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Report

The Archer Waste Transfer Station – Water Quality Monitoring and Management Plan 2025

PREPARED FOR:

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Acronyms

Acronyms	Description
Ag	Silver
As	Arsenic
AWTS	Archer Waste Transfer Station
Cd	Cadmium
Co	Cobalt
CoP	City of Palmerston
Cr	Chromium
Cu	Copper
Hg	Mercury
Mn	Manganese
NH ₃	Ammonia
Ni	Nickle
NT	Northern Territory
Pb	Lead
Sb	Antimony
TN	Totoal Nitrogen
TRH	Total Recoverable Hydrocarbon
TSS	Total Suspended Solids
TP	Total Phosphorus
Zn	Zinc

Document history & status

Revision	Date issued	Reviewed by	Revision type
A	11/09/2025	Paul Davey	Draft

Distribution of copies

Version	Date issued	Approved by	Quantity	Electronic	Issued to
B	12/09/2025	Paul Davey	1	Word	City of Palmerston
0	02/10/2025	Jeni Young	1	Word and PDF	City of Palmerston

Last Saved:	2 October 2025
File Name:	1002035 WQM and MP_Rev 0
Author:	Jeni Young
Project Manager:	Jeni Young
Client:	Palmerston City Council
Document Title:	The Archer Waste Transfer Station – Water Quality Monitoring and Management Plan 2025
Document Version:	Rev 0
Project Number:	1002035

Section 1 Introduction

This Water Quality Monitoring and Management Plan (WQMMP) has been developed for the Archer Waste Transfer Station, operated by the City of Palmerston, to ensure compliance with Northern Territory Environment Protection Agency (NT EPA) requirements and to protect the surrounding environment from potential water quality impacts associated with waste management activities. The plan outlines the monitoring framework, performance criteria, roles and responsibilities, and response protocols necessary to maintain regulatory compliance and environmental stewardship.

1.1 Purpose and Objectives

The purpose of this WQMMP is to establish a robust framework for monitoring, managing, and reporting water quality at the Archer Waste Transfer Station. The objectives of the plan are to:

- Ensure that water discharges from the site do not adversely impact the surrounding environment.
- Comply with the conditions of Environmental Protection Licence (EPL 233), Appendix A, issued by the NT EPA.
- Implement best practice monitoring and management strategies in alignment with national and territory guidelines.
- Provide clear procedures for sampling, analysis, reporting, and response to non-conformance events.

1.2 Scope

This plan applies to all water quality monitoring activities conducted at the Archer Waste Transfer Station, including surface water, stormwater, and associated environmental management practices.

Section 2 Site Description

2.1 Site Details

The site operates as the waste transfer station for the Palmerston area. The site area is approximately 16ha, however the main operational area used for storage of waste occupies <2ha shown in Figure 2-1. The majority of the operational area of the site is covered with bitumen, except for the green waste area and the truck access to the general waste skip bins, which remain unsealed. Some parts of the site are grassed, but no waste is stored or contained in these grassy areas (EcOz, 2018). The site details are provided in Table 2-1 below.

Table 2-1 Site details*

Item	Description
Site Location	Site is located south of the suburb of Bellamack, on the southern side of Elrundie Avenue, and is accessed via the existing Flack Road and Durack Road
Site Area	Site Area – approx. 16ha Operational Areas – <2ha shown in Figure 2-1
Municipality	Palmerston
Planning Zone	GI – General Industry
Planning Overlays	Land subject to flooding – Eastern boundary
Current Use	A waste transfer station
Surround land uses	South: Native bushland and Adelaide to Darwin railway line (800m) and estuarine mangrove flats located ~1,100m. North: Suburban subdivisions along Elrundie Avenue (<500m) East: Predominantly vacant land West: Predominantly vacant land South-east: Old decommissioned landfill
Surrounding Receptors	Nearby receptors comprise: Suburban residents (nearest >300m) Onsite worker/s and public user/s Waterways including two unnamed drainage lines and Elizabeth River approximately 2km south of the site Ecological receptors (terrestrial/aquatic flora & fauna) Recreational user/s in surroundings Groundwater aquifers and shallow seasonal water table
Topography and Drainage	The site typically slopes from northwest to southeast. The site has two drains that flow from north to south and discharge into the Elizabeth River. Drainage is influenced by a ridge that runs on a north-south trajectory through the site, thus shedding water toward the east and west respectively (Figure 3-1).
Geology	Geoscience Australia mapping shows that the site's underlying geology is mainly sedimentary rocks.

Item	Description
	Soils are primarily sandy, with variations of sandy clay and sandy silt, underlain by claystone and siltstone. This suggests that the soils are relatively porous, allowing water to move both vertically and laterally through the soil profiles.
Hydrogeology	Groundwater direction is south-west towards Darwin Harbour. Groundwater depth is generally between 20m and 40m. Previous assessment and hydrogeological studies undertaken by EcOz Environmental indicates that there is a deeper, high yielding aquifer which is unlikely to be impacted by the sites works. There is also a shallower water table that fluctuates seasonally and is tidally influenced in the eastern portion of the site.

Site details are taken from EcOz, 2016.

Key site features and operational area of the site are provided in Figure 2-1.

2.2 Activities Overview

City of Palmerston operate the AWTS and are authorised to 'store' (for a maximum period of 20 business days as per EPL233-02) waste at this facility under the NT *Waste Management and Pollution Control Act* in accordance with Environment Protection Licence (EPL233-02). Wastes stored at the facility prior to transport and disposal at the Shoal Bay Waste Management Facility comprise the following:

- Paper and cardboard
- Plastics
- Glass and aluminium
- General household waste
- Steel and metal
- Batteries
- Paint
- Waste oil
- White goods and gas bottles.

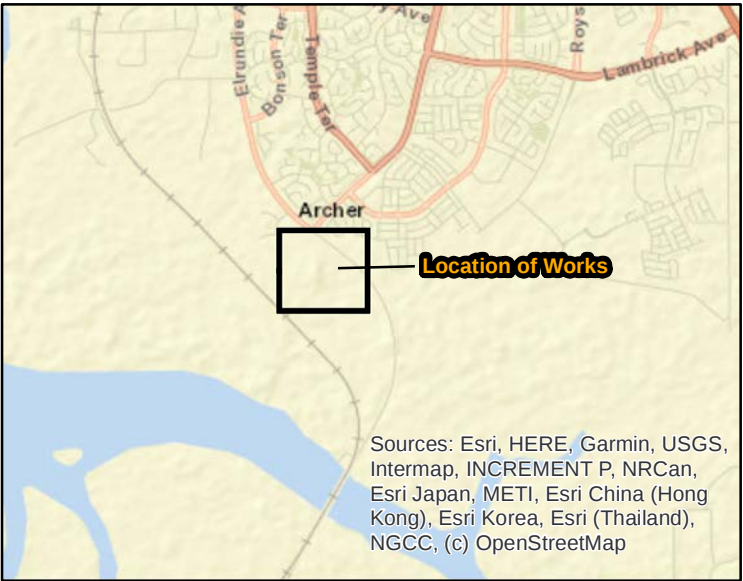
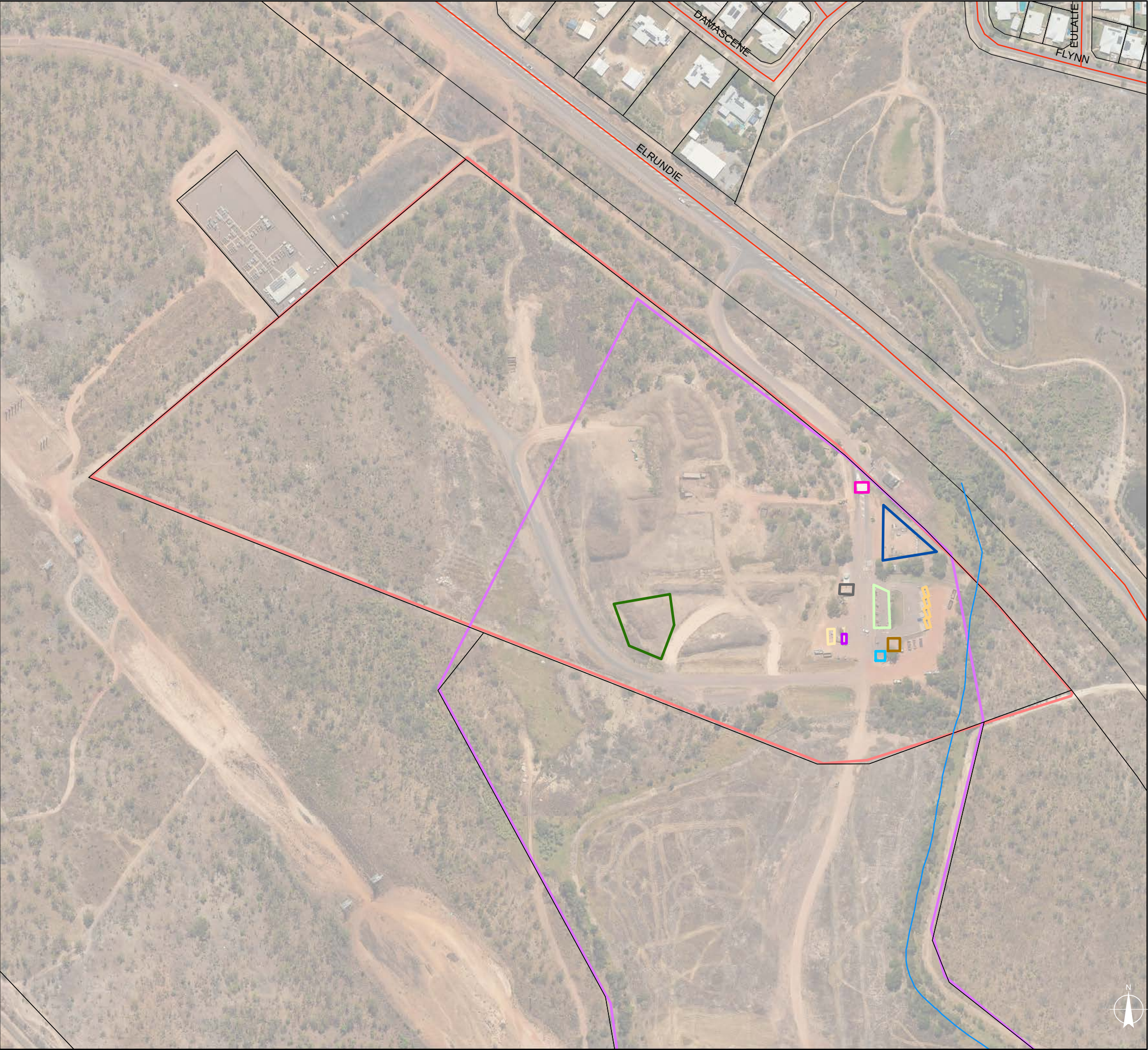
Green waste is accepted and mulched onsite for sale to the general public. Refer to site layout in Figure 2-1.

Hazardous wastes are stored in bunded containers to prevent spills. Green waste is processed into mulch for sale on site. All waste is stored above ground and regularly transported to Shoal Bay landfill. The site does not accept commercial or industrial waste such as tyres or car bodies.

A list of operational activities is provided below:

- Receiving of general waste
- Receiving of listed wastes as per EPL 233-02
- Receiving of green waste
- Mulching
- Receiving of recyclables including carboards, steel, white goods

General operation activities including truck, excavator and forklift movement.



Archer Waste Transfer Facility

Figure 2-1 Key Site Features Legend

- Roads
- Stream
- Cadastre
- New Dry Recycling
- White Goods
- Waste Transfer Bin
- Waste Oil
- Scrap Metal
- Waste Batteries
- Paint
- Old Facility
- Green Waste
- Gatehouse
- Current Dry Recycling
- Current Facility

DATA SOURCE:
Esri, Maxar, Geoeye, Earthstar Geographics,
CNES/Airbus DS, USDA, USGS, AeroGRID,
IGN, and the GIS User Community

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Section 3 Conceptual Site Model and Risk Assessment

The Conceptual site model (CSM), Appendix C, identifies potential pathways, Figure 3-1, between the identified source(s) and receptor(s). Where a complete source-pathway-receptor linkage exists, an assessment of the nature and significance of the exposure pathway is required to assess the level of risk (ASC NEPM, 2013).

3.1 Potential source of contamination, pathways, receptors and risk

Table 3-1 below presents a summary of potential sources of contamination that may be associated with these areas and provides a relative priority rating for investigation of each item with respect to contamination at the site. The rating is not intended to infer severity or extent of impact; rather, it is intended to indicate the potential for the contamination to exist at the site.

Based on the review of the current site activities a CSM was developed to identify potential impacts to receptors and the potential pathways linking them. Development of the CSM included assessment of the following:

- Sources of contamination and potential contaminants of concern
- Pathways by which contaminants may move in the environment.
- Receptors, including humans, animals, waterways and ecosystems that may be impacted by the contaminant onsite and offsite.

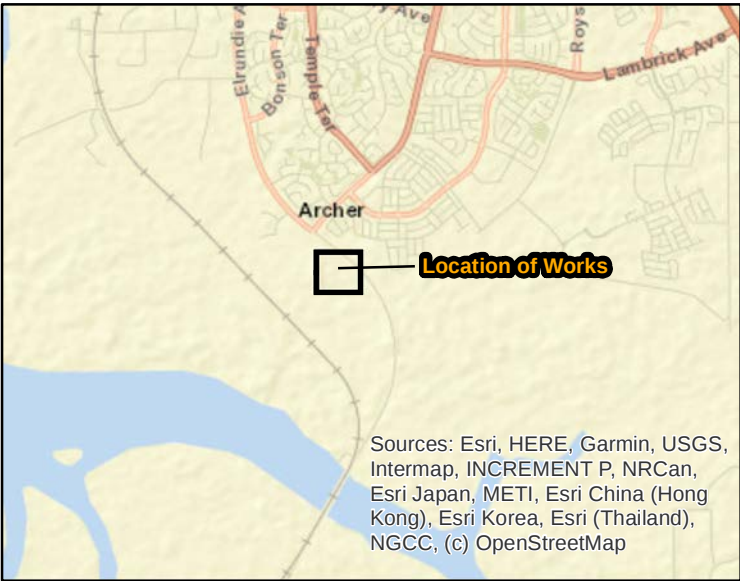
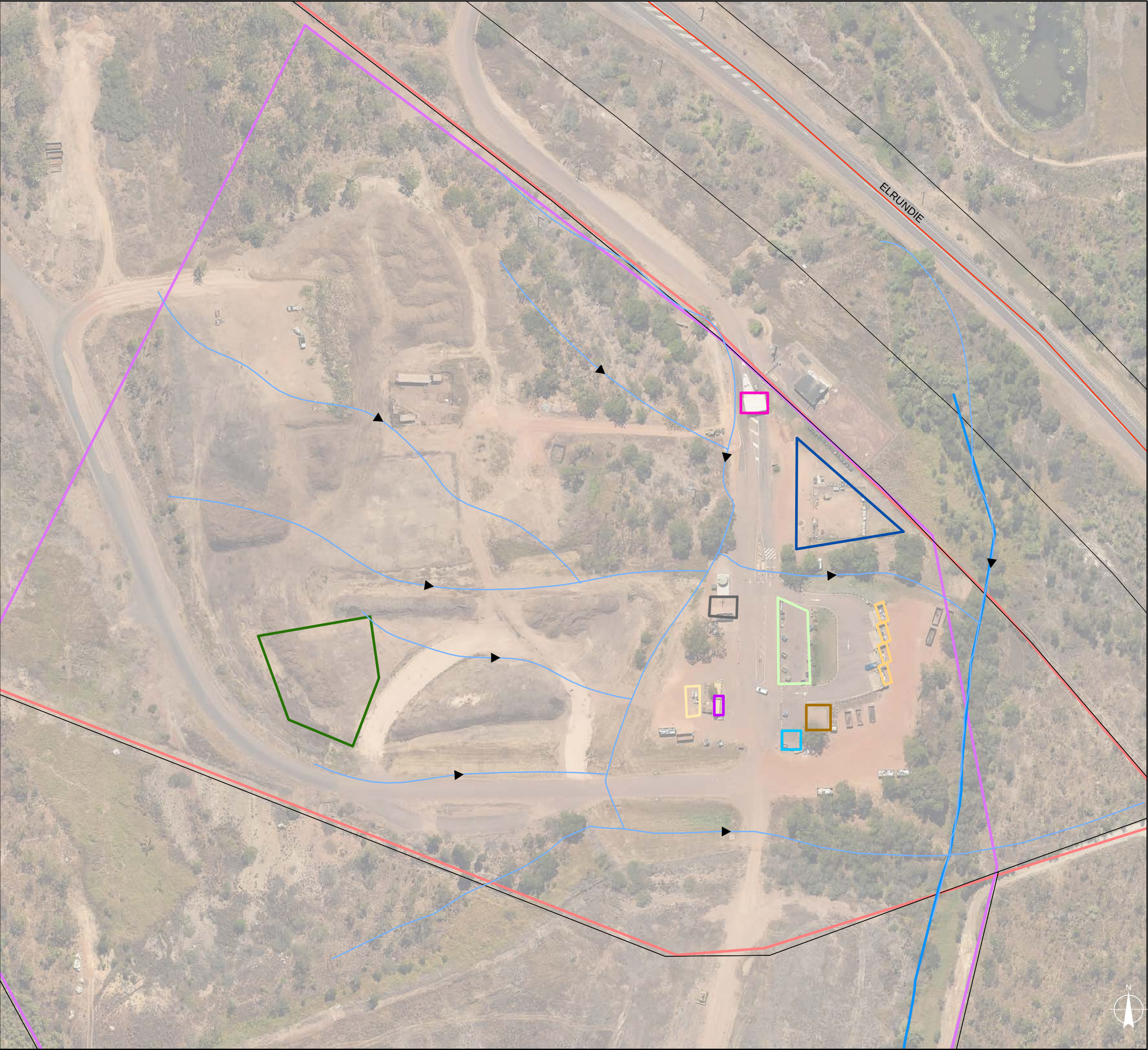
The key definitions of the **pathways** are as below:

- **P1** - Inhalation of vapours Volatile organic compounds (VOCs) and odour causing compounds) from the waste stockpiles.
- **P2** - Direct contact with waste and/or site soils (dermal, oral and dust inhalation).
- **P3** - Surface water run off
- **P4** - Leaching of contaminants through the soil profile into groundwater via unsealed surface.

The key definitions of the **receptors** are as below:

- **R1** - Onsite worker/s and members of public accessing the site.
- **R2** - Waterways – local drainage and further downstream of the Elizabeth River.
- **R3** - Ecological receptors offsite - mangrove flats and associated flora and fauna.
- **R4** - Recreational user/s in surroundings.
- **R5** - Groundwater aquifers and shallow seasonal water table.
- **R6** - Surrounding residents

The CSM, comprising a visual representation of contamination sources and how contamination might move in the environment to onsite and offsite receptors is shown in Figure 3-2 along with a flowchart.



**Archer
Waste Transfer Facility**

Figure 3-1 Surface Water Movements

- Legend**
- Roads
 - ▶ Surface_water_drainage_lines
 - Stream
 - ▭ Cadastre
 - ▭ New Dry Recycling
 - ▭ White Goods
 - ▭ Waste Transfer Bin
 - ▭ Waste Oil
 - ▭ Scrap Metal
 - ▭ Waste Batteries
 - ▭ Paint
 - ▭ Old Facility
 - ▭ Green Waste
 - ▭ Gatehouse
 - ▭ Current Dry Recycling
 - ▭ Current Facility

DATA SOURCE:
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Table 3-1 Review of Complete and Potential Exposure Pathways

Source	Commonly Associated Contaminants	Pathway	Receptor	Impact	Mitigation/ Control	RISK
General waste (stored in skip bins) – banded and unbanded areas	BOD, Metals (such as Cr, Cu, Cd, Pb, Zn), TRH, PAH, BTEX, Odour causing compounds	P1	R1	▪ Pollution of downstream waterways and Darwin Harbour with gross pollutants, metals, hydrocarbons, nutrients, pathogens, and associated impacts on aquatic ecosystem health ▪ Erosion and sedimentation of surrounding environment, and downstream watercourses (Elizabeth River and Darwin Harbour) ▪ Groundwater contamination from leachate from storage areas, seeping vertically into groundwater via soils	▪ Separation and storage of general waste in appropriately contained, banded and sealed or covered containers ▪ Maintenance of storages to ensure waste is contained ▪ Housekeeping to ensure all waste is within designated storages ▪ Maintenance of drainage and bunding downstream around general waste storage area to capture any surface runoff ▪ Implement an Erosion and Sediment Control Plan ▪ Install and maintain erosion and sediment controls as per plan ▪ Visual inspections of erosion and sediment controls post rainfall events ▪ Separation and storage of general waste in appropriately contained, banded and sealed or covered containers ▪ Maintenance of storages to ensure waste is contained ▪ Housekeeping to ensure all waste is within designated storages ▪ Inspections and implementation of clean up measure post rainfall as required ▪ Regular removal of stored waste to Shoal Bay Waste Management Facility	MEDIUM
		P2	R1			
		P3	R2			
			R3			
			R4			
		P4	R5			

Source	Commonly Associated Contaminants	Pathway	Receptor	Impact	Mitigation/ Control	RISK
Listed wastes including batteries, waste oil and paints (bunded)	Metals (such as Sb, Cd, Co, Pb, Mn, Ni, Hg, Ag, Zn), Acids (such as sulphuric, hydrochloric)	P2	R1	- Spill of product and contamination of surface water runoff and downstream water bodies - Spills and soil contamination, with additional potential seepage into groundwater	- Storage of substances in accordance with Listed Waste Management Plan (i.e. bunded, under cover, separated) - Housekeeping and labelling for adequate separation and storage of listed wastes - Spill kit kept at facility and staff trained in spill response - Maintenance of records and site manifest to monitor volumes - Regular inspections of storage areas to identify potential spills - Regular removal of listed waste to Shoal Bay Waste Management Facility	LOW
Green waste and mulching	Nutrients (N, P), Metals (naturally occurring in the soils), BOD	P1	R1	Contamination of surface water runoff and downstream waterways with nutrient rich water and organic matter (e.g. TKN, BOD)	- Drainage works to direct surface water runoff around mulch piles - Maintenance of mulch stockpiles to contain mulch in allocated area - Install berms around mulch area to capture mulch prior to runoff entering drains - Visual inspections of mulch stockpile areas following rainfall to identify any issues requiring remediation - Monitoring of downstream waterways to identify any potential impacts on water quality	LOW
		P2	R1			
		P3	R2			
			R3			
			R4			
		P4	R5			
Recycling and storage of steel (bunded)	Solvents (such as methylene chloride, ODCB), TRH, Metals (such as Cr, Cd, Pb, Zn)	P2	R1	Spread of gross pollutants into surrounding landscape	- Housekeeping, separation and storage of inert wastes in a manner that minimises the spread of gross pollutants - Monitoring and maintenance of storage areas to minimise impacts on surrounding area, cleaning up as required	LOW

Source	Commonly Associated Contaminants	Pathway	Receptor	Impact	Mitigation/ Control	RISK
Recycling and storage of white goods (unbunded)	Solvents (such as methylene chloride, ODCB), TRH, Metals (such as Cr, Cd, Pb, Zn)	P2	R1			
Operational activities	Metals, Odour causing compounds	P2	R1	- Greenhouse gas emissions from machinery use - Noise and dust emissions and impact on nearby residents - Odour emissions and impact on nearby residents	- Maintain vehicles and machinery in good working order - Operate machines in an efficient manner - Avoid use of machinery when not required - Regular removal of stored waste to Shoal Bay Waste Management Facility - Record and respond to any complaints received from neighbouring residents - Implement dust suppression (e.g. water carts) as required - Restrict operating hours to avoid impacts on nearby residents - Maintain waste storage areas as required to minimise wind distribution of waste - Maintain buffer distance between earthworks areas and residential zones, and plant vegetation buffers as required around site boundary	LOW

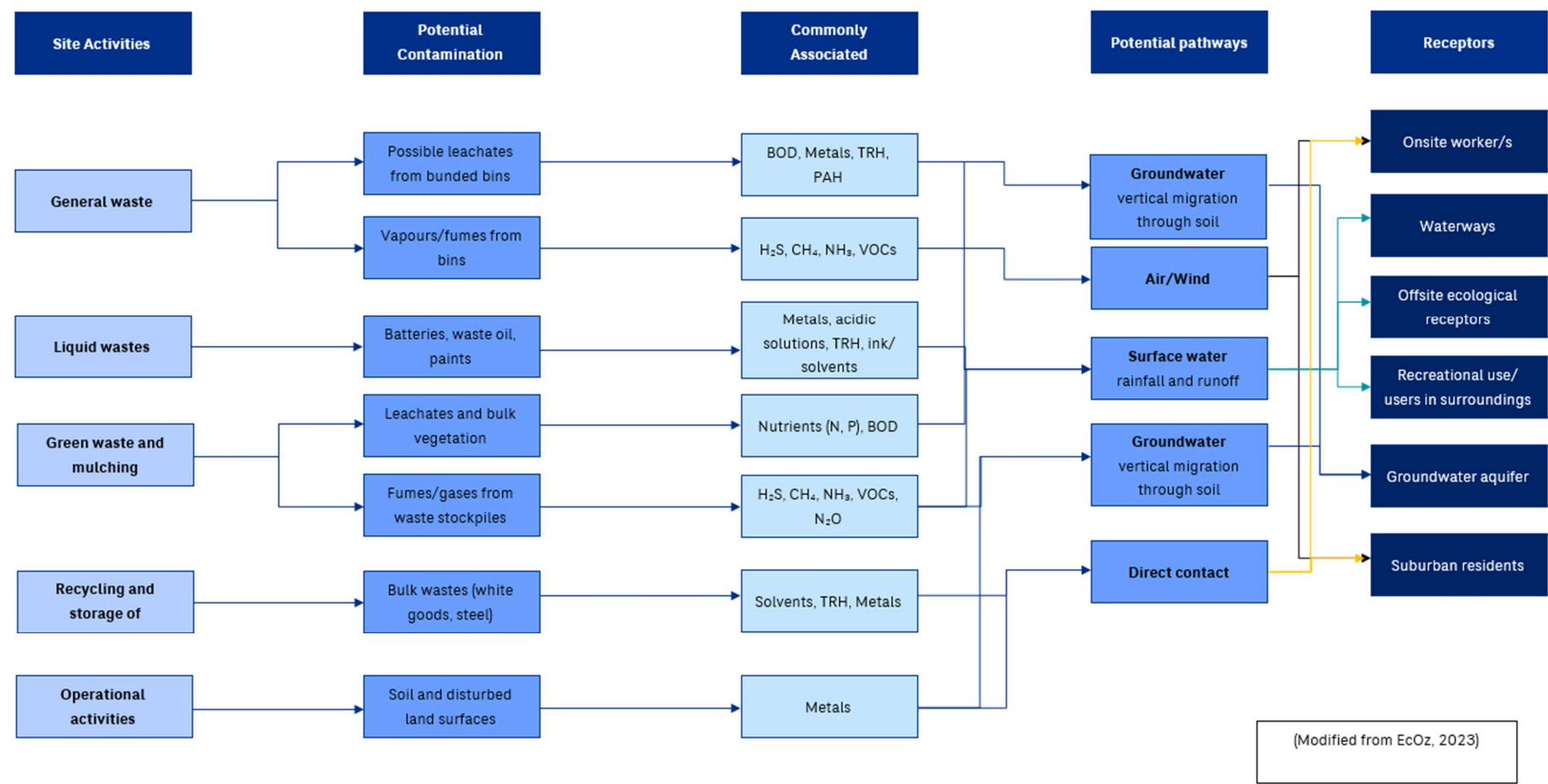


Figure 3-2 – Preliminary Conceptual Site Model

Section 4 Sampling Plan

The monitoring program aims to:

- Characterize water quality at key locations within and adjacent to the site
- Detect potential contamination events
- Assess compliance with regulatory criteria
- Inform management actions and continuous improvement.

The program follows the following standards and guidelines:

- Australian/New Zealand Standard on Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998), Standards Australia, New South Wales.
- Australian/New Zealand Standard on Water Quality Sampling - Part 4: Guidance on sampling from lakes, natural and man-made (AS/NZS 5667.4:1998), Standards Australia, New South Wales.
- Australian/New Zealand Standard on Water Quality Sampling - Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6:1998), Standards Australia, New South Wales.
- Australian Standard/New Zealand Standard on Water Quality Sampling - Part 10: Guidance on sampling of waste waters (AN/NZS 5667.10:1998), Standards Australia, New South Wales.

4.1 Sample Events

There are three sample sites to be sampled during the wet season. The timing of the samples will depend on the first flush rainfall event of that season with monthly sample events to follow. Sample locations (accessible throughout the wet season) are detailed in Table 4-1, and Figure 4-1.

All sample locations will be assigned the EPL233-02 trigger values to assess for compliance. The methodologies to be followed for the sample event are outlined in Appendix B.

Table 4-1 Sample locations

Sample Name	Rationale	Latitude	Longitude
SW01	Upstream of site. Captures water quality of stream before impact of runoff from site. Location's results reportable under EPL233-02.	715054	8615118
SW03	Minor drainage line flowing north to south in the centre of the site. Would capture water shed from mulching area. Location's results reportable under EPL233-02.	714916	8615027
SW07	Downstream of confluence of ephemeral stream and runoff from site. Captures impact of runoff from site. Trigger values apply only to this site. Location's results reportable under EPL233-02.	715031	8614965

Samples collected for laboratory analysis are to be transferred directly from the sample cup to the specific laboratory supplied bottles. The analytical suite is detailed in Table 4-2 along with the EPL trigger values.

All samples are to be dispatched to a NATA accredited laboratory under a chain of custody in accordance with the surface water sampling SOP (Appendix B).

Table 4-2 Sample analytical program and EPL233-02 trigger values

Parameter	Unit	Trigger value
Field Measurement		
pH	pH units	6 – 8.5 ³
Temperature	°C	-
Electrical Conductivity (EC)	µS/cm	-
Dissolved Oxygen (DO)	% saturation	80 – 100 ³
Turbidity	NTU	-
Metals		
Cadmium (Ca)	µg/L	5.5 ⁷
Chromium (Cr)	µg/L	4.4 ^{6,7}
Copper (Cu)	µg/L	1.3 ⁷
Lead (Pb)	µg/L	4.4 ⁷
Mercury (Hg)	µg/L	0.4 ⁷
Nickel (Ni)	µg/L	70 ⁷
Zinc (Zn)	µg/L	15 ⁷
Other		
Chemical Oxygen Demand (COD)	mg/L	-
Total Suspended Solids (TSS)	mg/L	10 ³
Total Dissolved Solids (TDS)	mg/L	-
Nutrients		
Total Nitrogen (TN)	µg/L	20 ³
Total Phosphorous (TP)	µg/L	300 ³
Ammonia (NH ₃ as N)	µg/L	30 ³
Hydrocarbons		
Total Recoverable Hydrocarbons (TRH) (C6-C40)	µg/L	-
Benzene	µg/L	700 ⁷
Toluene	µg/L	-
Ethylbenzene	µg/L	-
Xylene	µg/L	-
Naphthalene	µg/L	70 ⁷

1. Trigger values only apply to all monitoring locations

2. *Only during months December to March*
3. *Based on Darwin Harbour Water Quality Objectives (Marine and Estuary Systems – Upper Estuary)*
4. *Estimate the flow at time of sampling*
5. *Analyse for Trivalent and Hexavalent Chromium if total chromium exceeds trigger value*
6. *Based on Hexavalent Chromium 95% species protection ANZECC Water Quality Guidelines 2018 (ANZG 2018)*
7. *Based on 95% species protection for marine water ANZECC Water Quality Guidelines 2018 (ANZG 2018)*

A factual report outlining any compliance issues is produced after each sample event. All exceedances are reportable to the NT EPA. The factual report is to include:

- Introduction
- Sampling locations, photos
- Assessment criteria and analytical program
- In-Situ monitoring data and observations including flow rates
- Laboratory results
- Conclusions.

Section 5 Site Management

5.1 Trigger, Action, Response Plan

The following Trigger, Action, Response Plan (TARP) tables have been developed to provide a clear and systematic approach for managing water quality at the Archer Waste Transfer Station. Based on the performance criteria outlined in the Water Quality Monitoring and Management Plan, the TARP framework identifies specific triggers, such as exceedances of water quality criteria, evidence of contamination, or signs of ecological impact and prescribes corresponding actions and response procedures. This structured process ensures that monitoring results are promptly assessed, appropriate corrective measures are implemented, and regulatory reporting requirements are met, thereby supporting effective environmental management and compliance with licence conditions.

Table 5-1 Archer Water TARP

Trigger	Action	Response Plan
Physical/lab readings above adopted criteria	Review data and determine cause (natural or anthropogenic). May need more data for trend assessment. Report to EPA.	If necessary, re-sample to confirm results or collect additional samples from other locations to determine/delineate source and extent of potential impact.
Evidence of gross contamination (sheen, odour, discolouration) or incident (spill)	Immediately follow spill response procedure: 1. Identify source, volume, type; 2. Control/contain spill; 3. Clean up; 4. Dispose contaminated material; 5. Additional water sampling; 6. Report significant spills to NT EPA.	Validate clean up with additional water sampling. Report significant spills or spills that have entered stormwater to NT EPA Pollution Hotline (1800 064 567)
Evidence of erosion/sedimentation (TSS/turbidity exceeds criteria)	Investigate methods to stabilize stormwater drains or decrease flow rate; monitor downstream water quality for TSS/turbidity.	Measure water quality after implementation to monitor effectiveness of control methods.
Signs of impact to riparian terrestrial/aquatic ecosystems	Review data and determine cause (natural or anthropogenic).	Determine whether impact caused by on-site or off-site activities. May need more data for trend assessment.
Health of riparian vegetation appears affected	Maintain photographic record and note visual observations.	Determine whether impact caused by on-site or off-site activities.
Physical/lab readings at SW01, SW03, SW07 above adopted criteria	Determine whether exceedances are significant enough to affect downstream receiving water body (Elizabeth River).	Consider undertaking one round of water sampling of the Elizabeth River for comparative background purposes.

5.2 Non-Conformance Response Plan

If performance measures outlined in the TARP are not met, or if monitoring results and indicators suggest the need for further investigation or corrective action, the following non-conformance response procedures must be implemented:

- **Immediate Assessment:** Upon detection of non-conformance (e.g., exceedance of water quality criteria, evidence of contamination, or environmental incident), promptly assess the situation to determine the nature and extent of the issue.
- **Field Verification:** Conduct field parameter measurements at existing or additional locations to confirm initial readings and identify the source and extent of the impact.
- **Additional Sampling and Analysis:** Undertake further water sampling and laboratory analysis at existing or new locations to validate anomalous results and delineate the affected area.
- **Implementation of Controls:** Recommend and implement additional engineering or operational control measures as necessary to improve water quality and mitigate environmental harm.
- **Incident Management:** For incidents involving spills or loss of containment, immediately follow the site's spill response procedures, including containment, clean-up, and validation sampling. Significant spills or those entering stormwater must be reported to the NT EPA Pollution Hotline (1800 064 567) without delay.
- **Documentation and Reporting:** Record all non-conformances, corrective actions, and outcomes in the site's incident register. Submit required notifications and reports to regulatory authorities in accordance with Environmental Protection Licence (EPL 233) and NT EPA guidelines.
- **Review and Follow-Up:** Review the effectiveness of corrective actions and update management plans and procedures as needed to prevent recurrence. Conduct follow-up monitoring to ensure compliance is restored.

Adhering to this non-conformance response plan ensures timely resolution of environmental issues, regulatory compliance, and continuous improvement in site management practices.

5.3 Compliance Requirements

All monitoring, management, and response actions outlined in this TARP must be conducted in accordance with the conditions of Environmental Protection Licence (EPL 233) and relevant regulatory guidelines. The Archer Waste Transfer Station is required to:

- **Meet Water Quality Standards:** Ensure that all water discharges from the site comply with adopted criteria specified by the Northern Territory Environment Protection Authority (NT EPA), including the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and other referenced standards.
- **Record and Report Incidents:** Maintain accurate records of monitoring data, incidents, non-conformances, and corrective actions. Significant spills, exceedances, or environmental incidents must be reported immediately to the NT EPA Pollution Hotline (1800 064 567) as specified in the licence.
- **Implement Corrective Actions:** Where performance measures are not met, undertake further investigation, additional sampling, and implement engineering or operational controls as required by the licence and management plan.
- **Maintain Documentation:** Ensure that all monitoring plans, sampling records, incident reports, and compliance documentation are kept up to date and made available for inspection by regulatory authorities upon request.
- **Continuous Improvement:** Regularly review and update the Water Quality Monitoring and Management Plan and associated procedures to reflect changes in site operations, regulatory requirements, or environmental conditions.

Adherence to these compliance requirements is essential for maintaining licence validity, protecting the surrounding environment, and demonstrating responsible waste management practices.

5.4 Training Requirements

All personnel involved in water quality monitoring, incident response, and environmental management at the Archer Waste Transfer Station to receive basic training in order to effectively implement the TARP and compliance with regulatory obligations. Training requirements include:

- **Water Quality Monitoring Procedures:** Staff must be trained in sampling techniques, use of field equipment, data recording, and laboratory submission protocols as outlined in the Water Quality Monitoring and Management Plan.
- **Incident and Spill Response:** Personnel must be familiar with spill response procedures, including identification, containment, clean-up, and reporting of environmental incidents. Regular drills and refresher training should be conducted to maintain readiness.
- **Regulatory Compliance:** Staff must understand the requirements of Environmental Protection Licence (EPL 233), relevant NT EPA guidelines, and reporting obligations for non-conformances and environmental incidents.
- **Health and Safety:** Training in occupational health and safety (OH&S) is mandatory, including hazard identification, use of personal protective equipment (PPE), and safe work practices during sampling and incident response.
- **Record Keeping and Documentation:** Personnel must be instructed on accurate record keeping, maintenance of monitoring logs, incident registers, and preparation of compliance documentation for regulatory review.

Regular training updates and competency assessments should be conducted to ensure all staff remain informed of current procedures, regulatory changes, and best practices in environmental management.

5.5 Roles Responsible for Delivery

To ensure effective implementation of the Trigger, Action, Response Plan (TARP) and compliance with regulatory requirements, the following roles are responsible for delivering and coordinating training at the Archer Waste Transfer Station:

- **City of Palmerston:** Where necessary, ensures relevant staff receive appropriate training. Responsible for verifying staff/contractor competency in water quality monitoring, incident response, and record keeping.
- **Managing Contractor:** Develops and delivers specialized training on environmental management procedures, spill response, compliance obligations, and regulatory reporting. Acts as the primary contact for environmental compliance and incident management.
- **Environmental Consultants:** Provides technical training on sampling methodologies, laboratory procedures, and data quality assurance. Supports the development of training materials and conducts periodic competency assessments for staff involved in monitoring and analysis.
- **Managing Contractors:** Delivers OH&S training, including hazard identification, use of personal protective equipment (PPE), and safe work practices during sampling and incident response activities.
- **All Staff and Contractors:** Responsible for participating in scheduled training sessions, inductions, maintaining up-to-date knowledge of procedures, and adhering to site protocols.

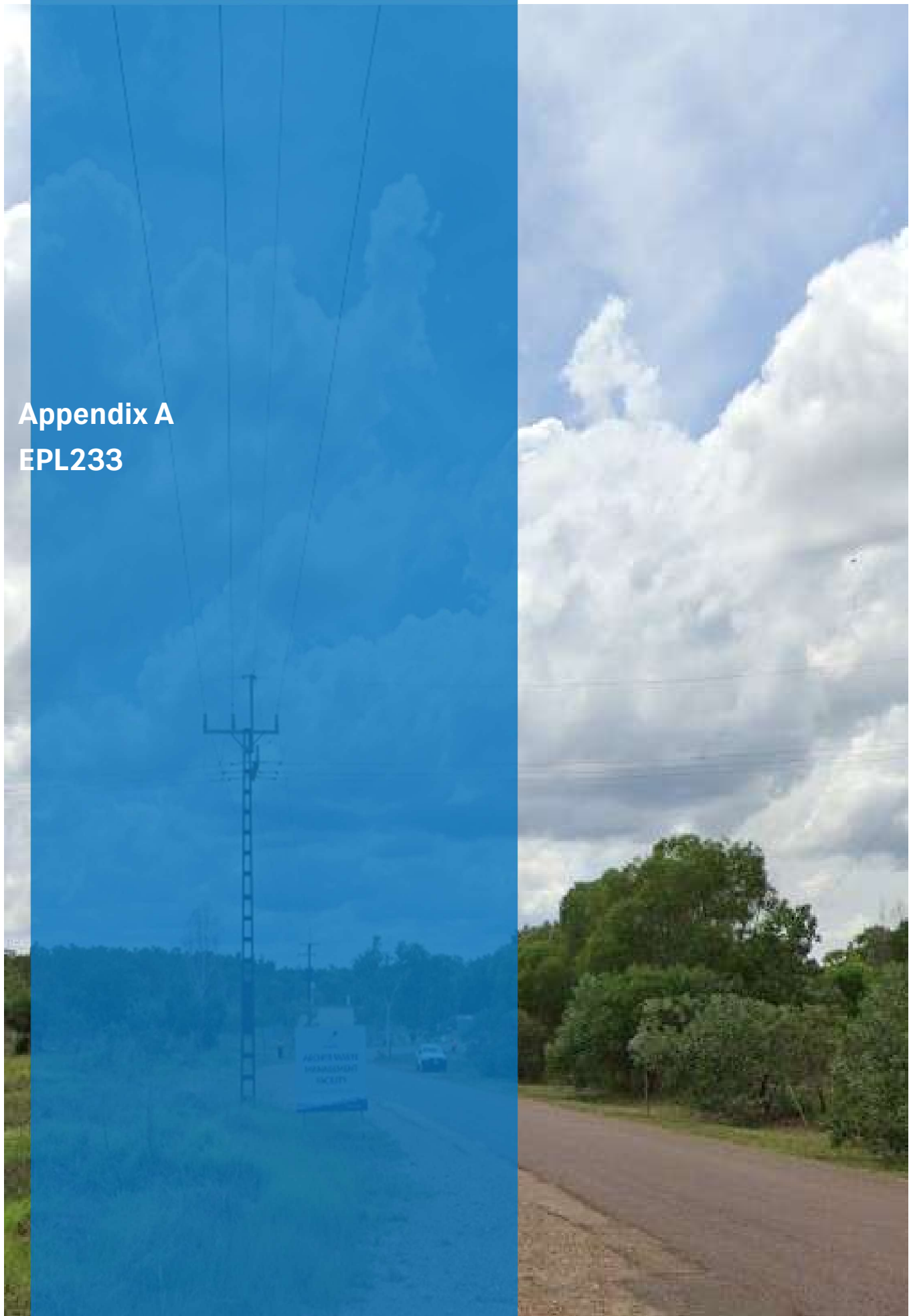
Regular review and documentation of training activities should be conducted to ensure all personnel remain competent and compliant with the requirements of the Water Quality Monitoring and Management Plan and Environmental Protection Licence (EPL 233).

Section 6 References

- AS/NZS 5667.1:1998. Australian Standard on Water Quality Sampling – Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples
- AS/NZS 5667.4:1998. Australian Standard on Water Quality Sampling – Part 4: Guidance on sampling from lakes, natural and man-made
- AS/NZS 5667.6:1998. Australian Standard on Water Quality Sampling – Part 6: Guidance on sampling of rivers and streams
- AN/NZS 5667.10:1998. Australian Standard on Water Quality Sampling – Part 10: Guidance on sampling of waste waters
- ANZECC & AMRCANZ 2000, Australian Guidelines for Water Quality Monitoring and Reporting, National Water Quality Management Strategy Paper No 7, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
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- CDM Smith (2022). Standard Operating Procedures for Sampling Surface Waters, February 2022.
- CDM Smith (2024). Conceptual Site Model 2025. Prepared for City of Palmerston, December 2024.
- CDM Smith (2025). Comprehensive Annual Monitoring Report 2025. Prepared for City of Palmerston, June 2025.
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- Ecoz (2016). Updated Conceptual Site Model and Risk Assessment for the Archer Waste Transfer Station, Palmerston. Prepared for City of Palmerston, October 2016.
- Ecoz (2023). EPL233 Monitoring Report Archer Waste Transfer Station. Prepared for City of Palmerston, May 2023.
- Northern Territory Environment Protection Authority (NT EPA). (2021). Appendix 19: Water Quality Results Tables. Retrieved from https://ntepa.nt.gov.au/_data/assets/pdf_file/0011/1011143/19-water-quality-results-tables.pdf
- Northern Territory Government. Water Quality Objectives for the Darwin Harbour Region for marine and estuarine systems

Appendix A

EPL233



ENVIRONMENT PROTECTION LICENCE

(Pursuant to section 34 of the *Waste Management and Pollution Control Act*)

Licensee	City of Palmerston*
Licence Number	EPL233 - 02
Registered Business Address	City of Palmerston* 2 Chung Wah Terrace Palmerston NT 0830
ABN	42 050 176 900
Premises Address	Lot 11497 Town of Palmerston plan(s) S2013/193 ELRUNDIE AVE, ARCHER
Anniversary Date:	19 December
Commencement Date:	19/12/2020
Expiry Date:	18/12/2025
Scheduled Activity	Operating premises , other than a sewage treatment plant, associated with collecting, transporting, storing, re-cycling, treating or disposing of a listed waste (as per Table 1) on a commercial or fee for service basis.
Description	City of Palmerston operates the Archer Waste Management Facility to consolidate and manage recyclables and waste prior to further transport to appropriate facilities. The Waste Transfer Station accepts listed waste in the form of used lead acid batteries (ULABs), paints and waste mineral oils.

Table 1 - Listed Wastes Authorised to be Handled

Listed Waste	Collection	Transport	Storage	Treatment	Recycling	Disposal
Lead, lead compounds	✗	✗	✓	✗	✗	✗
Acidic solutions or acids in solid form	✗	✗	✓	✗	✗	✗
Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish	✗	✗	✓	✗	✗	✗
Waste mineral oils unfit for their original intended use	✗	✗	✓	✗	✗	✗
Waste mixtures, or waste emulsions, of oil and water or hydrocarbon and water	✗	✗	✓	✗	✗	✗

✓ Activity authorised by this licence

✗ Activity not authorised by this licence

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ATTACHMENTS

- 1 Surface Water Monitoring Program.pdf

ENVIRONMENT PROTECTION LICENCE 233 - 02

INFORMATION ABOUT THIS LICENCE

- This licence does not in any way relieve the licence holder from its obligations to comply with the *Waste Management and Pollution Control Act* (WMPC Act), including the general environmental duty in section 12 of the WMPC Act and the duty to notify of incidents causing or threatening to cause pollution under section 14 of the WMPC Act.

Duration of a licence (section 40, 43 and 45 of the WMPC Act)

- A licence will remain in force until its expiry date or until it is surrendered by the licensee or is suspended or cancelled in accordance with the WMPC Act.
- The licensee must notify the Northern Territory Environment Protection Authority (NT EPA) within 14 days after ceasing to conduct the activity.
- The licensee may, with the approval of the NT EPA, surrender the licence to the NT EPA.

Amendment or Revocation of a licence (section 37 of the WMPC Act)

- The licensee may apply to amend or revoke a condition of this licence.
- A fee applies and the application must be made using the designated form via NT EPA Online.
- The NT EPA may also amend or revoke a condition of this licence as set out in section 38 of the WMPC Act.

Transfer of a licence (section 46 of the WMPC Act)

- The licensee can apply to transfer their licence to another person.

Renewal of a licence (section 40 of the WMPC Act and section 3 of the Regulations)

- The licensee may apply for the renewal of their licence not earlier than 90 days, and not later than 30 days, before their licence expires.
- A fee applies and the application must be made via NT EPA Online.

Public Register

- A copy of environment protection licences and any plans for environmental management, reports, submissions or documents required as a condition of an environment protection licence, will be placed on a register in accordance with section 9 of the WMPC Act.
- A copy of the Annual Return will be placed on the register.
- The NT EPA makes this register freely available from the NT EPA website.

Environment Protection Objectives (Part 4 of the WMPC Act), and Water Quality Standards (section 73 of the *Water Act*)

- An Environment Protection Objective (EPO) is a statutory instrument to establish principles on which:
 - a. environmental quality is to be maintained, enhanced, managed or protected;
 - b. pollution, or environmental harm resulting from pollution, is to be assessed, prevented, reduced, controlled, rectified or cleaned up; and
 - c. effective waste management is to be implemented or evaluated.
- In accordance with section 18 of the WMPC Act a beneficial use, quality standard, criteria or objective declared under section 73 of the *Water Act* and in force is an environment protection objective for the purposes of the WMPC Act.

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- The following EPOs and Beneficial Use Declarations (BUDs) are relevant to this licence:
 - Declaration of Beneficial Uses and Objectives, Darwin Harbour Region.

Environmental Interests

- This section highlights sensitivity of the surrounding land use and environment associated with the location of the approved activity.
- Sites of Conservation Significance - Darwin Harbour
- Directory of Important Wetlands - Port Darwin

Cultural Interests

- It is the licensee's responsibility to contact the Aboriginal Areas Protection Authority, appropriate land council or other governing body and ensure that any Authority Certificates required as a result of conducting the licenced activity are obtained and complied with.

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RULES FOR INTERPRETING THE CONDITIONS OF THIS LICENCE

- Where there is a discrepancy between the conditions of this licence and any plan, standard, guideline or other document referred to in this licence, the conditions of this licence prevail to the extent of the inconsistency.
- Any reference to any standard (Australian or international) in this licence means the relevant parts of the current version of that standard.
- A reference to any guideline or code of practice (or to the relevant parts of any guideline or code of practice) in this licence means the current version of the guideline or code of practice.
- Under section 39 of the WMPC Act, any contravention of or failure to comply with this licence by the licensee may be an offence.
- In determining whether the licensee has committed an offence, the licensee may be liable for the conduct of its directors, employees or agents.
- The licensee should ensure that each of its directors, employees, contractors or agents are aware of, and comply with, this licence.
- In this licence, unless the contrary intention appears, words that are defined in the WMPC Act are intended to have the meaning given to them in that Act.

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LICENCE CONDITIONS

GENERAL

- 1 The licensee must ensure the contact details recorded in NT EPA Online for this licence are correct at all times.
- 2 The licensee must at all times have a 24 hour emergency contact.
- 3 The licensee must pay the annual fee calculated in accordance with the method prescribed in the Regulations within 10 business days of the anniversary of the commencement date of this licence, for each year or part of a year that this licence is in force.
- 4 The licensee must cause clear and legible signage, in English, to be displayed in a prominent location at each public entrance to the premises that includes the following details:
 - 4.1 environment protection licence number issued under the WMPC Act; and
 - 4.2 24 hour emergency contact details.
- 5 The licensee must cause a copy of this licence to be available for inspection by any person, in hard copy form, at the premises.
- 6 The licensee must provide to the NT EPA, within 10 business days of a request, a copy of any document, monitoring data or other information in relation to the activity, in the format requested by the NT EPA.
- 7 All notices, reports, documents or other correspondence required to be provided as a condition of this licence, unless otherwise specified as a condition of this licence, must be provided in electronic form by uploading the document via NT EPA Online (or by emailing waste@nt.gov.au).
- 8 The licensee must maintain and implement documents listed in Table 2:

Table 2 - Documents Relevant to Licensed Activity

Reference	Document Title
-	Listed Waste Management Plan - Archer Waste Management Facility
171420-17	Archer Waste Transfer Station - Water Quality Monitoring and Management Plan

- 9 Within 10 business days of any amendment (other than typographical changes or revisions to formatting or referencing) being made to a document listed in Table 2 the licensee must provide the amended document to the NT EPA, along with:
 - 9.1 a tabulated summary of the amendment(s) with document references;
 - 9.2 reasons for the amendment(s); and
 - 9.3 an assessment of environmental risk associated with the amendment(s).
- 10 The NT EPA may require the licensee to revise or amend and resubmit any amended document. Where the NT EPA requires a document to be resubmitted, the licensee must submit it to the NT EPA by the date specified by the NT EPA.
- 11 The licensee must, for the duration of this licence, implement, maintain and follow a Consultation and Communication Plan which includes a strategy for communicating with persons who are likely to have a real interest in, or be affected by, the activity.
- 12 The licensee must maintain a Complaint Log for all complaints received by the licensee in relation to the

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activity.

- 13 The licensee must ensure that the Complaint Log includes, for each complaint received by the licensee, the following information:
 - 13.1 the person to whom the complaint was made;
 - 13.2 the person responsible for managing the complaint;
 - 13.3 the date and time the complaint was reported;
 - 13.4 the date and time of the event(s) that led to the complaint;
 - 13.5 the contact details of the complainant if known, or where no details are provided a note to that effect;
 - 13.6 the nature of the complaint;
 - 13.7 the nature of event(s) giving rise to the complaint;
 - 13.8 prevailing weather conditions at the time (where relevant to the complaint);
 - 13.9 the action taken in relation to the complaint, including any follow-up contact with the complainant; and
 - 13.10 if no action was taken, why no action was taken.
- 14 The licensee must implement, maintain and follow an Emergency Response Plan that addresses procedures for responding to emergencies associated with the activity that may cause environmental harm.

EARLY SURRENDER OF LICENCE

- 15 Any reports, records or other information required or able to be provided by the licensee under this licence must be submitted to the NT EPA prior to the licensee surrendering the licence. If the date on which a report, record or other information is required falls after the date the licensee requests to surrender this licence, the licensee must provide the report, record or information as far as possible using data available to the licensee up to and including the date the request to surrender the licence is made.

OPERATIONAL

- 16 The licensee must not collect, transport, store, recycle, treat or dispose of listed waste other than the listed waste specified in Table 1.
- 17 The licensee must ensure that listed waste found at the premises not specified in Table 1 is:
 - 17.1 managed in accordance with the conditions of this licence; and
 - 17.2 not stored for longer than 20 business days.
- 18 The licensee must ensure that all materials that are likely to cause environmental harm are handled and stored in areas with a containment system in accordance with the relevant Australian Standard. Where no relevant Australian Standard exists, the containment system must be sized to contain 110% of the volume of the largest container within the area.
- 19 The licensee must ensure any plant and equipment used by the licensee in conducting the activity:
 - 19.1 is reasonably fit for the purpose and use to which it is put;

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- 19.2 is maintained;
 - 19.3 is operated by a person trained to use the plant and equipment; and
 - 19.4 is operated by, or operated by a person accompanied by, a person trained to handle, store or dispose of listed waste in connection with the activity.
- 20 The licensee must ensure that wastewater generated from washing plant and equipment associated with the activity does not cause pollution.
- 21 The licensee must segregate waste received at the premises in clearly designated areas for recycling, re-use or disposal.
- 22 The licensee must segregate waste generated at the premises in clearly designated areas for recycling, re-use or disposal.
- 23 The licensee must ensure that litter:
- 23.1 is contained within the boundary of the premises;
 - 23.2 is not deposited or allowed to accumulate in stormwater drain(s), water or leachate dam(s); and
 - 23.3 does not accumulate along the boundary of the premises.
- 24 The licensee must not cause or permit waste to be burned.
- 25 The licensee must maintain a log of fires occurring at the premises including the following information:
- 25.1 the time and date of when the fire was reported;
 - 25.2 the circumstance which ignited the fire;
 - 25.3 the time and date of when the fire ceased and whether it burnt out or was extinguished;
 - 25.4 the location of the fire on the premises (e.g. green waste, putrescible waste);
 - 25.5 prevailing weather conditions;
 - 25.6 observations made in regard to smoke direction and dispersion;
 - 25.7 the amount of waste combusted by the fire; and
 - 25.8 action taken to extinguish the fire.
- 26 The licensee must notify the NT EPA of any fires at the premises by contacting the Pollution Hotline on telephone number 1800 064 567 as soon as practicable after (and in any case, within 24 hours after) first becoming aware of the fire. The licensee must provide the status of the fire and this licence number when contacting the Pollution Hotline.
- 27 The licensee must ensure that all listed waste being transported from the premises is transported by a person licenced under section 30 of the WMPC Act to transport the listed waste.
- 28 The licensee must comply with the National Environment Protection (Movement of Controlled Wastes between States and Territories) Measure.

DISCHARGES AND EMISSIONS

- 29 The licensee must ensure there is no migration or overflow of a contaminant or waste, which causes or may cause environmental harm, beyond the boundary of the land on which the premises are located. (For the avoidance of doubt, this condition is not intended to authorise the discharge of a contaminant or

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waste to any land or water which discharge has not been specifically authorised by another condition of this licence.)

- 30 The licensee must not allow a contaminant or waste, which causes or may cause environmental harm, to enter water.
- 31 The licensee must ensure that stormwater does not come into contact with a contaminant or waste, which causes or may cause environmental harm.

MONITORING

- 32 The licensee must conduct surface water monitoring in accordance with Attachment 1 (the Monitoring Program) of this licence.
- 33 The licensee must ensure that every sampling location is sampled in each sampling round. Where a sampling location is inaccessible or dry during a sampling round, further attempts must be made to sample in that same round should accessibility or water return to the location.
- 34 The licensee must ensure that all samples and field environmental data are representative of the conditions at the time of sampling.
- 35 The licensee must ensure that all samples and field environmental data are collected in accordance with recognised Australian Standards and guidelines (such as AS/NZS 5667, ANZG 2018).
- 36 The licensee must ensure that all monitoring samples are analysed at a laboratory with current NATA accreditation or equivalent, for the parameters to be measured.
- 37 The licensee must ensure any samples collected in accordance with this licence are obtained by, or under the supervision of a qualified sampler.
- 38 The licensee must ensure that, for each sample collected in accordance with the Monitoring Program or the activity, the following information must be recorded and retained:
 - 38.1 the date on which the sample was collected;
 - 38.2 the time at which the sample was collected;
 - 38.3 the location at which the sample was collected;
 - 38.4 the name of the person who collected the sample;
 - 38.5 the chain of custody forms relating to the sample;
 - 38.6 the field measurements (if any) and analytical results (if any) relating to the sample; and
 - 38.7 laboratory quality assurance and quality control documentation.

RECORDING AND REPORTING

- 34 The licensee must maintain records of the nature, quantities and source of waste, other than listed waste, received at the premises in each successive 12 month period following the commencement date of this licence.
- 35 The licensee must keep and maintain records relating to the activity undertaken and the listed waste handled by the licensee in each successive 12 month period following the commencement of this licence, which include:
 - 35.1 the date of collection;

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- 35.2 the source of the listed waste;
 - 35.3 the name of the transport company, if not the licensee;
 - 35.4 the vehicle registration;
 - 35.5 a description of the listed waste;
 - 35.6 the quantity of the listed waste;
 - 35.7 the final destination of the listed waste; and
 - 35.8 whether the listed waste was stored, recycled, treated or disposed of.
- 36 The licensee must retain records relating to waste, including listed waste, as required by the conditions of this licence, for a period of 2 years after the end of the 12 month period to which the record relates.
- 37 The licensee must keep records of all non-compliances with this licence. These records must be adequate to enable the licensee to comply with the non-compliance notification conditions of this licence.
- 38 The licensee must notify the NT EPA of any non-compliance with this licence by completing the Non-Compliance Notification via NT EPA Online (or by emailing waste@nt.gov.au), as soon as practicable after (and in any case within 24 hours after) first becoming aware of the non-compliance.
- 39 The licensee must include in the notification of non-compliance the following information:
- 39.1 when the non-compliance was detected and by whom;
 - 39.2 the date and time of the non-compliance;
 - 39.3 the actual and potential causes and contributing factors to the non-compliance;
 - 39.4 the risk of environmental harm arising from the non-compliance;
 - 39.5 the action(s) that have or will be undertaken to mitigate any environmental harm arising from the non-compliance;
 - 39.6 corrective actions that have or will be undertaken to ensure the non-compliance does not reoccur;
 - 39.7 if no action was taken, why no action was taken; and
 - 39.8 a date when an incident investigation report will be submitted to the NT EPA.
- 40 The licensee must keep records of all exceedances of trigger values specified in the most current Monitoring Program. These records must be adequate to enable the licensee to comply with the exceedance notification conditions of this licence.
- 41 The licensee must as soon as practicable (and in any case within 24 hours) after becoming aware, notify the NT EPA when a trigger value for a parameter specified in the most current Monitoring Program is exceeded on a single occasion where the parameter measures greater than or equal to two times the trigger value.
- 42 The licensee must ensure that the notification of the trigger value exceedance includes the following information:
- 42.1 when the exceedance was detected and by whom;
 - 42.2 the date and time of the exceedance;
 - 42.3 the actual and potential causes and contributing factors to the exceedance;

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- 42.4 the risk of environmental harm arising from the exceedance assessed in accordance with relevant standards as listed in Attachment 1;
- 42.5 the action(s) that have or will be undertaken to address the exceedance and/or environmental harm; and
- 42.6 if no action was taken, why no action was taken.
- 42.7 a date when an incident investigation report will be submitted to the NT EPA.
- 43 The licensee must complete and provide to the NT EPA a Monitoring Report, as prescribed by this licence, by 31 May each year.
- 44 The licensee must ensure that each Monitoring Report:
 - 44.1 is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring';
 - 44.2 includes a tabulation of all monitoring data required as a condition of this licence. Data must be provided electronically in Microsoft Excel format;
 - 44.3 includes long term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of three years (where the data is available). Data used in the analysis must be provided electronically in Microsoft Excel format; and
 - 44.4 includes an assessment of environmental impact from the activity.
- 45 The NT EPA may require the licensee to revise or amend and resubmit any Monitoring Report. Where the NT EPA requires the Monitoring Report to be resubmitted, the licensee must submit it to the NT EPA by the date specified by the NT EPA.
- 46 The licensee must submit a completed Annual Return via NT EPA Online within 10 business days after each anniversary date of this licence, which report relates to the preceding 12 month period.

END OF LICENCE CONDITIONS

This licence is not valid unless signed below:



Leonie Cooper
Director Environment Authorisations
Delegate of the Northern Territory
Environment Protection Authority
Dated: 21/12/2020

END NOTES

This licence is a renewal and supercedes EPL233-01

EPL233-01 was an amended licence issued on 1 May 2020.

EPL233 was issued on 26 April 2018 and superseded EPL96-01.

EPL96-01 was an amended licence issued on 13 April 2016.

EPL96 was issued on 19 December 2012.

The End Notes are to assist with historical records.

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DEFINITIONS

All terms in the Licence which are defined in the *Waste Management and Pollution Control Act* have the meaning given in that Act unless otherwise or further defined in this section.

DEFINITION	In this licence, unless a contrary intention appears:
24 hour emergency contact	the phone number of a person who can be contacted at any time and be capable of responding to and providing information about any incident associated with the activity.
Activity	the Scheduled activity as described on the covering page of this licence.
Annual fee	yearly fee payable in respect of the activity as specified in the WMPC Act and the Regulations.
Annual Return	an NT EPA prescribed format for demonstrating and reporting compliance with the conditions of this licence and providing information on waste volumes for the preceding 12 month period.
ANZG 2018	Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia.
Business days	a day not Saturday, Sunday or a public holiday, in the Northern Territory.
Complaint Log	a register of complaints to be maintained by the Licensee that records the details of each complaint received in relation to the activity.
Consultation and Communication Plan	a written plan documenting proposed consultation and communications for the activity before, during and after the activity which includes a strategy for communicating with members of the public who are likely to have a real interest in, or be affected by, the activity.
Contact details	includes the 24 hour emergency contact, and name, position title and phone number of a representative of the licensee who can be contacted about the licence and activity.
Contaminant	a solid, liquid or gas or any combination of such substances and includes: (a) noise, odour, heat and electromagnetic radiation; (b) a prescribed substance or prescribed class of substances; and (c) a substance having a prescribed property or prescribed class of properties.
Discharges	allow a liquid, gas or other substance to flow out from where it has been confined.
Emergency Response Plan	a written plan documenting the licensee's procedures for responding to emergencies caused by, resulting from or associated with the activity and that may cause environmental harm.
Environmental harm	(a) any harm to or adverse effect on the environment; or (b) any potential harm (including the risk of harm and future harm) to or potential adverse effect on the environment, of any degree or duration and includes environmental nuisance.
Environmental nuisance	means: (a) an adverse effect on the amenity of an area that: (i) is caused by noise, smoke, dust, fumes or odour; and

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	(ii) unreasonably interferes with or is likely to unreasonably interfere with the enjoyment of the area by persons who occupy a place within the area or are otherwise lawfully in the area; or (b) an unsightly or offensive condition caused by contaminants or waste.
Incident	includes: (a) an accident, emergency or malfunction; and (b) a deliberate action, whether or not that action was taken by the person conducting the activity in the course of which the incident occurred.
Land	includes water and air on, above or under land.
Leachate	any liquid produced by the action of water percolating through waste, and that contains contaminants.
Listed waste	a waste included under Schedule 2 of the Regulations.
Litter	litter, garbage, rubbish, refuse or waste matter, and includes the body of a dead animal.
Maintain	kept in a manner that it does not present or cause a risk of environmental harm or a hazard to persons or property or, for the purposes of documents including plans, a process of reviewing and amending documentation to ensure it is relevant.
Material environmental harm	environmental harm that: (a) is not trivial or negligible in nature; (b) consists of an environmental nuisance of a high impact or on a wide scale; (c) results, or is likely to result, in not more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) results in actual or potential loss or damage to the value of not more than \$50,000 or the prescribed amount (whichever is greater).
NATA	National Association of Testing Authorities, Australia.
Non-compliance	failure or refusal to comply, whether by act or omission, with obligations or requirements and includes any exceedance of a licence limit.
Non-compliance notification	an NT EPA prescribed format for notifying the NT EPA of a non-compliance.
NT EPA Online	online system for Environment Protection Licence (EPL), Environment Protection Approval (EPA) and Waste Discharge Licence (WDL) lodgement and maintenance.
Plant and equipment	all material items used in association with the activity, including (but not limited to) storage vessels and containers, pipe work and hosing, vehicles (including vessels), tools, and measuring equipment.
Pollute	(a) emit, discharge, deposit, or disturb, directly or indirectly, a contaminant or waste; or (b) cause, permit, or fail to prevent, directly or indirectly, the emission, discharge, deposition, disturbance or escape of a contaminant or waste.
Pollution	(a) a contaminant or waste that is emitted, discharged, deposited or disturbed or that escapes; or (b) a contaminant or waste, effect or phenomenon, that is present in the environment as a consequence of an emission, discharge, deposition, escape or disturbance or a contaminant or waste.

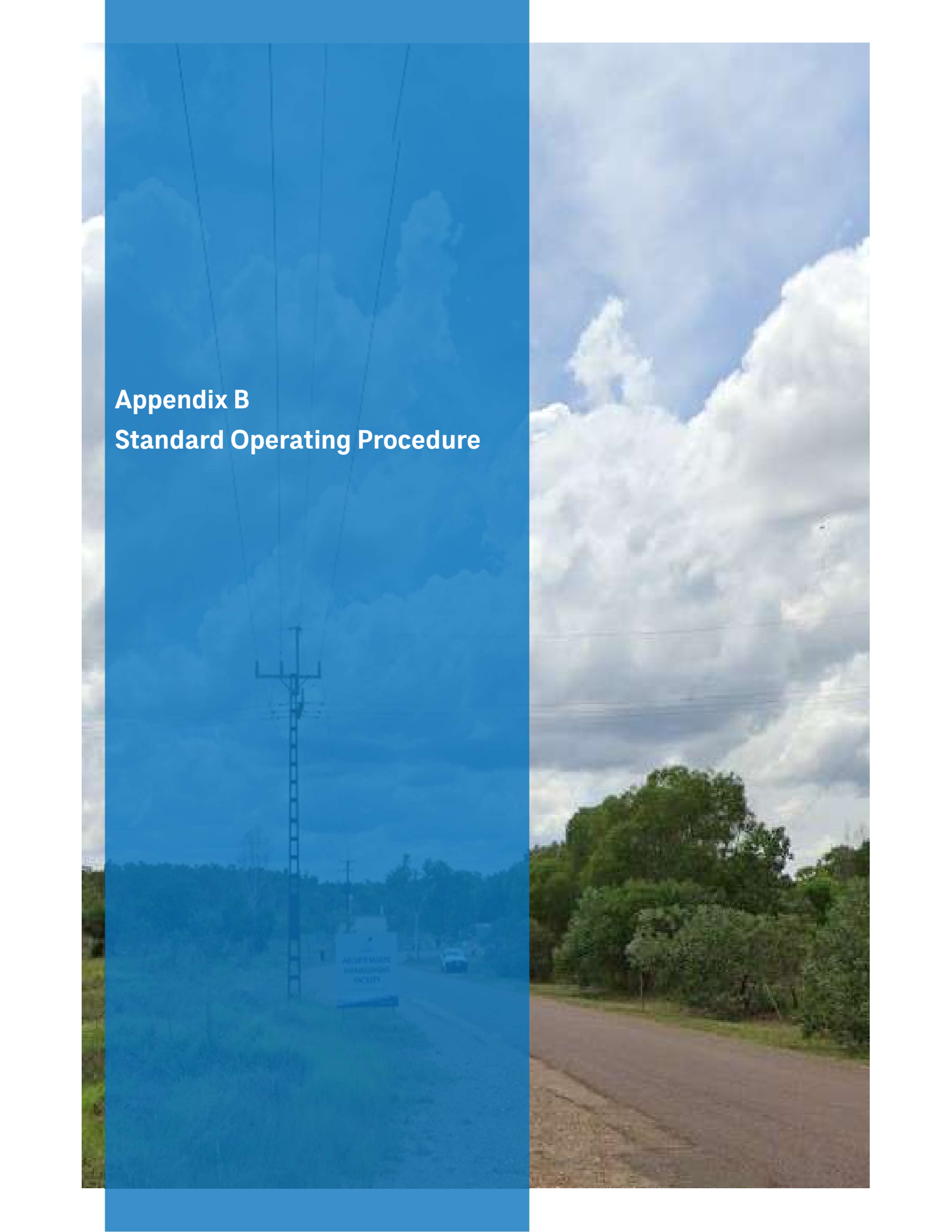
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Premises	the premises identified in this licence which includes equipment, plant and structures, whether stationary or portable, and the land on which premises are situated.
Public entrance	access to the premises that is utilised by the public.
Regulations	<i>Waste Management and Pollution Control (Administration) Regulations.</i>
Serious environmental harm	environmental harm that is more serious than material environmental harm and includes environmental harm that: (a) is irreversible or otherwise of a high impact or on a wide scale; (b) damages an aspect of the environment that is of a high conservation value, high cultural value or high community value or is of special significance; (c) results or is likely to result in more than \$50,000 or the prescribed amount (whichever is greater) being spent in taking appropriate action to prevent or minimise the environmental harm or rehabilitate the environment; or (d) results in actual or potential loss or damage to the value of more than \$50,000 or the prescribed amount (whichever is greater).
Stormwater	water flowing over ground surfaces, in natural streams and drains as a direct result of rainfall over a catchment and consists primarily of rainfall runoff.
Waste	(a) a solid, a liquid or a gas; or (b) a mixture of such substances, that is or are left over, surplus or an unwanted by-product from any activity (whether or not the substance is of value) and includes a prescribed substance or class of substances.
Wastewater	water that contains a contaminant or waste.
Water	includes: (a) surface water, ground water and tidal waters; (b) coastal waters of the Territory, within the meaning of the Coastal Waters (Northern Territory Powers) Act 1980 of the Commonwealth; and (c) water containing an impurity.
WMPC Act	the Northern Territory <i>Waste Management and Pollution Control Act</i> .

Attachment 1 – Surface Water Monitoring Program

			Sample Locations			
			Sample Locations			
			Site Code	SW07	SW01	SW04
			Easting (m E)	715031	715054	714895
Northing (m S)			8614965	8615118	8614982	
Parameter	Units	Trigger Value ¹	Frequency ²			
Field Measurement						
Flow ⁴	L/s	-	M	M	M	
pH	pH units	6 – 8.5 ³	M	M	M	
Electrical Conductivity (EC)	µS/cm	-	M	M	M	
Dissolved Oxygen (DO)	% saturation	80 – 100 ³	M	M	M	
Temperature	°C	-	M	M	M	
Turbidity	NTU	-	M	M	M	
Metals/Metalloids (filtered (0.45µm) and unfiltered)						
Cadmium (Cd)	µg/L	5.5 ⁷	M	M	M	
Chromium (Cr) ⁵		4.4 ^{6,7}	M	M	M	
Copper (Cu)		1.3 ⁷	M	M	M	
Lead (Pb)		4.4 ⁷	M	M	M	
Mercury (Hg)		0.4 ⁷	M	M	M	
Nickel (Ni)		70 ⁷	M	M	M	
Zinc (Zn)		15 ⁷	M	M	M	
Other						
Chemical Oxygen Demand (COD)	mg/L	-	M	M	M	
Total Suspended Solids (TSS)		10 ³	M	M	M	
Total Dissolved Solids (TDS)		-	M	M	M	
Nutrients						
Ammonia (NH ₃ as N)	µg/L	20 ³	M	M	M	
Total Nitrogen (TN)		300 ³	M	M	M	
Total Phosphorous (TP)		30 ³	M	M	M	
Hydrocarbons						
Total Recoverable Hydrocarbons (TRH)	µg/L	-	M	M	M	
Benzene		700 ⁷	M	M	M	
Toluene		-	M	M	M	
Ethylbenzene		-	M	M	M	
Xylene		-	M	M	M	
Naphthalene		70 ⁷	M	M	M	
M – Monthly during the months December to March	¹ – Trigger values only apply to monitoring location SW07 ² – Only during months December to March ³ – Based on Darwin Harbour Water Quality Objectives (Marine and Estuarine Systems – Upper Estuary) ⁴ – Estimate the flow at the time of sampling ⁵ – Analyse for Trivalent and Hexavalent Chromium if total chromium exceeds trigger value ⁶ – Based on Hexavalent chromium 95% species protection ANZECC Water Quality Guidelines 2018 (ANZG 2018) ⁷ – Based on 95% species protection for marine waters ANZECC Water Quality Guidelines 2018 (ANZG 2018)					



The background image shows a paved road curving to the right. On the left side of the road, there is a tall utility pole with several cross-arms and wires. Below the pole, a white sign is visible, which appears to read 'AGRI'S WASTE MANAGEMENT SOCIETY'. The road is bordered by green grass and trees. The sky is filled with large, white, fluffy clouds. A blue semi-transparent rectangle covers the left half of the image, and the title text is positioned within this rectangle.

Appendix B

Standard Operating Procedure

Field Preparation

Equipment

- Water Quality meter (WQM) and calibration solutions (depending on the meter usually pH, EC and ORP) and spare batteries (or make sure it is fully charged before use)
- Sample pole (can make one using a long stick (e.g. broom stick), zip ties and a cut off physico chem bottle)
- Sample bottles (see below)
- Sample cup
- Filters and syringes (always take extra)
- Sampling gloves – disposable, nitrile, powder-free.
- Clipboard, pens/pencil/ and permanent marker (and spares)
- Field sheets/field record
- Camera/phone to take photos
- Personal Field Folder containing; relevant SWMS, COC's, emergency contact information, staff contacts, site maps, spare field record sheets, standard operating procedure.
- Esky (with ice or icebricks to keep the samples chilled).

Personal Protection Equipment (PPE)

- Mobile phone
- First aid kit
- Long sleeved shirt
- Safety glasses (tinted and clear)
- Midge bite repellent (Aerogard)
- Enclosed shoes/Gumboots
- Sunscreen
- Drinking water and electrolyte additives where required
- Wet season gear (only when working during the wet season).

Sampling Procedure

Mobilisation

- Ensure equipment is charged and equipment is calibrated, take spare batteries (if meter uses them)
- Ensure equipment including vehicle is functioning, clean and has been booked
- Create the Chain of Custody
- Ensure that your mobile phone is charged (or carry a charger/ battery pack).

- Always notify your team leader/ manager upon arrival at site.
- Double check all equipment is packed before leaving the office to undertake sampling.

Things to consider - reducing sample contamination

Ensure that samples are not contaminated during sampling. Sources of sample contamination when collecting the sample include sunscreen, insect repellent, cigarette smoke and preservatives from other bottles. Reduce the risk of contamination by the following:

- Apply sunscreen and insect repellent prior to leaving for sampling and avoid applying directly on hands and wrists. Ensure that hands and wrists are washed with soap and water to remove any excess product.
- Do not smoke or eat when sampling.
- Use clean disposable gloves at each sampling site immediately before opening sample bottles. Ensure you do not wipe gloved hands on your skin or clothing.
- Keep sample bottles closed until sampling. If grime is present on the outside of the bottle, rinse with sample water prior to opening.
- Sample with hands away from the bottle opening (wear clean disposable gloves at all times when collecting the sample, and change gloves between sites or if contamination is suspected).

On Arrival

At each sample location, take a moment to assess the area for dangers, including potential slips / trip hazards, signs of crocodile habitat – slides, nests, footprints, snakes.

If the sample location cannot be accessed, write the reason on the field record, and make the Project Manager aware of why it was not sampled.

Consider a site dry only when the pool at its deepest point is too shallow to fill the sample bottles.

Take care not to introduce sediments when sampling water from shallow pools. Record the depth and pool dimensions on the field data sheet.

Sample alternative locations within the same reach (i.e. the visible section of the stream when standing at the sampling site) if the usual sampling site is dry. The location of an alternative site should be relative to the impact and its position. This will provide a continuity of data. Ensure that the alternative site location is documented on the field data sheet.

Field Records/Sheet

At each sampling location, field records shall include the following minimum information:

- Exact location info (sample point number/name and/or GPS coordinates), sampling time, date and the name of the sampler(s)
- Sample type, number of containers
- Weather conditions
- Sample collection equipment and method
- In-situ water quality parameter (pH, EC, DO, TDS, temperature etc) readings
- Physical characteristics of sample (e.g. odour, sheen, colour)
- Sample equipment decontamination procedures, where non-disposable sampling equipment is utilised

- Photograph of sample location
- Record comments on field observations including, water depth, flow, visibility, creek width, presence of fish / tadpoles etc and other fauna / flora in the area, and any unusual observations such as visible grease/scum, floating fish. Also make a note on the field book which samples have been collected at the site.

FILL IN ALL SECTIONS OF FIELD RECORD SHEET.

- Label all bottles with permanent marker. Fill in the sticker with Client/Company name, Project area, sample ID, date of sample and samplers' initials. On the large Ziplock bag, record date and sample ID. Don't forget to mark which of the bottles have been filtered in the field.
- Prior to taking the sample, don nitrile gloves to avoid sample contamination and skin burns from preservative in some of the bottles.
- If using the sample pole, place the cup in the carrier of the sample pole.
 - Face the cup upstream, capture water and discard of it downstream away from the sample collection location three times (this is part of the decontamination process and cleans the sample cup). Make sure you are collecting from at least 10cm below the water's surface.
 - Collect the water sample and fill up all the sample bottles that do not require field filtered water.
 - Collect water in the sample cup, put it on a flat surface. Use syringe to draw up water, attach the filter and push water through into the sample bottle marked 'field filtered'. This may take several draw ups of water and remember do not overflow the sample bottle. If you require the use of more than one filter while sampling (it will get hard to squeeze the sample into the bottle), remove the filter from the syringe and re-attach new filters, avoiding possible contamination (hold by the packaging only to avoid contamination), and squeeze the sample into the sample bottle.
 - Use one syringe for each sampling site
- Alternatively, samples can be collected directly from the water course if safe to do so.
 - If wading into the water to collect a sample, aim to minimise the amount of substrate disturbance. Sample water outside of the sediment plume or wait until the plume has been washed downstream. Note that during rapid flow if it is not safe to enter the water, samples should be collected using a sampling pole, with the operator standing on the bank.
 - If standing in the water, stand downstream of the sample bottle with the opening facing upstream. If using a sampling pole (or other appropriate device), place the sampling container in the water with the opening facing upstream and avoid placing hands near the mouth of the bottle. Water samples should be collected from as near to the centre of the channel as possible.
 - The sample container should be placed approximately 10 cm below the water surface. If the water is shallow, hold the bottle opening above the substrate to prevent the collection of settled solids (this will depend on the substrate type: silt, sand etc). Fill the bottle to the top and replace the lid, so as not to trap air bubbles. Replace the lid immediately after the bottle has been filled.
 - Use syringe to draw up water, attach the filter and push water through into the sample bottle marked 'field filtered'. This may take several draw ups of water and remember do not overflow the sample bottle
- Put all full bottles in the sample bag with the site ID on it and in the esky of ice/ice bricks.
- Undertake field duplicates, triplicates and rinsate blank samples, if required (see Quality Control/Quality Assurance below).
- Put rubbish into a bag -- used gloves, syringe, filters and dispose of responsibly.

Field Readings

- Turn on the WQM Unit.
- After sampling re-fill the sample cup with water from the sample point.
- Ensure all protective covers on the probes are removed (if applicable, this depends on the WQM – pH and DO probes often have protective caps)
- Rinse the water quality meter sensors over with the sample water.
- Re-fill the sample cup with sample water and place on a flat surface.
- Put the sensors into the sample cup. Care must be taken to ensure this equipment is not damaged whilst taking readings.
- Record the general site observations on the surface water field sheet while the sensors are stabilising their readings. Record comments on field observations including, water depth, flow, visibility, creek width, presence of fish / tadpoles etc and other fauna / flora in the area, and any unusual observations such as visible grease/scum, floating fish.
- Record the in-situ readings on the surface water field sheet.
- Remove the sensors from the water, careful not to damage them on removal.
- Replace the protective covers of the probes (if applicable) and turn off WQM Unit.
- Ensure the WQM Unit is stored appropriately so as not to damage the equipment.

Packing Up

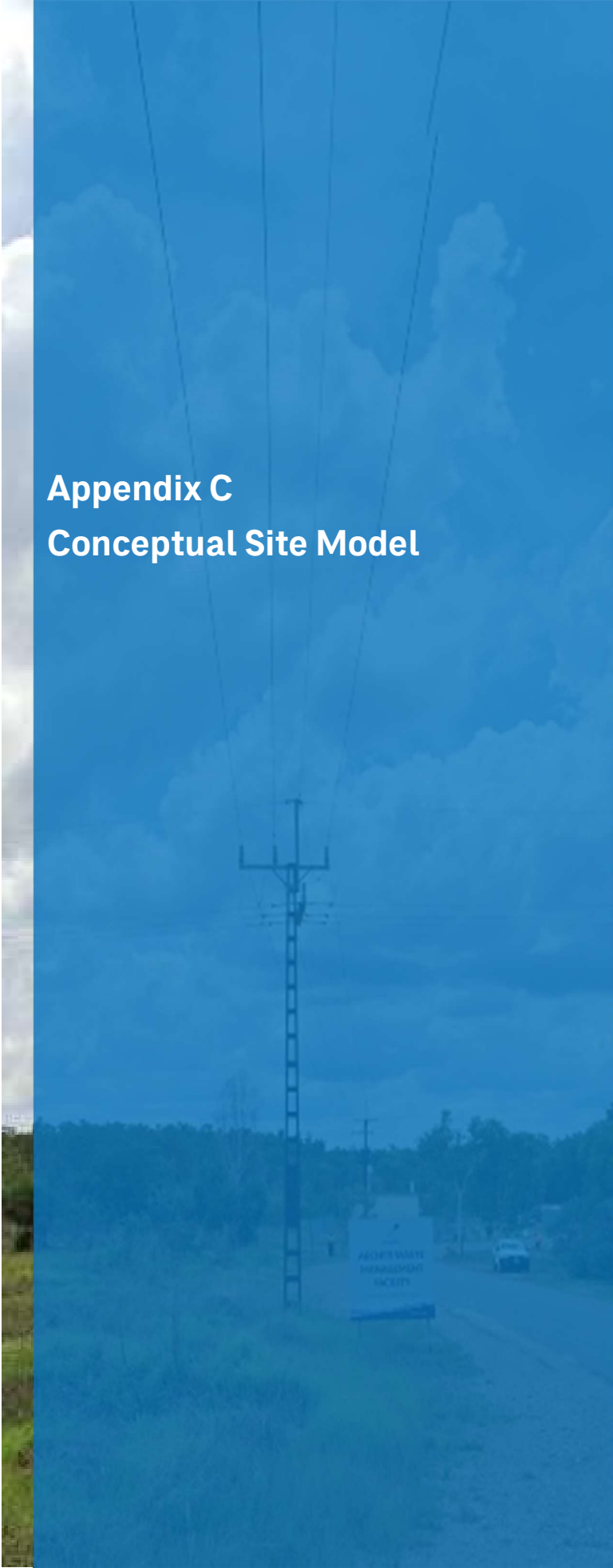
- As we are rinsing all equipment in the sample locations prior to collecting the actual samples all equipment just need a good rinse off at the last location and dried.
- Ensure WQM unit is turned off and packed up appropriately. Make sure to open it up in a safe location in the office to dry out before packing it away.
- Always notify your team leader/ manager on departure from site.
- Calibrate equipment as per the manufacturer's specifications in the relevant manuals and complete the calibration register.
- Take a photo of all field sheets and send it to the project manager.

Sample Dispatch

- The Chain of Custody (CoC) is to be completed prior to samples being dispatched to the airport. Ensure all samples are listed in the sample ID column and marked analysis is correct.
- Take a photo of the paperwork and send it to the project manager.
- Put a label sticker on each esky for transport.
- Samples are to be taken to the airport in eskys with ice bricks (ice bricks can be bottles of frozen water).
- Once the samples have been packed, place one signed copy of the CoC into a zip-lock bag and ensure it is properly sealed before placing it in the packed esky.

Relevant Documentation

- AS/NZS 5667.4:1998 'Water Quality – Sampling Part 4: Guidance on Sampling from Lakes, natural and man-made'.
- AS/NZS 5667.6:1998 'Water Quality – Sampling, Part 6: Guidance on sampling of rivers and streams'.

A photograph of a road with a utility pole and a sign, overlaid with a blue semi-transparent rectangle. The sign on the road reads "AGRI'S WASTE MANAGEMENT FACILITY".

Appendix C

Conceptual Site Model

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Report

The Archer Waste Transfer Station – Conceptual Site Model (CSM) - DRAFT



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Acronyms

Acronyms	Description
Ag	Silver
As	Arsenic
Ba	Barium
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
Cd	Cadmium
CH ₄	Methane
Co	Cobalt
COPC	City of Palmerston Council
Cr	Chromium
CSM	Conceptual Site Model
Cu	Copper
Hg	Mercury
H ₂ S	Hydrogen Sulfide
Mn	Manganese
N	Nitrogen
N ₂ O	Nitrous Oxide
NH ₃	Ammonia
Ni	Nickle
NT	Northern Territory
ODCB	Orthodichlorobenzene
P	Phosphorus
PAH	Polyaromatic Hydrocarbons
Pb	Lead
Sb	Antimony
Se	Selenium
Ti	Titanium
TRH	Total Recoverable Hydrocarbon
VOCs	Volitile Organic Compounds
Zn	Zinc

Document history & status

Revision	Date issued	Reviewed by	Revision type
A	25/10/2024	Sarah Leviston	Draft
B	28/10/2024	Jeni Young	Draft

Distribution of copies

Version	Date issued	Approved by	Quantity	Electronic	Issued to
0	30/10/2024	Jeni Young	1	Draft Word	City of Palmerston
1	04/11/2024	Jeni Young	1	Draft word (includes risk assessment)	City of Palmerston
2	13/12/2024	Jeni Young	1	PDF Final	City of Palmerston

Last Saved:	13 December 20242024
File Name:	1001837 CSM Draft Rev 2
Author:	Sahil Rana
Project Manager:	Jeni Young
Client:	Palmerston City Council
Document Title:	The Archer Waste Transfer Station – Conceptual Site Model (CSM) - DRAFT
Document Version:	Rev 2
Project Number:	1001837

Section 1 Introduction

CDM Smith has been engaged by the City of Palmerston Council (COPC) to review and update the existing Conceptual Site Model (CSM) for Archer Waste Transfer Station (herein referred as “the site”) to ensure it is reflective of current operational site conditions. COPC operates the Archer Waste Transfer Station situated on Lot 11497, Town of Palmerston, Elrundie Avenue, Archer. City of Palmerston Council is authorised to ‘store’ waste at the site under the NT *Waste Management and Pollution Control Act* in accordance with Environment Protection Licence (EPL233-02). The overall objective of this CSM is to assess the current risks to human health and the environment from current operational activities as a waste transfer station. The CSM is based on data provided to CDM Smith by COPC.

Note: The CSM only considers the operation activities associated with the site use as a waste transfer station. Historical site uses, current and historical surrounding uses are not considered part of this CSM

1.1 Site Details

The site operated as the waste transfer station for the Palmerston area. The site area is approx. 16 hectares, however the main operational area used for storage of waste occupies <2 hectares shown in Figure 1 1 below. The majority of the operational area of the site is covered with bitumen, except for the green waste area and the truck access to the general waste skip bins, which remain unsealed. Some parts of the site are grassed, but no waste is stored or contained in these grassy areas (EcOz, 2018). The site details are provided in Table 1-1 below

Table 1-1 Site details*

Item	Description
Site Location	Site is located south of the suburb of Bellamack, on the southern side of Elrundie Avenue, and is accessed via the existing Flack Road and Durack Road
Site Area	Site Area – approx. 16 hectares Operational Areas – <2 hectares shown in Figure 1-1 below.
Municipality	Bellamack
Planning Zone	GI – General Industry
Planning Overlays	Land subject to flooding – Eastern boundary
Current Use	A waste transfer station
Surround land uses	South: Native bushland and Adelaide to Darwin railway line (approx. 800 m) and estuarine mangrove flats located approx. 1100 m. North: Suburban subdivisions along Elrundie Avenue (<500 m) East: Predominantly vacant land West: Predominantly vacant land South-east: Old decommissioned landfill
Surrounding Receptors	Nearby receptors comprise: Suburban residents (nearest >300 m) Onsite worker/s and public user/s Waterways including two unnamed existing drainage lines and Elizabeth River approx. 2km south of the site

Item	Description
	Ecological receptors (terrestrial/aquatic flora & fauna) Recreational user/s in surroundings Groundwater aquifers and shallow seasonal water table
Topography and Drainage	The site typically slopes from north to south. The site has two existing drains that flow from north to south and discharge into the Elizabeth River. Drainage is influenced by a ridge that runs on a north-south trajectory through the site, thus shedding water toward the east and west respectively (Figure 1-2)
Geology	Geoscience Australia mapping shows that the site's underlying geology is mainly sedimentary rocks. Soils are primarily sandy, with variations of sandy clay and sandy silt, underlain by claystone and siltstone. This suggests that the soils are relatively porous, allowing water to move both vertically and laterally through the soil profiles.
Hydrogeology	Groundwater direction is south-west towards Darwin Harbour. Groundwater depth is generally between 20 m and 40 m. Previous assessment and hydrogeological studies undertaken by EcOz Environmental indicates that there is a deeper, high yielding aquifer and a shallow seasonal water table that fluctuates seasonally and is tidally influenced in the eastern portion of the site.

*Site details are taken from EcOz, 2018

Key site features and operational area of the site are provided in Figure 1-1.

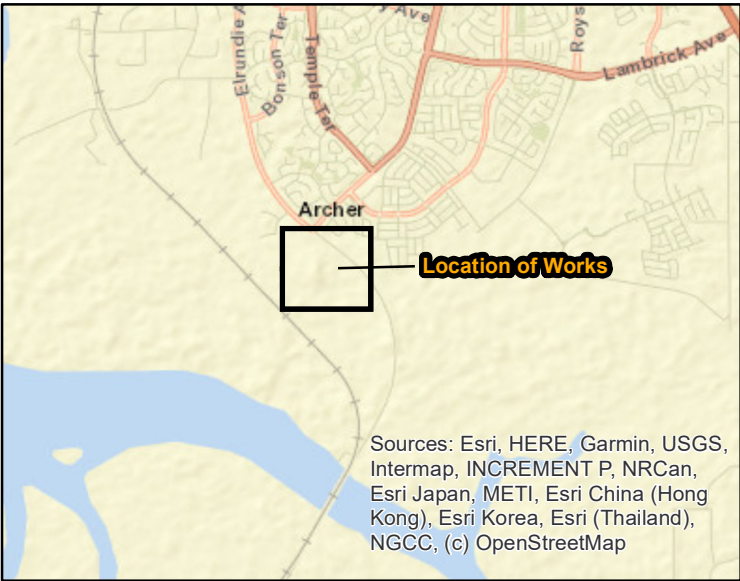
1.2 Activities Overview

An list of operational activities is provided below:

- Receiving of general waste
- Receiving of listed wastes as per EPL 233-02
- Receiving of green waste
- Mulching
- Receiving of recyclables including carboards, steel, white goods
- General operation activities including truck, excavator and forklift movements.



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Archer Waste Facility

Figure 1-1 Key Features

Legend

- Facility Labels
- Stream
- ▭ Archer Waste Facility
- Roads
- Rivers

DATA SOURCE:
Esri, Maxar, Geoeye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.



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Archer Waste Facility

Figure 1-2 Water pathways

Legend

- Surface_Water_Sample_Locations
- ➔ Surface Water Flows
- ▭ Archer Waste Facility
- Contours 1m
- Stream
- ▭ Green_Waste
- ▭ Paint
- ▭ White_Goods
- ▭ Scrap_Metal
- ▭ Waste_Batteries
- ▭ Waste_Oil
- ▭ Dry_Recycling
- ▭ Gatehouse
- ▭ Waste_Transfer_Bin
- Roads

DATA SOURCE:
Esri, Maxar, Geoeye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Scale
0.04 0.02 0 0.04
Kilometres
Scale @ A4 size: 1:1,200

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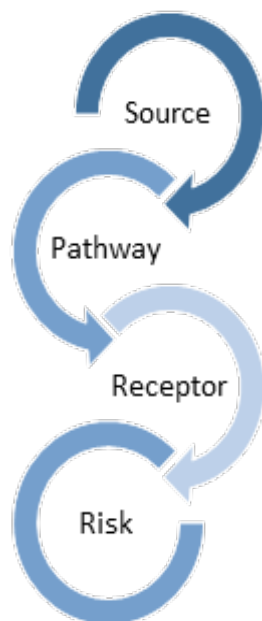
Section 2 Conceptual Site Model

Australian guidance for environmental assessment (NEPM, 2013) recommends development of a CSM to identify and assess risk to receptors, from identified contamination. The purpose of the CSM is to describe how the 'environmental values' may be impacted by the described contamination.

Development of a conceptual site model includes identification of the following:

- Sources of contamination and likely chemicals of concern.
- Pathways by which contamination may move in the environment (for example migration from surface water to groundwater).
- Receptors, including humans, animals, waterways, and ecosystems that may be impacted by the identified contamination.

The CSM identifies potential pathways between the identified source(s) and receptor(s). Where the pathway between a source and a receptor is incomplete, exposure via that pathway does not occur. However, based on the data gaps identified as part of this work, some potential pathways are yet to be confirmed. Where a complete source-pathway-receptor linkage exists, an assessment of the nature and significance of the exposure pathway is required to assess the level of risk (ASC NEPM, 2013).



The development of a **CSM** is a **dynamic process which continues to evolve as more information becomes available**. The essential elements in this preliminary CSM include:

- Identification of primary and secondary sources of contamination. Primary sources are identified contaminant streams (like the storage and use of chemicals) or events that occurred onsite (like chemical spills) and secondary sources are impacted media resulting from dispersion or spreading from primary sources.
- Potential exposure pathways (including movement of contaminants onsite and potentially off-site).
- Receiving environments and receptors (people and ecological receptors).

The CSM brings information together specifically relating to the site and surrounds with consideration of the contaminants of concern associated with operational activities.

2.1 Preliminary conceptual site model

2.1.1 Potential source of contamination

The site operates as a waste transfer station for the Palmerston area located south of the suburbs of Bellamack, which accepts various types of waste including, listed wastes (e.g. oils, paint, batteries), inert general waste, green waste, household waste and construction waste. Table 2-1 below presents a summary of potential sources of contamination that may be associated with these areas and provides a relative priority rating for investigation of each item with respect to contamination at the site. It should be noted the rating is not intended to infer severity or extent of impact; rather, it is the intention to indicate the potential for the contamination issue to exist at the site.

Note: Information about historical use of site has not been provided.

Table 2-1 Onsite activities associated contaminant with the site operations

Potential Onsite Sources – Site Operations	Commonly Associated Contaminants
General waste stored in skip bins	BOD, Metals (such as Cr, Cu, Cd, Pb, Zn), TRH, PAH, BTEX, Odour causing compounds
Listed waste – batteries (stored above ground on bitumen surface)	Metals (such as Sb, Cd, Co, Pb, Mn, Ni, Hg, Ag, Zn), Acids (such as sulphuric, hydrochloric)
Listed waste – paint (stored above ground on bitumen surface)	Metals (such as As, Ba, Cd, Cr, Co, Pb, Mn, Hg, Se, Zn, Ti), Solvents (e.g. toluene), Resins
Listed waste – oil waste (stored above ground on bitumen surface)	TRH, BTEX, PAH, Acids, Alkalies, Metals, Cyanides
Green waste, mulching (bundled areas but unsealed)	Nutrients (N, P), Metals (naturally occurring in the soils), BOD
Recycling and storage of white goods and steel	Solvents (such as methylene chloride, ODCB), TRH, Metals (such as Cr, Cd, Pb, Zn)
Operational activities	Metals, Odour causing compounds

2.1.2 Transport Pathways and Receptors

Based on the review of the current site activities a conceptual site model was developed to identify potential impacts to receptors and the potential pathways linking them. Development of the conceptual site model included assessment of the following:

- Sources of contamination and potential contaminants of concern (listed above)
- Pathways by which contaminants may move in the environment.
- Receptors, including humans, animals, waterways and ecosystems that may be impacted by the identified contamination onsite and offsite.

A summary of the potential sources and pathways, based on site operations and operational controls is provided in Table 2-2.

Table 2-2 Review of Complete and Potential Exposure Pathways

Source	Pathway	Receptor	Complete/Incomplete	Potential Transport Mechanisms and Pathways	Potential Receptors
General waste (stored in skip bins) – bunded and unbunded areas	P1	R1	Complete	P1 - Inhalation of vapours (VOCs and odour causing compounds) from the waste stockpiles. P2 - Direct contact with waste and/or site soils (dermal, oral and dust inhalation). P3 - Surface water run off P4 - Leaching of contaminants through the soil profile into groundwater via unsealed surface.	R1 - Onsite worker/s and members of public accessing the site. R2 - Waterways – local drainage and further downstream the Elizabeth River. R3 - Ecological receptors offsite - mangrove flats and associated flora and fauna. R4 - Recreational user/s in surroundings. R5 - Groundwater aquifers and shallow seasonal water table. R6 – Surrounding residents
	P2	R1	Potential*		
	P3	R2	Complete		
		R3	Potential^		
		R4	Potential^		
	P4	R5	Potential*		
Listed wastes including batteries, waste oil and paints (bunded)	P2	R1 -	Complete		
Green waste and mulching	P1	R1	Complete		
	P2	R1	Complete**		
	P3 -	R2	Complete		
		R3	Potential^		
		R4	Potential^		
	P4	R5	Complete		
Recycling and storage of steel (bunded)	P2	R1	Potential*		
Recycling and storage of white goods (unbunded)	P2	R1	Potential*		
Operational activities	P2	R1	Complete		
* Direct contact with waste is deemed a potential exposure pathway where reasonable steps are taken to ensure waste contact is minimised – for example staff and visitors have restricted access to stored waste, prior to removal from site. ** complete pathways for green waste and mulch are attributed to windblown dust/particulates ^ Pathways to ecological receptors and recreational land users is a potential pathway, dependant on the contamination status of water that results from the operational uses of the site.					

2.1.3 Preliminary Conceptual Site Model

The preliminary CSM, comprising a visual representation of contamination sources and how contamination might move in the environment to onsite and offsite receptors is shown in Figure 2-1 along with a flowchart.

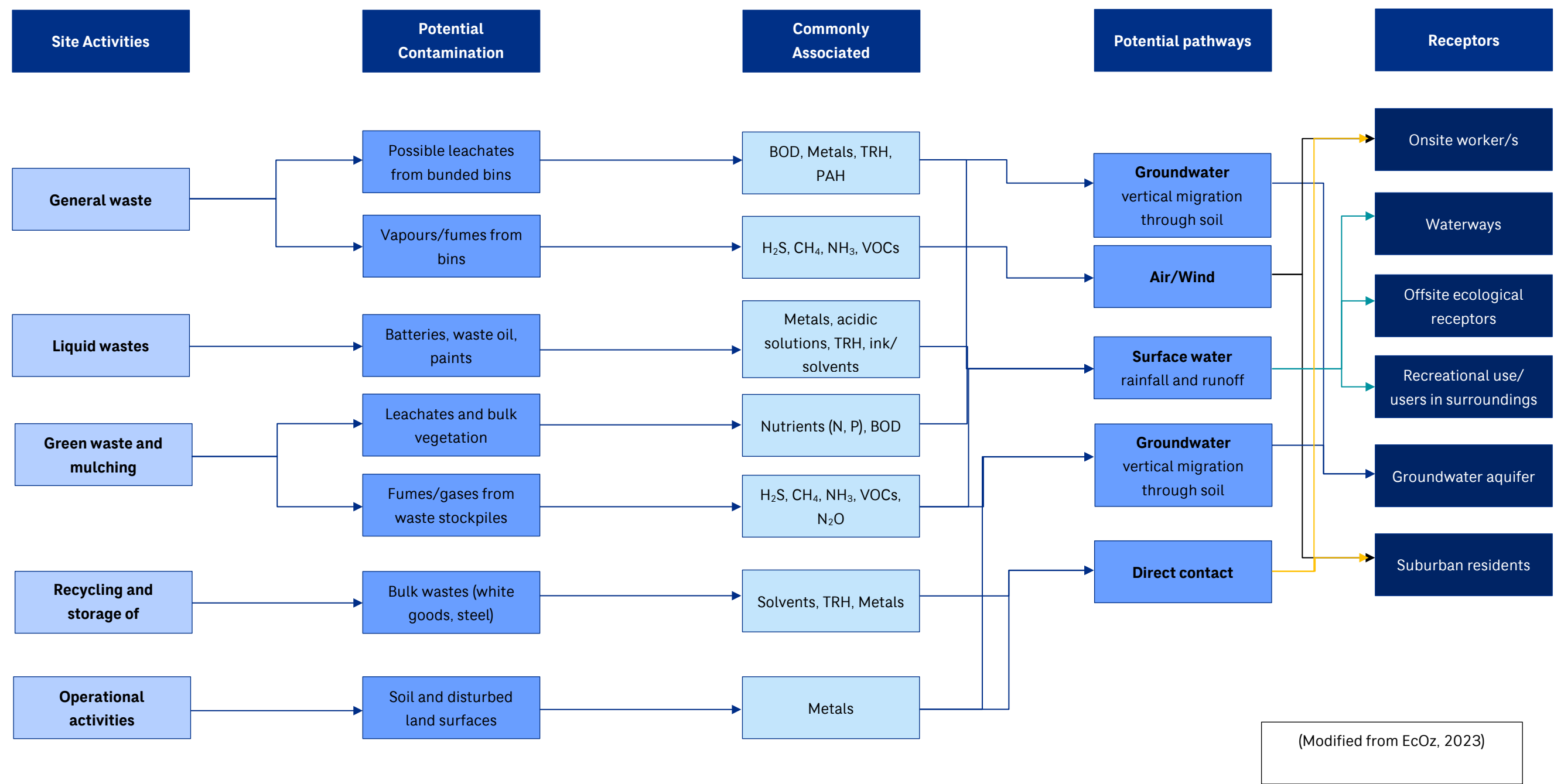


Figure 2-1 – Preliminary Conceptual Site Model

2.1.4 Review of Complete Exposure Pathway

The review of complete and potential exposures pathways is based on the information presented in Figure 2-1 above.

The following pathway → receptor linkages were considered incomplete for the site:

- Surface water run-off and infiltration to groundwater associated with listed wastes (batteries, waste oils and paints) where waste materials were suitably housed and waste was placed on a suitable bund, with appropriate protection from excessive rainfall.
- Surface water run-off and infiltration to groundwater associated with recycling and storage of steel, where waste materials are suitably housed, and waste is placed on a sufficient hardstand and material is sorted and removed from site efficiently.
- Infiltration to groundwater associated with recycling and storage of white goods, where waste materials are suitably housed, and waste is placed on a sufficient hardstand and material is sorted and removed from site efficiently.
- Exposure pathways for surrounding residents were considered incomplete based on the considerable distances to receptors (closest residents are 300m to 500 m from the site).

The above incomplete exposure pathways may require revision if site conditions are different to those assumed.

2.2 Data Gaps and Uncertainties

2.2.1 Data Gap Assessment

This review was undertaken with the purpose of identifying data gaps in the current information to support the CSM in:

- forming an opinion regarding the actual condition of the site and if there are risks of harm to human health or the environment, and;
- review of complete and potential exposure pathways that may require assessment or management to manage the risk of harm to human health or the environment associated operational activities.

The following data gaps and uncertainties have been identified as part of this preliminary CSM.

- The nature of any odour causing compounds has not been qualified.
- No measures of dust/particulates from the site are present to qualify exposure pathways.

The nature and extent of soil, groundwater and surface water contamination (onsite and offsite) has not been fully defined and as such no review of environmental values has not been undertaken.

The data gaps listed above are not comprehensive and other data gaps may be identified after the site walkover.

2.2.2 Recommendations

- Ongoing monitoring be undertaken for complete and potential exposure pathways, including groundwater and surface water at onsite drainage channels and nearby surface water bodies, to assess the contamination status of surface water and groundwater, as it relates to operational status of the site.
- Ongoing review of waste management procedures including storage and transfer of waste materials to reduce exposure to onsite and offsite receptors.
- Keep a record of any complaints as they relate to odour and dust, to determine requirements for active monitoring.

Section 3 Risk Assessment

The risk assessment framework for the Project has been developed and implemented in accordance with international best practice standard methodologies including:

- Australian/New Zealand Standards (AS/NZS) ISO 31000:2018: Risk management— Principles and guidelines (Standards Australia 2018); and
- Standards Australia/Standards New Zealand (SA/SNZ) HB 203:2012: Environmental risk management – Principles and process (Standards Australia/Standards New Zealand 2012).

The risk assessment aims to develop a qualitative assessment of potential impacts that may occur during the works, propose mitigation and management measures, and assess the residual risk (assuming effective implementation of measures).

3.1 Risk Matrix

Assessment of risk has been conducted through pragmatic consideration of the circumstances around risks, identifying necessary controls to address potential impacts and assuming effective implementation of planned and committed mitigation of potential impacts. While prioritisation has been given to avoidance as per the environmental decision-making framework, mitigation is proposed, where possible, to achieve a reduced residual risk (risk after mitigation) to below “Extreme” or “High” risk outcomes to the extent reasonably practicable.

The first step involves the identification of the consequence levels should a particular risk result in a negative impact and these are summarised in Table 3-1.

Table 3-1 Maximum reasonable consequences

	Ranking	Health & Safety	Vehicle/Property Damage	Environmental	Reputation/Community/Media	Financial
Negligible	1	Report only – no treatment required of an employee, public or contractor	Damage to vehicle or property under \$1K	No environmental damage	Minimal impact to any issue regarding reputation/community/media	Financial loss under \$1K
Minor	2	First aid treatment of an employee, public or contractor	Damage to vehicle or property under \$10K	Minor environmental damage. Rectification occurs from within existing budget	Some impact on business continuity/reputation	Financial loss under \$10K

	Ranking	Health & Safety	Vehicle/Property Damage	Environmental	Reputation/Community/Media	Financial
Moderate	3	Medial treatment of employee, public or contractor	Damage to vehicle or property under \$50K	Would cause some environmental damage requiring the allocation of some resources to rectify	Moderate to small impact on business continuity/reputation	Financial loss under \$50K
Major	4	Lost time injury or permanent disability of employee, public or contractor or notifiable to NT WorkSafe	Damage to vehicle or property under \$100K	Would cause extensive environmental damage requiring significant resources to rectify	Significant impact on business continuity or reputation/local media exposure	Financial loss under \$100K
Catastrophic	5	Fatality of employee, public or contractor or notifiable to NT WorkSafe	Damage to vehicle or property over \$100K	Would cause catastrophic environmental damage leading to fines against the Council and significant resources to rectify	Critical impact on business continuity or reputation/national media exposure	Financial loss over \$100K

The second step involves defining the risk categories. This considered the frequency of activities that may cause the impact and likelihood (probability) of the impact occurring during the activity. The level of likelihood that a risk would occur is summarised in Table 3-2.

Table 3-2 Level of Likelihood

LIKELIHOOD		
Rare	1	Highly unlikely, may occur in exceptional circumstances (never heard of within this environment)
Unlikely	2	Unlikely, but could occur at some time (has occurred previously within this environment)
Possible	3	Possible that it might occur at some time (has occurred previously within this environment)
Likely	4	Will probably occur in most circumstances (happens several times a year within this environment)
Almost Certain	5	Expected to occur in most circumstances (happens often each year within this environment)

The risk rating categories that were adopted for this project are outlined in Table 3-3.

Table 3-3 Risk Rating Categories

Risk category	General description
Low	Potential impacts either require no specific management measures or can be directly managed through design measures, general mitigation measures and safety controls.
Moderate	Management responsibility required. Potential impacts can be mitigated through the application of relatively standard environmental management measures.
High	Management attention needed. Detailed assessment and planning are necessary to develop appropriate measures to mitigate and manage the potential impacts associated with the risk.
Extreme	Immediate action required. Detailed assessment and planning are necessary to develop appropriate measures to mitigate and manage the potential impacts associated with the risk.

The risk rating category of each potential impact was then determined by combining the likelihood with the consequence of the risk according to the matrix shown in Table 3-4. Table 3-4 provides a summary of the qualitative risk matrix adopted and the levels of risk for the various consequence and likelihood combinations.

Table 3-4 Risk matrix

	Consequence				
Probability	Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost certain (5)	Moderate 5	Moderate 10	High 15	Extreme 20	Extreme 25
Likely (4)	Low 4	Moderate 8	High 12	High 16	Extreme 20
Possible (3)	Low 3	Moderate 6	Moderate 9	High 12	High 15
Unlikely (2)	Low 2	Low 4	Moderate 6	Moderate 8	Moderate 10
Rare (1)	Low 1	Low 2	Low 3	Low 4	Moderate 5

As indicated in Table 3-4, risk rating scores were also attributed to each risk rating. These scores ranged between one and twenty five. Risks were initially allocated assuming that no management measures were in place. The risk rating was then revised to take into account the effectiveness of mitigation measures that would be implemented, known as the residual risk rating.

Table 3-5 Risk assessment

Aspect	Impact	Risk Ranking	Mitigation/Control	Residual Risk
Construction activities (current and future)	Erosion and sedimentation of surrounding environment, and downstream watercourses (Elizabeth River and Darwin Harbour)	Moderate 9	- Implement an Erosion and Sediment Control Plan - Install and maintain erosion and sediment controls as per plan - Visual inspections of erosion and sediment controls post rainfall events - Visual inspections for sedimentation of surrounding environment and waterways post rainfall events	Low 4
	Noise and dust emissions and impact on nearby residents	Moderate 6	- Record and respond to any complaints received from neighbouring residents - Maintain buffer distance between earthworks areas and residential zones - Implement dust suppression as required (e.g. water carts) to minimise dust emissions - Restrict operating hours to avoid impacts on nearby residents - Maintain skip bin covers as required to minimise wind distribution of waste	Low 1
	Greenhouse gas emissions from machinery use	Moderate 8	- Maintain vehicles and machinery in good working order - Operate machines in an efficient manner - Avoid use of machinery when not required	Low 2
Collection and storage of general waste	Pollution of downstream waterways and Darwin Harbour with gross pollutants, metals, hydrocarbons, nutrients, pathogens, and associated impacts on aquatic ecosystem health	High 12	- Separation and storage of general waste in appropriately contained, bunded and sealed or covered containers - Maintenance of storages to ensure waste is contained - Housekeeping to ensure all waste is within designated storages - Maintenance of drainage and bunding downstream around general waste storage area to capture any surface runoff - Inspections and implementation of clean up measure post rainfall as required - Regular removal of stored waste to Shoal Bay Waste Management Facility	Moderate 8

Aspect	Impact	Risk Ranking	Mitigation/Control	Residual Risk
	Groundwater contamination from leachate from storage areas, seeping vertically into groundwater via soils	Moderate 6	- Separation and storage of general waste in appropriately contained, banded and sealed or covered containers - Maintenance of storages to ensure waste is contained - Housekeeping to ensure all waste is within designated storages - Inspections and implementation of clean up measure post rainfall as required - Regular removal of stored waste to Shoal Bay Waste Management Facility	Low 2
	Impacts on local residents of odour (particularly during dry season with SE winds)	Moderate 6	- Separation and storage of general waste in appropriately contained, banded and sealed or covered containers - Ensure storage areas are covered, and all rubbish is within storage areas - Regular removal of stored waste to Shoal Bay Waste Management Facility - Record and respond to complaints received from neighbouring residents	Low 2
Storage of listed wastes (batteries, oil, paint)	Spill of product and contamination of surface water runoff and downstream water bodies	Moderate 9	- Storage of substances in accordance with Listed Waste Management Plan (i.e. banded, under cover, separated) - Housekeeping and labelling for adequate separation and storage of listed wastes - Spill kit kept at facility and staff trained in spill response - Maintenance of records and site manifest to monitor volumes - Regular inspections of storage areas to identify potential spills - Regular removal of listed waste to Shoal Bay Waste Management Facility	Low 2
	Spills and soil contamination, with additional potential seepage into groundwater	Moderate 9	- Storage of substances in accordance with Listed Waste Management Plan - Housekeeping and labelling for adequate separation and storage of listed wastes - Spill kit kept at facility and staff trained in spill response - Implement spill response process in Listed Waste Management Plan if required - Maintenance of records and site manifest to monitor volumes	Low 2

Aspect	Impact	Risk Ranking	Mitigation/Control	Residual Risk
			Regular inspections of storage areas to identify potential spills (visual inspection for stained soil)	
Storage and mulching of green waste	Contamination of surface water runoff and downstream waterways with nutrient rich water and organic matter(e.g. TKN, BOD)	High 12	- Drainage works to direct surface water runoff around mulch piles - Maintenance of mulch stockpiles to contain mulch in allocated area - Install berms around mulch area to capture mulch prior to runoff entering drains - Visual inspections of mulch stockpile areas following rainfall to identify any issues requiring remediation - Monitoring of downstream waterways to identify any potential impacts on water quality	Low 2
Storage of bulk wastes	Spread of gross pollutants into surrounding landscape	Moderate 9	- Housekeeping, separation and storage of inert wastes in a manner that minimises the spread of gross pollutants (e.g. bunded pallets in dedicated areas) - Monitoring and maintenance of storage areas to minimise impacts on surrounding area, cleaning up as required	Low 2
Recycling activities	Spread of gross pollutants into surrounding landscape	Moderate 8	- Housekeeping, separation and storage of inert wastes in a manner that minimises the spread of gross pollutants - Monitoring and maintenance of storage areas to minimise impacts on surrounding area, cleaning up as required	Low 2
General operations	Greenhouse gas emissions from machinery use	Moderate 6	- Maintain vehicles and machinery in good working order - Operate machines in an efficient manner - Avoid use of machinery when not required	Low 2
	Noise and dust emissions and impact on nearby residents	Moderate 8	- Record and respond to any complaints received from neighbouring residents - Maintain buffer distance between earthworks areas and residential zones, and plant vegetation buffers as required around site boundary - Implement dust suppression (e.g. water carts) as required - Restrict operating hours to avoid impacts on nearby residents	Low 2

Aspect	Impact	Risk Ranking	Mitigation/Control	Residual Risk
			Maintain waste storage areas as required to minimise wind distribution of waste	
	Odour emissions and impact on nearby residents	Moderate 8	- Maintain good housekeeping and separation of wastes to ensure adequate storage - Record and respond to any complaints received from neighbouring residents - Ensure storage areas are covered to minimise odour - Maintain buffer distance between storage areas and residential areas - Regular removal of stored waste to Shoal Bay Waste Management Facility	Low 2

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