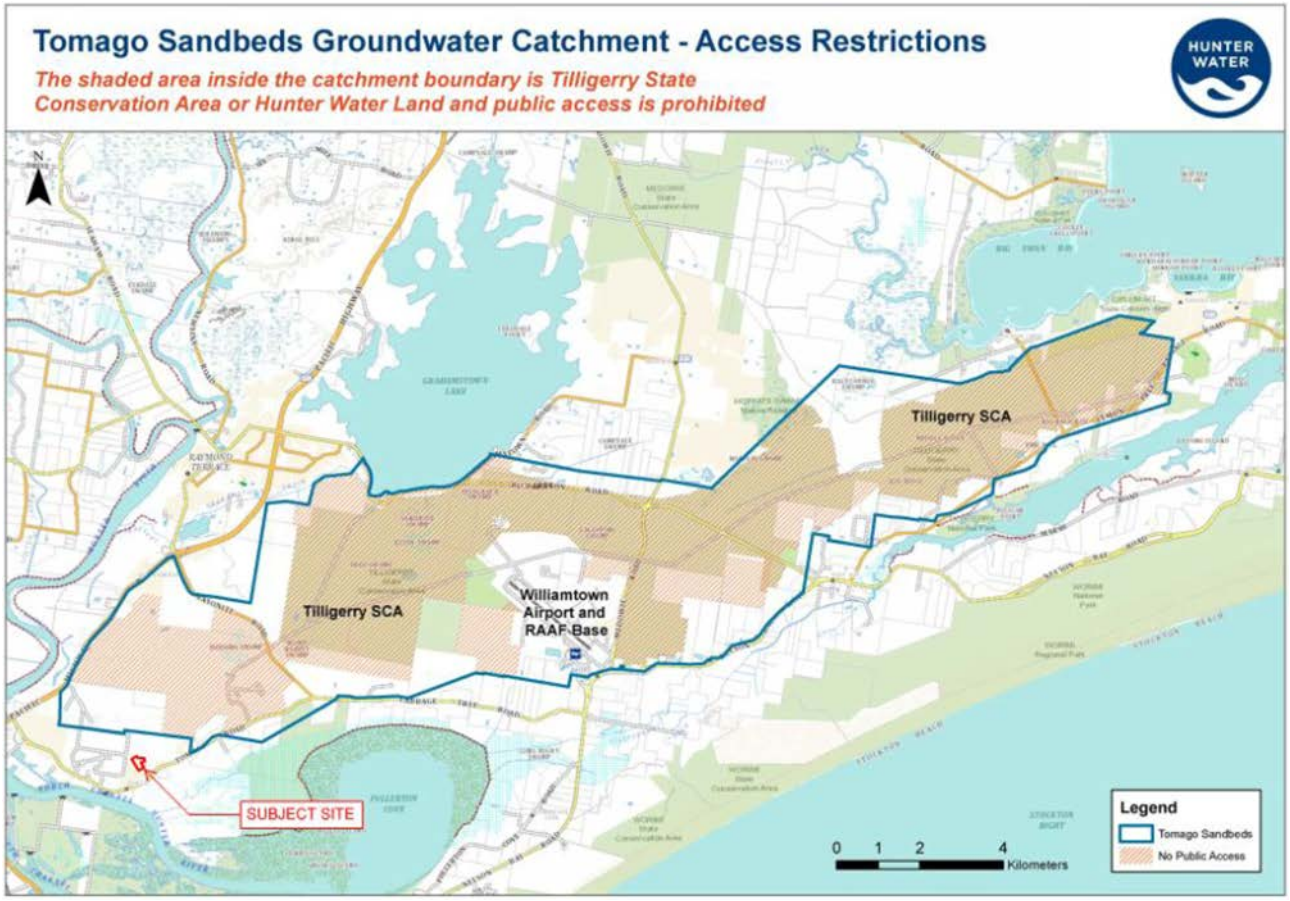

Figure 4 - Tomago Sandbeds Drinking Catchment (Jackson Environment and Planning, 2020)

Section 2.4 of the SWMP (Northrop, 2020) confirms that all waste material handling will be undertaken in a protected indoor environment that will prevent any potential pollutants from entering the stormwater system. Proprietary treatment devices described in Section 3.2 of this report will be utilised to treat runoff for pollutants typically generated by civil works / industrial developments.

3.2 Existing Water Management System

21D School Drive

As per the WAE drawings (Northrop, 2020), the existing stormwater management network at 21D School Drive includes:

- Three below ground on-site detention (OSD) / infiltration tanks capturing surface runoff. As per the SWMP Addendum report (Northrop, 2021), detention was provided by infiltration tanks to limit post-development peak flow to zero for all storm events up to the 1% AEP.
- A pit and pipe network leading to the OSDs, including secondary and tertiary proprietary treatment devices treating runoff prior to entering the OSDs (Jackson Environment and Planning, 2020):
  - Humeceptor STC-5 – This system utilises hydrodynamic and gravitational separation to effectively remove total suspended solids and entrained hydrocarbons from runoff; and
  - Humes Jellyfish HF-1800 – This system utilises filtration membrane to remove floatables, litter, oil, debris, total suspended solids, silt sized particles and a high percentage of particulate-bound pollutants including phosphorous, nitrogen, metals and hydrocarbon;

- Two 100kL rainwater reuse tanks which are fed by the roofs of the two main buildings (buildings 1 and 2); and
- Two discharge points for clean stormwater – 2x underground stormwater pipe crossings grading from north to south across School Drive (see Figure 5). Topography beyond these discharge points is relatively flat; however, it is assumed stormwater discharging from these pipes then drains generally towards the east / south-east whilst infiltrating into the sandy natural ground and migrating towards the Hunter River.

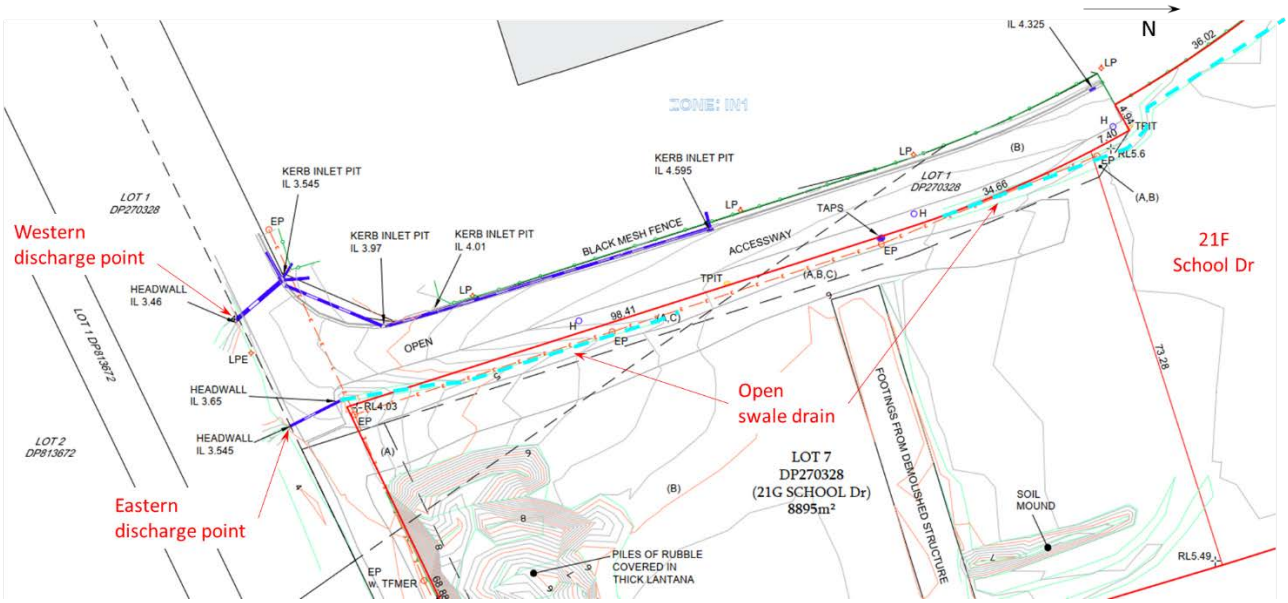

Figure 5 - Two clean water discharge points shown on Survey Plan (Tony Mexon & Associates, 2020)

Additional details regarding existing water management infrastructure can be found in Appendix A (Internal Civil Works Plan) and Appendix B (Survey Plan).

21F School Drive

The existing stormwater system at 21F School Drive consists of:

- A pit and pipe network with the hardstand area graded to fall towards surface inlet pits (see drawing C3.3 of the Internal Civil Works Plan). The pits will be fitted with filter inserts and an oil absorbent pillow to capture and prevent gross pollutants from entering the stormwater system.
- A subsoil network of impermeable lining material and subsoil drains that divert runoff into the stormwater pits, preventing pollutants from infiltrating into the natural soils;
- A low flow bypass diversion pit containing six 460PSORB Ocean Protect Filter Cartridges to remove fine sediment and nutrients including phosphorous and nitrogen;
- A high flow bypass enabling the system to provide the required treatment for minor storm events without affecting the hydraulic performance for the more extreme rainfall events;
- A 100m^3 OSD / 120m^2 infiltration area on the north-eastern boundary of the site utilising void forming storage units wrapped in permeable geotextile allowing infiltration of stormwater into the natural soils at the base of the tank; and
- A 100mm high, 500mm wide, approx. 60m long level spreader mound along the north-eastern boundary shall disperse water overtopping water from the proposed OSD to mimic natural flow regime and reduce scour.

As discussed in Section 3.1, all waste material handling (including the truck washdown bay) shall be undertaken in a protected environment (sheltered, bunded, etc.) that will prevent any potential pollutants from entering the stormwater system. Therefore, it is understood that additional 'dirty' water infrastructure shall not be required as part of the operational stormwater system as the Site

will only produce 'clean' stormwater runoff. Additional information on leachate, fire water sewer management and the truck washdown bay is provided in Section 3.3.1.

Additional details regarding proposed water management infrastructure can be found in Appendix A.

3.2.1 Wastewater Management

Leachate, Firewater & Oil Spill Management

As previously mentioned, all waste material handling (including the truck washdown bay) shall be undertaken in a protected environment (sheltered, bunded, etc.) that will prevent any potential pollutants from entering the stormwater system. As per the Fire Safety Study (FSS) (ACOR, 2020) and the National Construction Code (NCC) requirements, in the event of a fire in a warehouse, water shall be applied from two hydrants [2 x 600L/min] for a minimum of 20 minutes and a minimum 1080L/min shall be applied to an area of 216m^2 (18 sprinklers) for a minimum of 72 minutes. This results in an estimated storage requirement of 51kL (50% evaporation rate applied to 102kL) of contaminated firefighting water in each building. Therefore, each of the main buildings (Buildings 1, 2 and 3) have internal concrete bunds (and trafficable bunds at building exits / entrances) to contain any leaks, spills or fire water within them:

- Building 1 – floor area of 5325m^2, depth of 51m^3 equal to minimum 10mm bund wall around the inside perimeter of the building and at each building exit;
- Building 2 – floor area of 3239m^2, depth of 51m^3 equal to minimum 16mm bund wall around the inside perimeter of the building and at each building exit; and
- Building 3 has no specific firefighting requirements. However, it is assumed that 1 x fire hose reel will operate for 20 minutes, generating 270 litres (50% evaporation rate applied to 540 litres) of firewater. This will require a 5 mm bund wall around the inside perimeter of the building and at each building exit.

Firewater and contaminated wash water will be contained within the bunded areas of the buildings and sampled for testing at a NATA certified laboratory.

In addition, a vehicle washdown bay is proposed to be located min. 6m (due to fire risks) east of the outer wall of building 1. The washdown bay shall be sheltered with a canopy to reduce contaminated runoff volumes, while trafficable bunding will ensure any contaminated water from truck wash downs is captured. As per the SWMP Addendum Report (Northrop, 2021), run-off from the truck wash will be collected by existing floor sumps that will drain the water to a pit in the shed on the northern side of the maintenance workshop. Collected water will be treated in an oil and water separator and pumped to a 10kL holding tank also located nearby. The tank will be periodically pumped out, with treated water sent for off-site recycling in accordance with REMONDIS' existing Tankering Agreement with Hunter Water. Wastewater, which may contain small amounts pollutants from the waste material handled by the trucks will be stored and transported off-site as trade waste to be treated and disposed at a licenced facility. Figure 6 provides an indicative layout for the Truck Wash Bay.

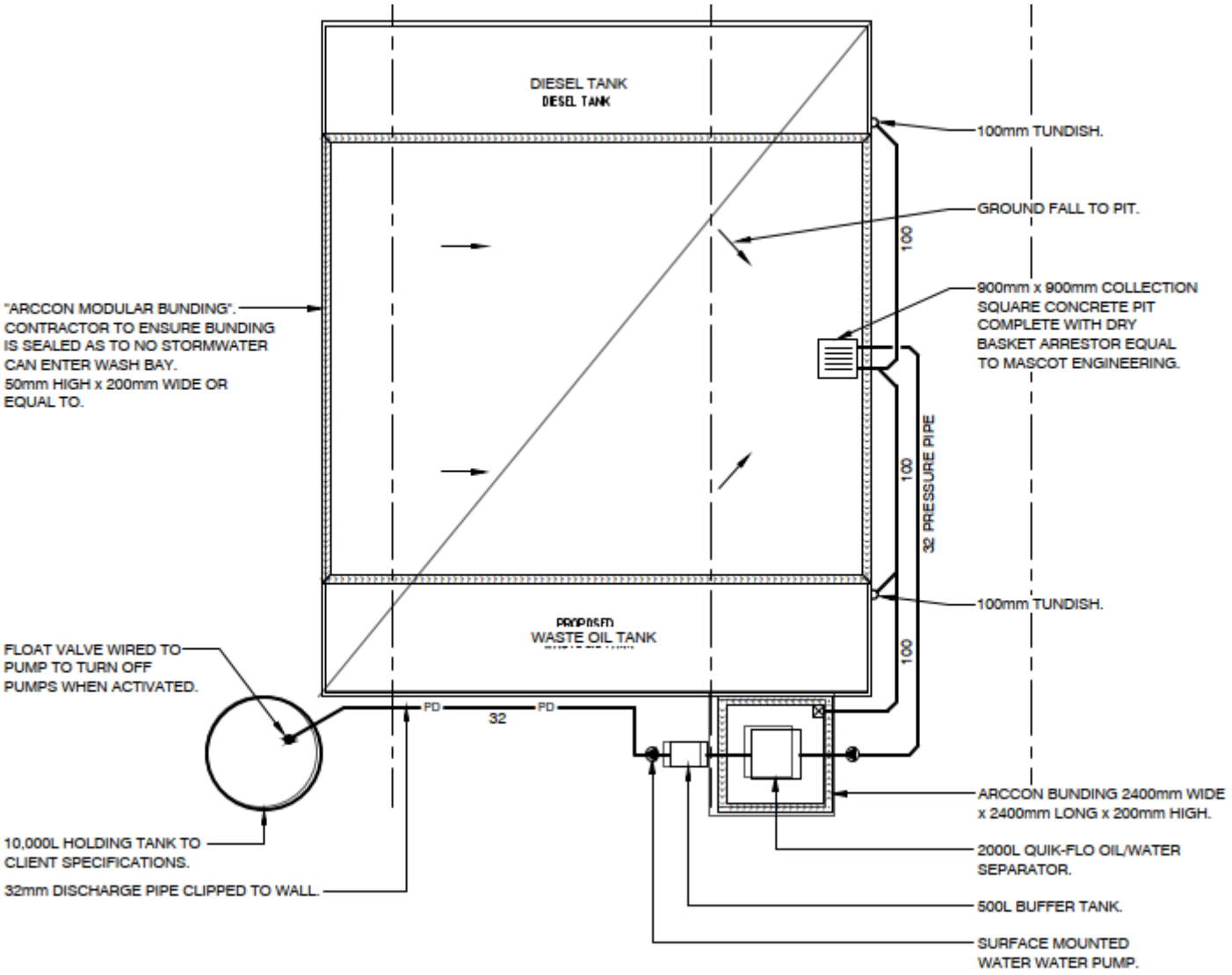

Figure 6 - Proposed Wash Bay layout (Northrop, 2021)

Receival of Drill Mud

As per the SWMP Addendum Report (Northrop, 2021), the Soil and Water Management Plan indicated that the waste processing system does not require water demand, however wastewater is generated from the extraction of the drill muds at the Drill Mud Recycling Facility. This generated wastewater (estimated to be 5,000 tpa) is then exported off-site to a Hunter Water treatment facility for disposal as trade waste as per the Waste Management Plan (Jackson Environment and Planning, 2021).

Sewer Management

The Development Consent conditions state:

"B25 – "Prior to the commencement of operation, the Applicant must obtain approval from Council under Section 68 of the Local Government Act 1993 for use of the on-site sewage management system for the development. The Applicant must provide a report from a suitably qualified consultant demonstrating the existing on-site sewage management system complies with the requirements of Port Stephens Development Assessment Framework."

As per the SWMP (Northrop, 2020), the site is currently serviced by an Envirocycle M23 on-site sewer treatment system. AWTS Maintenance Services Pty Ltd performed a condition assessment of the existing sewer and advised that the system was found to be in reasonable condition and provided recommendations to replace or repair broken or failed components.

The system has a treatment capacity of 4.5-5kL/day with a 1L/s peak treatment rate. Treated water is then stored onsite in a separate holding tank and periodically taken offsite via a pump-out truck. No on-site disposal methods are currently utilised for the existing development, and there are no proposals to utilise onsite disposal for the proposed development.

Additional details were provided in the SWMP Addendum Report, following a request from PSC. As per the SWMP Addendum Report (Northrop, 2021), the Site previously employed a total of 119 employees. The proposed development will employ a total of 76 employees over varying shifts. Daily inflows were estimated to be 50L per person per day, resulting in 3.8kL/day (<4.5-5kL/day) for 76 people.

Should it be observed that the system is undersized, there are a number of options to augment the existing system. This can be achieved by providing additional onsite storage tanks for the temporary storage of pre and post treatment water, or by increasing the frequency of which the treated sewage is removed from site.

3.2.2 Water Use

The Internal Civil Works Plan (Northrop, 2020) shows the Site currently has two 100kL rainwater reuse tanks fed by the roofs of the two main buildings. According to the SWMP (Northrop, 2020), rainwater collected in these reuse tanks will be harvested and used for toilet flushing. It was estimated that the demand for water reuse would be approx. 1.82kL/day. Captured roof water may also be reused for alternative water demands including irrigation or hardstand washdown.

A Site water balance was also completed as part of the SWMP (Northrop, 2020). Figure 7 summarises the findings of this water balance.

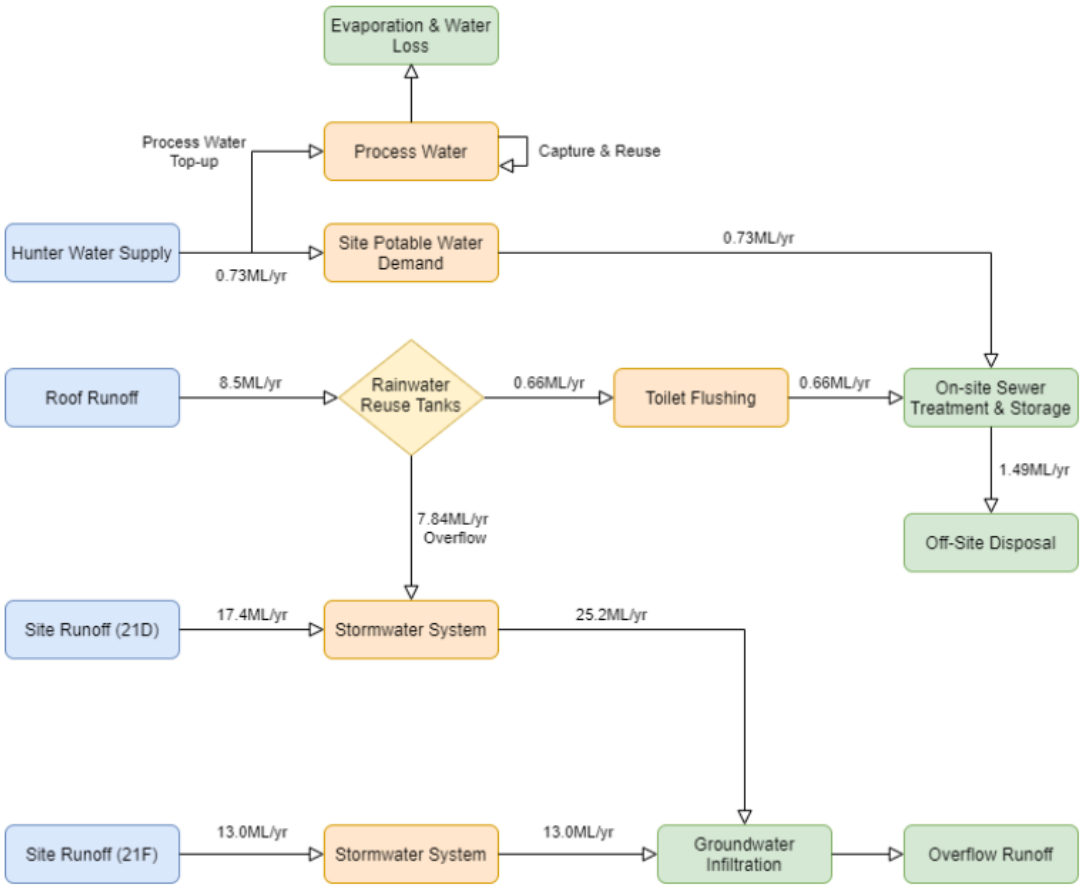

Figure 7 - Site water balance (Northrop, 2020)

It is anticipated that the existing 150mm Hunter Water main will provide sufficient potable water supply to meet the demands on site, including the requirement to maintain an instantaneous flow of 20L/s for firefighting purposes.

4.0 Surface Water Management Plan

The Development Consent conditions state:

"B26 – The Water Management Plan must form part of the OEMP required by condition C5 and must…

d) Contain a Surface Water Management Plan, including;
- *i. A program to monitor:*
- *ii. Surface water flows and quality;*
- *iii. Surface water storage and use; and*
- *iv. Detention basin operation;"*

4.1 Surface Water Baseline Data Summary

Council's Development Control Plan (DCP) (PSC, 2014) requirements and current industry practice is to achieve a percentage reduction in pollutant generated loads (see Table 3).

As discussed in the SWMP Addendum Report (Northrop, 2021), in order to monitor the effectiveness of the upstream controls, sampling of the runoff generated by the development would need to be taken at locations prior to treatment and at the discharge outlet at regular intervals. With post-development stormwater runoff being minimal as per Table 2 of the SWMP Addendum Report (Northrop, 2021) and also treated via the proposed OSD and other infrastructure, no runoff is expected or necessary for frequent storm events.

A MUSIC model (Version 6) was produced as part of the SWMP (Northrop, 2020), to assess the performance of the additional stormwater treatment infrastructure to be installed as part of the proposed development. Results for the modelling are provided in Table 3.

Table 3 - MUSIC Modelling Results (Northrop, 2020)

Pollutant Criteria	Reduction Target[1] (%)	Sources (kg/yr)	Residual Load (kg/yr)	Achieved Reduction (%)
Total Suspended Solids (TSS)	90	4,120	297	92.8
Total Phosphorous (TP)	60	1.87	0.65	65.2
Total Nitrogen (TN)	45	7.58	4.05	46.5
Gross Pollutants	90	4.76	0	100

1. *Reduction targets are as per Schedule E1 of PSC's DCP requirements.*

Table 3 shows that the proposed stormwater quality management strategy will achieve the required load reduction targets.

4.2 Surface Water Monitoring Program

As per the SWMP Addendum Report (Northrop, 2021), infrequent extreme rainfall events will likely produce minimal runoff at discharge locations, therefore concentrations of pollutants will be minimal potentially negating the effectiveness of the surface water sampling.

- On-Site Detention Basin Operation

As mentioned in Section 3.3, the proposed 100m^3 OSD / 120m^2 infiltration area on the north-eastern boundary of the Site utilises void forming storage units (Atlanta Flo-Tanks) wrapped in permeable geotextile allowing infiltration of stormwater into the natural soils at the base of the tank. Maintenance and use of the OSD shall be in accordance with local standards, the regulatory authority and AS/NZS 3500 (Plumbing and Drainage). Specific maintenance needs of the system may be identified as required by design and manufacturers specifications, and maintenance schedules adjusted and approved by the authorized engineer to suit requirements.

5.0 Groundwater Management Plan

The Development Consent conditions state:

"B26 – The Water Management Plan must form part of the OEMP required by condition C5 and must…

e) Contain a Groundwater Management Plan, including:
- *i. Baseline data on groundwater levels and quality;*
- *ii. A program to monitor groundwater levels and quality on a monthly basis;*
- *iii. Groundwater impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts; and*
- *iv. A protocol for the investigation and mitigation of identified exceedances of the groundwater impact assessment criteria."*

5.1 Groundwater Context and Baseline Data Summary

5.1.1 Regional Groundwater Bores

WaterNSW has an online search engine / map that makes real time data and groundwater bore summaries accessible to the public. A search in the general area of the RRF found that there were five registered bores on the Site, and fifteen within 1km of the site (see Figure 8).

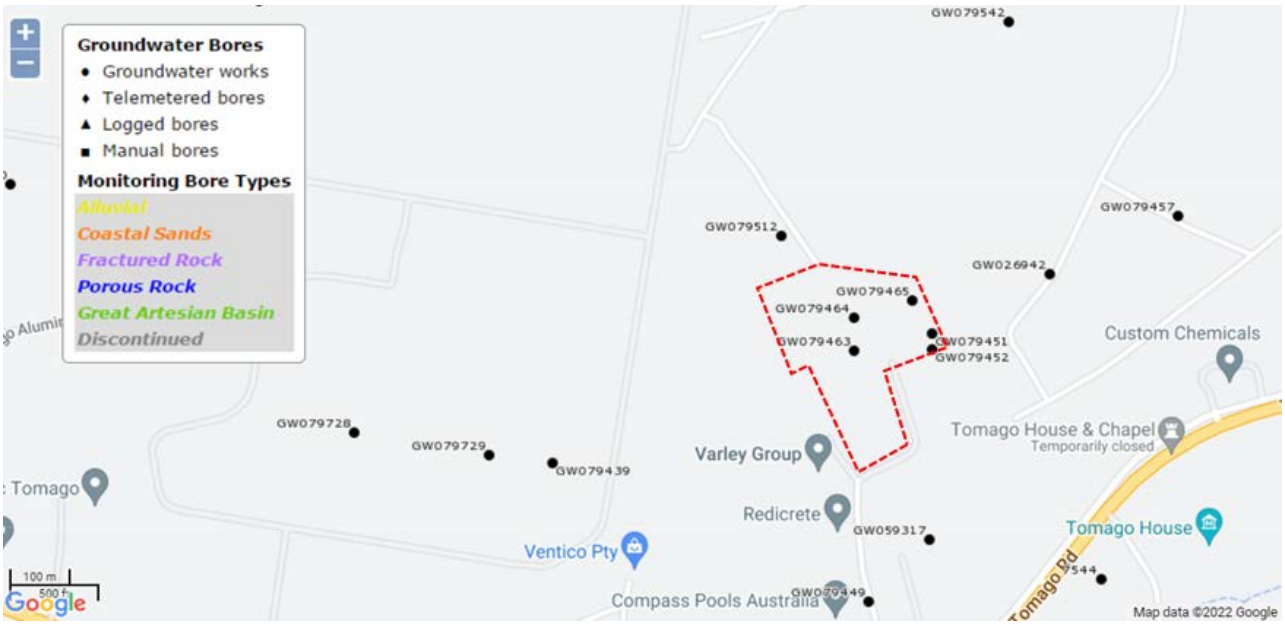

Figure 8 - Regional groundwater bore locations in the general area of the Site (WaterNSW)

Following a review of the real time data available on WaterNSW, limited useful data is available for bores within the general area of the Site.

5.1.2 On-Site Groundwater Monitoring Bore Locations

Following a SMEC Site inspection, it was confirmed that there is a total of seven (7) active groundwater monitoring bores that have not been impacted by the development:

- MW4 and MW5 – located on the southern end of the Site boundary near the existing light vehicle carpark and heavy vehicle exit (21D School Drive);

- MW6 – located outside of the Site boundary immediately north of Building 2 (21D School Drive);
- MW7 and MW8 – located on the southwestern boundary of the Site (21F School Drive). MW8 sits outside the Site boundary;
- MW9 – located immediately north of Building 2 (21D School Drive); and
- MW10 – located in the paved area between Buildings 1, 2 and 3 (21D School Drive).

There are no piezometers permanently installed on Site, however the monitoring well locations are sampled monthly by an appropriately qualified third party. Figure 9 shows the approximate locations of the groundwater monitoring wells on Site.

Figure 9 - Groundwater monitoring well locations (Google Earth, 2022)

5.1.3 Baseline Data Summary

Historically, groundwater monitoring at the RRF was undertaken by JM Environmental. Groundwater levels and quality was monitored on two occasions – 13th April 2021 and 11th June 2021.

Field Analysis

A summary of maximum, average and minimum groundwater levels at the existing seven monitoring locations for the two rounds of monitoring are provided in Table 4. Groundwater quality results are summarised in Table 7 and Table 8.

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Table 4 - Groundwater well level monitoring summary (JM Environments, 2021)

GW Well Location	GW Well Coordinates (Zone, Easting Northing)	Top of Case Elevation (mAHD)	Ave. Groundwater Depth (m)	Max. Elevation (mAHD)	Ave. Elevation (mAHD)	Min. Elevation (mAHD)
MW4	56H, 381033, 6367134	5.07	1.708	3.536	3.362	3.188
MW5	56H, 381089, 6367094	5.19	1.778	3.554	3.412	3.270
MW6	56H, 380931, 6367399	7.05	2.861	4.838	4.416	3.995
MW7	56H, 381085, 6367166	6.04	2.371	3.841	3.670	3.498
MW8	56H, 381108, 6367235	6.13	2.413	3.889	3.718	3.546
MW9	56H, 381110, 6367283	7.22	3.055	4.316	4.166	4.015
MW10	56H, 381010, 6367258	N/A[1]	1.786	N/A[2]	N/A[2]	N/A[2]

Coordinates are Map Grid of Australia (MGA) - Zone 56, MGA Coordinates are based on GDA2020 "Grid", and based around SSM97084 E:380715.628 N:6366667.408, Origin of Levels: SSM97084 RL 3.271, Levels are on Australian Height Datum (AHD), Combined Scale Factor: 0.999771 as at 19-04-2021

1. *Top of case elevation not measured by JM Environmental.*
2. *Groundwater elevation not calculated by JM Environmental.*

Table 5 - Groundwater well physical properties summary (JM Environments, 2021)

Bore Location	Date Monitored	pH	Dissolved Oxygen (ppm)	Electrical Conductivity (µS/cm)	Redox Potential (mV)	Temperature (°C)
MW4	13/04/2021	6.45	0.25	630	-149	23.5
	11/06/2021	5.07	0.16	360	-24.9	21.4
MW5	13/04/2021	6.78	0.98	617	-180	22.3
	11/06/2021	5.19	0.60	271	45.8	19.9
MW6	13/04/2021	5.15	8.73	94.4	-118	20.9
	11/06/2021	7.05	7.40	96.6	165.2	18.9
MW7	13/04/2021	5.96	2.02	244	-148	22.6
	11/06/2021	6.04	0.17	179	16.1	20.4
MW8	13/04/2021	5.67	2.16	224	-150	22.5
	11/06/2021	6.13	1.56	149.6	123	19.6
MW9	13/04/2021	5.73	2.45	200	-148	22.8
	11/06/2021	7.22	2.87	165.9	106	22.8
MW10	13/04/2021	6.02	1.37	242	-44.2	19.5

Laboratory Analysis

Laboratory results from groundwater monitoring wells compared with adopted default guideline values (DGV) and reporting limits. To summarise the Groundwater Contamination Assessment Report (JM Environments, 2021):

- BTEX, TRH and PAH were not detected at concentrations above the laboratory LOR;
- CHCs were not detected at concentrations above the laboratory LOR, with the exception of chloroform in MW5 on 13th April 2021. This was detected at 0.9µg/L, which is significantly lower than the DGV (270µg/L);
- Several PFAS compounds were detected in samples collected from both monitoring rounds:
  - The PFAS fingerprint in the samples collected from MW4, MW5, MW7 and MW8 appeared similar in the makeup of compounds and their concentrations;
  - PFOS was detected at concentrations above the NEMP 2.0 99% ecological protection value (0.00023µg/L) for MW4, MW5, MW7 and MW8 in the first monitoring round and in MW4, MW5, MW7, MW8, MW9 and MW10 in the second monitoring round;
  - The sum of PFOS and PFHxS was detected at concentrations above the adopted DGV (0.07µg/L) for MW4 in the second monitoring round; and
  - PFOA was detected at concentrations below the adopted DGV (0.56µg/L) in monitoring wells MW4, MW5, MW7 and MW8 in both monitoring rounds and MW10 in the second monitoring round;
- Fluoride was detected in monitoring wells MW4, MW5, MW6, and MW9 at concentrations below the adopted DGV (15mg/L) in the first monitoring round. Fluoride was not sampled for in the second monitoring round;
- Where arsenic, cadmium, nickel, lead and mercury were detected at concentrations above the laboratory detection limit, concentrations were still below the adopted DGVs; and
- The following metals were detected in some samples at concentrations which exceeded adopted DGVs:
  - Aluminium was detected at concentrations significantly greater than the adopted DGV (55µg/L) in the each of the monitoring wells sampled;
  - Copper was detected exceeding the adopted DGV (1.3µg/L) in monitoring wells MW4, MW5 and MW7 in the first monitoring round;
  - Chromium was detected exceeding the adopted DGV (4.4µg/L) in MW6 in both monitoring rounds; and
  - Zinc was detected in monitoring wells MW4, MW7 and MW8 in the first monitoring round only and monitoring well MW5 in both monitoring wells.

Appendix C provides tabulated laboratory results for each round of monitoring.

As discussed in the Groundwater Contamination Assessment Report (JM Environmental, 2021), fluoride and aluminium concentrations were largest in the upgradient (northern) wells. Aluminium concentrations were 160 times greater than the adopted trigger value in monitoring well MW9 and 129 greater in monitoring well MW6. It is understood that this is due to the Site sitting within the Tomago Aluminium Company (TAC) buffer zone. Concentrations appeared to diminish the further away from TAC the groundwater well was located.

Aluminium is considered to be highest ecological risk to down gradient receptors, and fluoride concentrations exceed the drinking water guidelines in some wells. JM Environments recommended:

- No remedial action is required due to the ongoing operation of the TAC leading to continual contamination; and
- The drinking of groundwater should be strictly prohibited on site.

5.2 Groundwater Monitoring Program

As previously mentioned, the Development Consent conditions for the RRF require a program to monitor groundwater levels and quality on a monthly basis. The EPL 21636 (NSW EPA, 2022) requires the following analytes are monitored during and post remediation works at Point 1 (MW4), Point 2 (MW6), Point 3 (MW7), Point 4 (MW8) and Point 5 (MW9) on a monthly basis:

- Physical parameters – standing water level, pH, dissolved oxygen and electrical conductivity and redox potential;
- Dissolved metals – (Arsenic, Cadmium, Chromium, Copper, Lead and Zinc); and
- PFAS compounds – (Perfluorooctane sulphonate (PFOS), perfluorooctanoic acid (PFOA)).

It is understood that no additional groundwater monitoring bores are required.

6.0 Performance Criteria Including Trigger Levels for Further Investigation

6.1 Surface Water Monitoring and Reporting

Surface water monitoring shall be undertaken as per the program discussed in Section 4.3, and the analyte suite presented in Table 4. All samples will be collected by a suitably qualified person, placed in appropriately treated sample bottles, placed on ice in a cooler and delivered to a NATA registered laboratory on the same day as they are collected.

As discussed in Section 3.3.2, water collected in the rainwater tanks shall be harvested and used primarily for toilet flushing, and if required for irrigation or hardstand washdown. Gauges on the tanks will be inspected to assess water storage and use for reporting. Bureau of Meteorology daily rainfall data collected at Williamtown RAAF shall also be recorded.

Any surface water findings shall be included in the Annual Monitoring Report.

6.2 Groundwater Monitoring and Reporting

Groundwater monitoring and reporting for the RRF include:

- Monthly monitoring of five groundwater monitoring wells as per the EPL 21626 (EPA, 2022). Monthly monitoring of groundwater is to be undertaken throughout the duration of remediation works as well as post-remediation;
- Groundwater monitoring shall be undertaken as per the program discussed in Section 5.2, and the analyte suite presented in Table 7;
- All samples will be collected by a suitably qualified person, placed in appropriately treated sample bottles, placed on ice in a cooler and delivered to a NATA registered laboratory on the same day as they are collected;
- Annual Monitoring Reports (Compliance Report) prepared by an appropriately qualified and experienced person for submission to the EPA. As per C14 of the Development Consent Conditions (DPIE, 2021), the first report is to be submitted within three (3) months after the commencement of the first year of operation, and in the same month each subsequent year (or such other timing as agreed by the Planning Secretary).
- As per C15 the Development Consent Conditions (DPIE, 2021), each Compliance Report must be publicly available no later than sixty (60) days after submitting it to the Planning Secretary and notify the Planning Secretary in writing at least seven (7) days before this is done;
- As per the EPL 21626 (EPA, 2022), the Annual Monitoring Reports must include:
  - A graphical representation of the monthly monitoring results required by condition M2.1 of the EPL 21626 for the annual return period;
  - For each parameter required to be monitored, provide a graph that compares the ANZECC Guideline trigger value with the monitoring results since monitoring began; and
  - Include daily rainfall data in graphical form; and
- Groundwater monitoring results and analysis of these results including comparison with predicted groundwater modelling will be included as part of annual reporting.

6.3 Water Monitoring Criteria Triggers and Mitigation Measures

6.3.1 Surface Water Quality

Further investigations will be undertaken, and appropriate measures implemented where required if any of the following surface water criteria are triggered:

- Analysis of surface water quality in infrastructure to be monitored (if required) indicates that stormwater runoff discharging off-site has the potential to impact the surrounding environment;
- Visual inspections of stormwater diversion infrastructure on Site indicate that sediment has been or has the potential to be transported off-site. Records of visual inspections including photographs will be established as part of each monthly monitoring (or additional) inspection that is undertaken;
- Monthly (or additional) inspections of the closed water management system indicate that there has been a breach of the stormwater system that has the potential to generate the off-site movement of water or sediment;
- Oil, grease or litter is observed during monthly (or additional) inspections;
- The following surface water quality pollutants remain within the PSC DCP post-development requirements (see Section 4.1):
  - Total Suspended Solids;
  - Total Phosphorous;
  - Total Nitrogen; and
  - Gross Pollutants; and
- Surface water monitoring results of sampled surface water do not conform with Marine Water Quality Guidelines (pH, electrical conductivity, dissolved oxygen, redox potential, turbidity).

Due to limited historical data, any surface water monitoring data results collected shall adhere to the Australian and New Zealand 2000 Guidelines for Fresh and Marine Water Quality standard requirements. Any exceedance of these trigger limits will be reported to the NSW EPA and managed within the REMONDIS incident management and reporting framework.

Table 6 - Trigger values for surface water analytes

Surface Water Analyte	Units	Action Criteria
pH[1]	-	7.0 – 8.0
Dissolved oxygen[1]	% saturation	80 – 110
Electrical conductivity[1]	µS/cm	200 – 300
Redox potential	mV	N/A
Turbidity[1]	NTU	0.5 – 10

6.3.2 pH, dissolved oxygen, electrical conductivity and turbidity limits are based on an estuary ecosystem type (ANZECC, 2000Groundwater Level

Groundwater level information for the existing five (5) wells as summarised in Table 4 has only been collected on two occasions. This is considered to be an insufficient level of data to provide a reasonable indication of the range of groundwater levels that could be expected at the site. Therefore, it is recommended that the upper and lower groundwater level triggers are confirmed following the initial year (i.e. twelve (12) rounds) of monitoring.

6.3.3 Groundwater Quality

As discussed in Section 6.3.2, historical groundwater quality data for the existing wells to be monitored on Site is limited. Therefore, any groundwater monitoring data results collected shall adhere to the following standards:

- ANZG 2018 Default Guidelines Values for Toxicants;

- Australian and New Zealand 2000 Guidelines for Fresh and Marine Water Quality; and
- HEPA 2020 PFAS National Environmental Management Plan (NEMP).

Table 7 provides the range of acceptable values / concentrations for the analytes being investigated in these monitoring works (as per EPL 21636.

Table 7 - Trigger values for groundwater analytes

Groundwater Analyte	Units	Action Criteria
Physical Parameters		
pH	-	7.0 – 8.0[1]
Dissolved oxygen	% saturation	80 – 110[1]
Electrical conductivity	µS/cm	200 – 300[1]
Redox potential	mV	N/A
Standing water level	metres (Australian height datum)	N/A
Dissolved Metals		
Arsenic	mg/L	>0.03[2]
Cadmium	mg/L	0.0005 – 0.005[2]
Chromium	mg/L	>0.05[2]
Copper	mg/L	>0.005[2]
Lead	mg/L	0.001 – 0.007[2]
Zinc	mg/L	>0.005[2]
PFAS Compounds		
Perfluorooctane sulphonate (PFOS)	mg/L	>0.00013[3]
Perfluorooctanoic acid (PFOA)	mg/L	>0.22[3]

1. *pH, dissolved oxygen and electrical conductivity limits are based on an estuary ecosystem type (ANZECC, 2000).*
2. *Trigger value is based on toxicant guidelines for the protection of aquaculture species in saltwater production (ANZECC, 2000).*
3. *Trigger value is based on 95% species protection for marine water (PFAS NEMP, 2020).*

Where there are repeated occurrences of groundwater triggers, relevant authorities will be notified, and an investigation will be undertaken to further understand the extent of the issue. A report outlining appropriate mitigation and contingency measures to be implemented shall be prepared and submitted to the relevant agencies within one month of the exceedance being detected.

6.4 Summary of Overall Surface and Groundwater Monitoring

A summary of surface and groundwater monitoring requirements is provided in Table 8. Monitoring locations are provided in Figure 9. Trigger values for further investigation are provided in regard to surface water are set out in Section 6.3.1. Trigger values for further

investigation are provided in regard to groundwater levels and quality are set out in Section 6.3.2 and 6.3.3 respectively. Further investigation and mitigation procedures are set out in Section 6.3.3.

Table 8 - Summary of monitoring on Site

Monitoring Type	Location	Parameters Monitored	Monitoring Frequency	Monitoring Method	Responsibility[1]
Rainfall	Office	Rainfall (mm)	Daily	Observation	REMONDIS
Drainage lines and diversion drains	All overland flow paths	- General condition of infrastructure; - pH; - Electrical conductivity; - Dissolved oxygen; and - Redox potential.	If sampling possible	Observation, photograph and sample (if possible)	REMONDIS
Discharge points	Pipe outlets (passing under School Dr)	- General condition of infrastructure; - pH; - Electrical conductivity; - Dissolved oxygen; and - Redox potential.	If sampling possible	Observation, photograph and sample (if possible)	REMONDIS
OSD pre-filtration system	Control pit	General condition	Monthly	Observation	REMONDIS
OSD storage	Proposed OSD	- Depth of sediment build up; and - Storage volume	Monthly	CCTV	REMONDIS
Rainwater tank gauge	Rainwater tanks 1 and 2	- Water storage; and - Water use	Monthly	Observation	REMONDIS
Groundwater quality	MW4, MW6, MW7, MW8 and MW9	- Physical parameters (pH, dissolved oxygen, electrical conductivity, and redox potential); - Dissolved metals (Arsenic, Cadmium, Chromium, Copper, Lead and Zinc); and - PFAS compounds (Perfluorooctane sulphonate (PFOS), perfluorooctanoic acid (PFOA))	Monthly	Purge first then grab sample	REMONDIS
Groundwater level	MW4, MW6, MW7, MW8 and MW9	Level (mAHD)	Monthly	Electronic dip meter	REMONDIS

1. *Data to be collected under REMONDIS internal Standards of Procedure.*

7.0 References

- Northrop (2020), Stormwater Management Plan
- REMONDIS (2022), Water Management Plan – Request for Quotation
- Jackson Environment and Planning (2021), Waste Management Plan (Version 4)
- Department of Planning, Industry and Environment (2021), State Significant Development (SSD) application (SSD-10447)
- Jackson Environment and Planning (2020), Environmental Impact Statement
- NSW EPA (2022), Environment Protection Licence 21636
- JM Environments (2021), Groundwater Contamination Assessment Report (Revision 2)
- Northrop (2020), Internal Civil Works Plan (Revision B)
- Hunter Water (2017), Hunter Water's Guidelines for Developing in the Drinking Water Catchments
- Northrop (2020), Soil and Water Management Plan (Revision E)
- Northrop (2021), Soil and Water Management Plan – Addendum Report
- Tony Mexon & Associates (2020), Survey Plan
- ACOR (2020), Fire Safety Study (Revision 2)
- Port Stephens Council (2014), Development Control Plan
- Landcom (2004), Managing Urban Stormwater, Soil and Construction Volume 1: Blue Book
- Atlantis (2015), Atlantis Flo Tank Technical Specification: https://cdn.shopify.com/s/files/1/0039/9258/4281/files/Technical_Specs_Australia.pdf?148
- WaterNSW Real-Time Data: https://realtimedata.waternsw.com.au/
- JM Environments (2021), Remedial Action Plan (Revision 2)
- ANZG (2018), Default Guidelines Values for Toxicants
- ANZECC (2000), Guidelines for Fresh and Marine Water Quality
- HEPA (2020), PFAS National Environmental Management Plan

8.0 Attachments

- Internal Civil Works Plan
- Survey Plan