



Prestons Waste Treatment Facility
Amendment Report

Appendix H

Draft Operational waste management plan



PRESTONS WASTE TREATMENT FACILITY

OPERATIONAL WASTE MANAGEMENT PLAN

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Glossary

Term	Definition
ADG Code	Australian Code for the Transport of Dangerous Goods by Road & Rail
ASS / PASS	Acid Sulfate Soils / Potential Sulfate Soils
CA	Consignment Authorisation
DCP	Development Control Plan
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPL	Environmental Protection Licence
GAC	Granular Activated Carbon
GIA	General Immobilisation Approvals
HiQ	HiQ Waste Treatment Services Pty Ltd
OEMP	Operational Environmental Management Plan
OTMP	Operational Traffic Management Plan
OWMP	Operational Waste Management Plan
PAH	Polycyclic Aromatic Hydrocarbons
POEO Act	Protection of the Environment Operations Act 1997
PPE	Personal Protective Equipment
PFAS	Per- and poly-fluoroalkyl substances
RRO / RRE	NSW EPA Resource Recovery Order (RRO) and Resource Recovery Exemption (RRE)
SAQP	Sampling and Analysis Quality Plans
SDS	Safety Data Sheet
SIA	Specific Immobilisation Approval
SSD	State Significant Development
TCLP	Toxic Characteristic Leaching Procedure
The Facility	The proposed building of which waste is received, treated, processed and disposed of at Prestons Waste Transfer Facility
The Site	9-13 Whyalla Place, Prestons NSW
Tpa	Tonnes per annum



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Term	Definition
TPH	Total Petroleum Hydrocarbons
VCZ	Volcanic Clinoptilolite Zeolite
WTF	Waste Treatment Facility
LWTP	Liquid Waste Treatment Plant

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1 Introduction

1.1 Overview

[Drafting note: Section to be revised following approval]

HiQ Waste Treatment Services Pty Ltd (HiQ) has submitted a State Significant Development application (SSD 9346594) for the construction and operation of a Waste Treatment Facility (WTF) at 9-13 Whyalla Place (the Facility), Prestons NSW (the Site) in accordance with Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979*. The Facility is wholly owned by HiQ (Refer to Figure 1-1).

HiQ is seeking approval to optimise the existing site for the purpose of processing and treating contaminated soils, sludges and liquid wastes to a level suitable for reuse or disposal to a landfill or sewer, with a throughput capacity of up to 210,500 tonnes per annum (tpa). The approval seeks to expand the existing warehouse to a total floor area of about 6,400 m² (an increase of 1,300 m²). This will be achieved through partial demolition of one external wall.

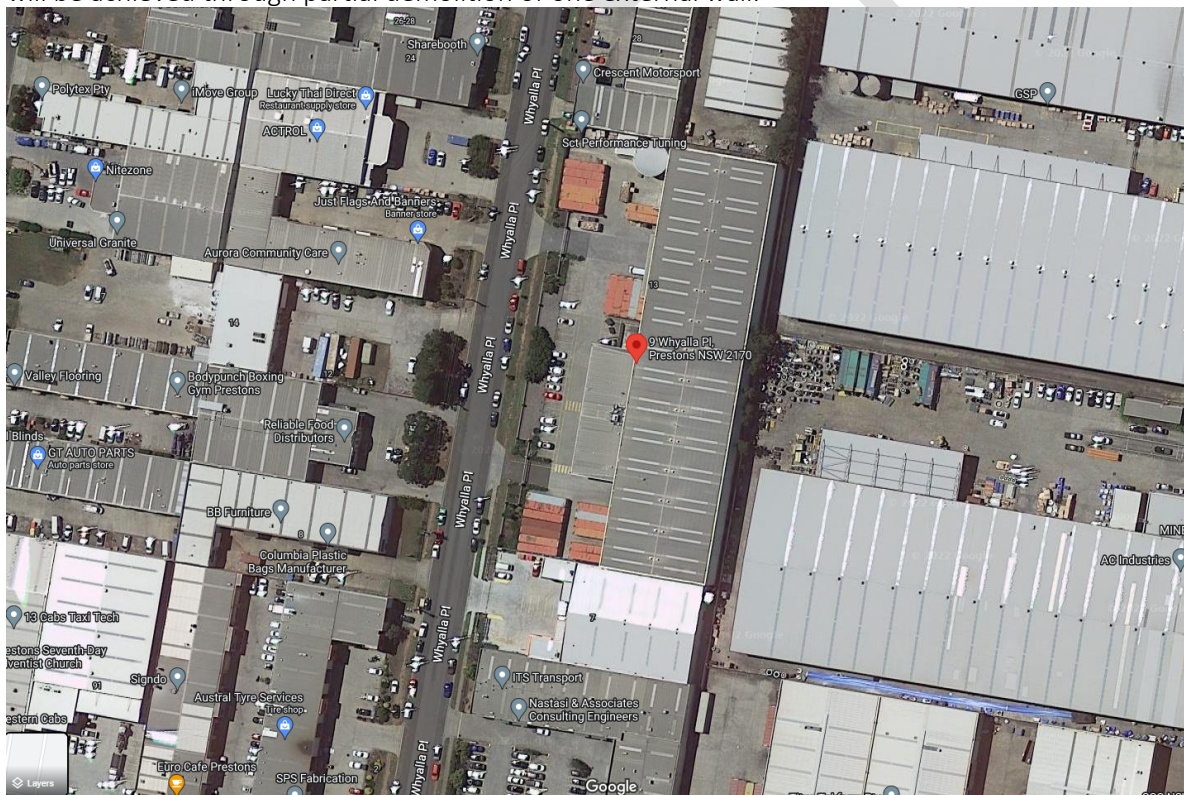


Figure 1-1: Project site (Source: Google Maps)



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1.2 Scope and Objectives

[Drafting note: Section to be revised following approval]

This Draft Operational Waste Management Plan (OWMP) has been prepared to support the Prestons WTF Amendment Report and will ultimately form a sub-plan to the Operational Environmental Management Plan (OEMP). This plan will be used to guide waste management at the Facility during operation.

This OWMP provides the framework and guidance for the Facility activities to be conducted in a manner whereby appropriate control measures are implemented to minimise the potential for adverse impacts on the environment and to meet compliance requirements of the approvals and licences.

The objectives of this OWMP are to:

- Describe the relevant legislation, policies, guidelines and standards which apply to the operation of the Facility and which influence the environmental management principles and procedures to be used at the Facility
- Identify key waste management considerations relating to the operation of the Facility
- Describe waste treatment procedures
- Provide a means of implementing appropriate project mitigation measures *[Drafting note: Determined by the Conditions]*
- Define roles and responsibilities for waste management
- Provide a basis for monitoring, reporting and maintaining compliance.

1.3 Interactions with other Environmental Management Plans

This OWMP has interrelationships with other management plans and documents: *[Drafting note: Determined by the Conditions]*

- OEMP that discusses the proposed waste facility processes
- Operational Air Quality Management Plan (OAQMP) that discusses the management of air ventilation systems used during waste treatment processes
- Operational Traffic Management Plan (OTMP) that discusses the management of truck movements within the Facility.

1.4 Consultation

[Drafting note: Section to be revised following approval]

If required by the Conditions of Consent, this section will be updated to detail any of the required consultation.

This OWMP may be required to be approved by the Department of Planning, Housing and Infrastructure (DPHI) prior to operations commencing.



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1.5 Key Performance Indicators

[Drafting note: Section to be revised following approval]

Key performance indicators related to waste at the WTF are detailed in Table 1-1:

Table 1-1: Key performance indicators

Measure	Target	Timeframe	Responsibility	Documentation	Where Addressed
Non-conforming waste	When loads of non-conforming waste are identified, the customer will be asked to leave the facility immediately with the load. In the event that the waste load has been deposited and the driver has left the Facility prior to the waste being identified as non-conforming the driver/waste generator would be called to return to collect the waste load. If a waste load containing an unauthorised Class of Dangerous Goods is delivered to the Facility it will be stored in isolation and the customer will be required to return and collect the material immediately.	At all times	Weighbridge operator	Rejected loads register	Section 2.2.2 Section 5.8 Section 9.5



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Measure	Target	Timeframe	Responsibility	Documentation	Where Addressed
Acceptance at the Facility	Only wastes that have undergone the Preliminary Waste Screening and received an 'Acceptance Letter' and a Unique Identification Number (UIN) for the batch of waste from HiQ are to be accepted at the Facility. Consignments that arrive without a valid 'Acceptance Letter' and UIN should be rejected at the weighbridge and not permitted to offload.	At all times	Weighbridge operator	Acceptance letter UIN	Section 5.3 Section 9.5
Waste volume limits	The WTF will implement an onsite volume limit for each waste type and will not accept waste at the Facility if it cannot be adequately stored and segregated from other waste types.	At all times	Site manager Weighbridge operator	Waste Inspection Waste records	Section 4.2 Section 9.5
Disposal	Following treatment, wastes processed at the WTF will undergo validation testing and final waste classification and reporting to determine if wastes destined for landfill, or sewer via the Trade Waste Agreement, are compliant with chemical composition acceptance criteria.	At all times	Site manager Environmental manager	Inspection Report Waste Classification and Validation Report	Section 7.3 Section 9.5
Meeting Project Approval Conditions regarding waste	Compliance with conditions <i>[Drafting note: To be updated once conditions have been received]</i>	At all times	Site Manager Environmental Manager	Environmental Inspection Checklist	Section 9.5



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2 Facility Overview and Operation

2.1 Facility Overview

The Facility is located in an existing IN3 Heavy industrial Zone. The nearest commercial receiver is Starfish Learn to Swim located 150 m to the north at 26-28 Whyalla Place, Prestons.

Access to the Facility is via Hoxton Park Road, Liverpool into Whyalla Place. The surrounding arterial roads include the M7 Motorway to the west and Hume Highway to the east.

The Site is approximately 9,100 m² and currently supports a warehouse building (~4,097 m²) and 650 m² office facility. The existing warehouse includes Compartment 1.

Once upgraded the Facility will feature:

- An enclosed warehouse with a total floor area of 6,400 m² for unloading and handling of waste, with environmental controls including an air extraction system
- An office building with office space and amenities for workers
- Three weighbridges facilitating a single-direction heavy vehicle flow of traffic
- An extension to the Facility to accommodate an additional two compartments. The three distinct compartments will include:
 - Compartment 1: Waste treatment storage, transfer bays and treatment of soil, muds and sludges, as well as dewatering plant, water tanks, wheel wash, weighbridge, reagent storage and leachate collection pits
 - Compartment 2: LWTP and reagent storage
 - Compartment 3: Mobile plant and equipment, cement silo, storage of packaged waste and resource recovery materials storage area.
- Two 8-metre-wide driveways to Whyalla Place for use by heavy vehicles and a third driveway for light vehicles, allowing for direct access to the carpark, separated from heavy vehicles.

The Facility will house the HiQ Group head office within the existing office space already at the Site.

A conceptual layout of the proposed Facility is provided in Figure 2-1.



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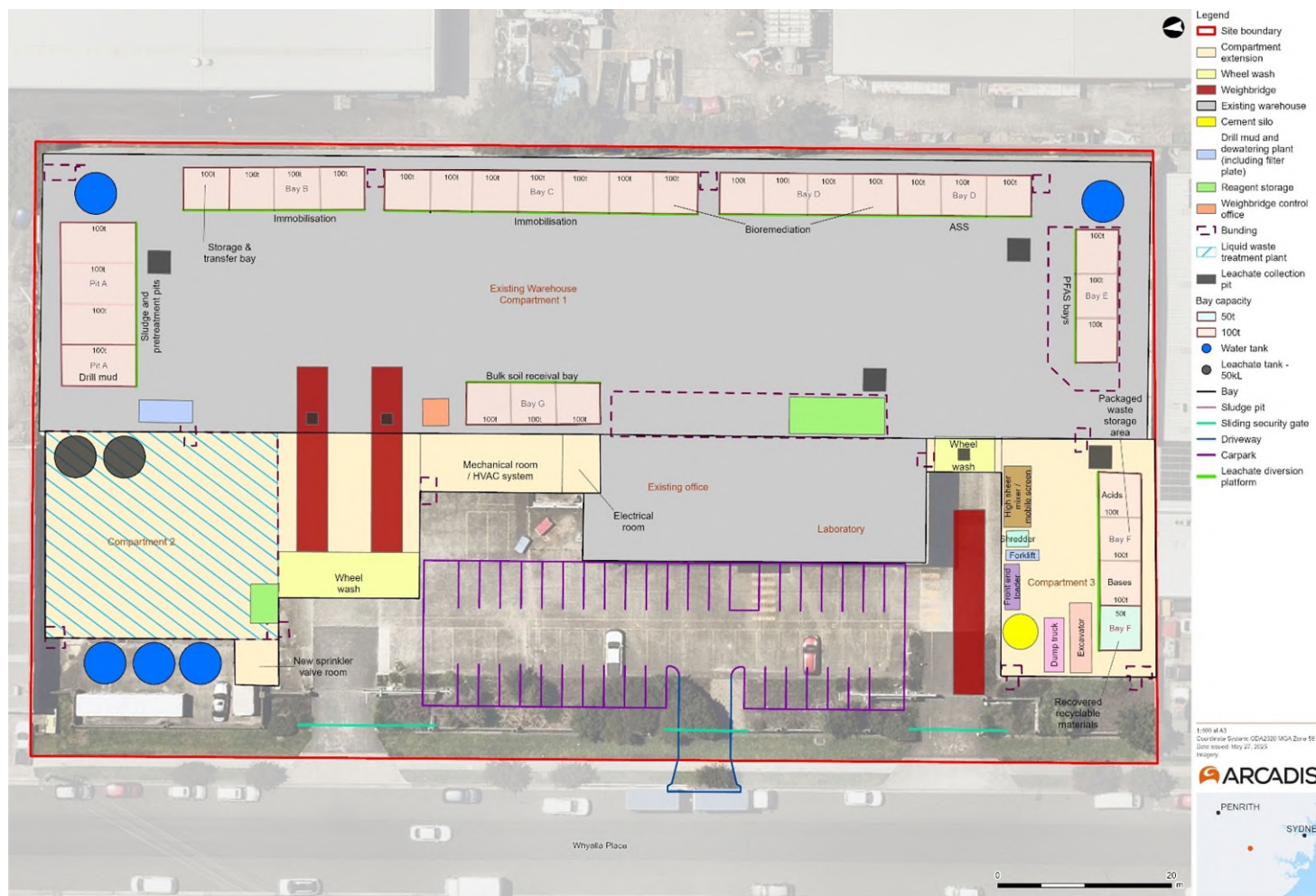


Figure 2-1 Conceptual Facility layout [Drafting note: Figure to be updated as required during detailed design following project approval]

Facility operations will comprise of the following:

- Storage, classification and transfer of contaminated soil, including Acid Sulfate Soils (ASS) ASS/ Potential Acid Sulfate Soils (PASS)
- Storage, classification and transfer of packaged waste in intact containers
- Storage, classification, transfer and treatment of contaminated liquids and sludges
- Shredding of non-contaminated, inert packaged waste
- Treatment of contaminated soil by bioremediation
- Treatment of ASS
- Treatment of contaminated soil in accordance with both general and specific immobilisation approvals. Soil immobilisation may be undertaken using the mobile high shear mixer, at various locations within the building.
- Operation of the LWTP.

Further details on Facility operations are provided in Section 2 of the OEMP.

The following sections provide specific detail on the Facility components for management of waste.

2.2 Wastes Accepted and Treated at the Facility

The WTF will utilise technologies aimed at treating waste to a level suitable for reuse, disposal to landfill or disposal to sewer. The Facility will process up to 210,500 tonnes of waste per annum including:

- Packaged waste
- ASS and PASS
- Contaminated liquid and solid wastes.

Source material will primarily be generated from industrial processes and contaminated sites. Further detail on the waste types that will be accepted and treated on site is provided in Section 4.

Treatment methodologies for wastes include:

- Physical screening
- Chemical separation
- Bioremediation
- Immobilisation.

2.2.1 Treatable Waste Categories

The waste types that will be accepted by the WTF are outlined in Table 2-1, along with the likely treatment technologies. Further details on the treatment technologies and procedures used for each waste stream is provided in Section 6. More detail regarding waste types is provided in Section 4.

Table 2-1: Summary of waste and proposed treatments

Type of Waste	Management	Tonnes per Annum
Packaged waste – Liquid	Contaminated packaged waste: no treatment, only storage Non-contaminated waste: shredding and offtake for disposal	40,000t
Packaged waste – Solid		
Per- and poly-fluoroalkyl substances (PFAS) contaminated soils	Storage only	7,500t
Bulk soils	Various methods:	58,000t
Contaminated soils	Primarily immobilisation	50,000t

Type of Waste	Management	Tonnes per Annum
<i>Contaminated soils</i>	<i>Primarily bioremediation</i>	8,000t
Acid sulfate soil	Acid neutralisation in batches	26,000t
Drill muds	Dewatering and liquid waste treatment	2,000t
Sediments and sludges	Dependent on moisture content of sludges – dewatering, liquid waste treatment and soil decontamination	7,000t
Liquid waste	Treated and validated in 50 kL batches through the LWTP	70 ML
Total		210,500

2.2.2 Non-Conforming Waste to be Automatically Rejected

The following materials are considered to be non-conforming waste that is to be automatically rejected:

- Scheduled PCB contaminated material as defined by the Polychlorinated biphenyl chemical control order (1997)
- PFAS contaminated soil above the restricted solid waste criteria
- Asbestos containing material
- Wastes classified as Dangerous Goods, other than liquid waste and packaged waste classified as Class 8 PG II or III, or PFAS classified as Class 9 PG III.

In the unexpected event that materials received at the Facility meet the classification of non-conforming waste, the material will be subject to an unexpected finds procedure (refer to Appendix C of the OEMP) and removed from the Facility for appropriate disposal.

Detailed weighbridge procedures for screening and acceptance of waste are described in Section 5.5. A procedure for the handling of non-conforming waste is provided in Section 5.8.

2.3 Operating Hours

The WTF receives waste 24 hours a day.

Processing and dispatch operations will be undertaken between:

- 7:00am to 6:00pm Monday to Saturday and
- 8:00am to 6:00pm Sundays and Public Holidays.

3 ENVIRONMENTAL REQUIREMENTS

Operation of the WTF is required to comply with all relevant legislation, permits, licences and development approvals that apply to the WTF.

This section provides an overview of the environmental planning and statutory context for the operations of the WTF. It also describes the WTF operations in the context of HiQ's corporate environmental and sustainability policies.

Compliance to applicable regulatory requirements concerning the operations of the WTF will be achieved through:

- Identifying and accessing legal and other requirements which are directly applicable to the organisation
- Consulting and involving relevant government agencies
- Internally communicating relevant information regarding legal and other requirements
- Continually auditing, reviewing and upgrading company systems, management plans and supporting documentation
- Providing relevant training.

3.1 Applicable Legislation and Guidelines

[Drafting note: Section to be revised following approval with any updates to legislation]

The legislation, planning instruments and guidelines considered during development of this plan are listed below with specific details provided in the Legislation Register within Section 3.1 of the OEMP.

- *Environmental Planning and Assessment Act 1979*
- *Environmental Planning and Assessment Regulation 2021*
- *Protection of the Environment Operations (POEO) Act 1997*
- *Protection of the Environment Operations (Waste) Regulation 2014*
- *Waste Avoidance and Resource Recovery Act 2001*
- *Protection of the Environment Operations (Clean Air) Regulation 2010*
- *National Greenhouse and Energy Reporting Act 2007*
- *Work Health and Safety Act 2011.*

Additional standards and guidelines relating to the management of waste include:

- Environment Protection Licence *[Drafting note: EPL to be obtained]*
- Waste Classification Guidelines – Part 1 (including Addendum): Classifying Waste, EPA, November 2014
- Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code), National Transport Commission (Edition 7.8, 2022)
- Controlled Waste National Environment Protection Measure
- Resource Recovery Orders (RRO) and Resource Recovery Exemptions (RRE) under Protection of the Environment Operations (Waste) Regulations 2014 (Clause 93)

3.2 ICHEMS Guideline

PFAS compounds may be considered an industrial chemical under *the Industrial Chemicals Environmental Management (Register) Instrument 2022*, requiring specific controls to be implemented for the use. A summary of the Industrial Chemicals Minimum Environmental Management Standard (ICHEMS) are provided in Table 3-1. The table provides a cross reference to where the Standard has been addressed throughout the proposal documentations to reduce the impact of industrial chemicals on the environment.

Table 3-1 ICHEMS Guidelines

ICHEM Minimum Standards	Where addressed
Information and Awareness Obtain, share, and use information on the environmental risks of industrial chemicals to ensure that any persons handling the chemical throughout the supply chain are aware of these risks, and enabled to undertake activities using industrial chemicals in an environmentally safe manner. For introducers (importers and manufacturers) and reformulators, this includes a requirement to develop and provide information to the supply chain about the environmental risks of the industrial chemical, when used for the purpose for which it was manufactured.	Operational risk register (Appendix H of OEMP) Emergency Response Plan (Appendix B of OEMP) Liquid and Hazardous Waste Risk and Minimisation Report (Arcadis 2025)
Risk Management Planning Identify risks and develop, assess, evaluate and monitor control measures.	Operational risk register (Appendix H of OEMP) Liquid and Hazardous Waste Risk and Minimisation Report (Arcadis 2025)
Harm Minimisation Controls Apply practicable control measures to eliminate risks, then reduce risks that cannot be eliminated, then manage residual risks using best available techniques and best environmental practices.	Operational risk register (Appendix H of OEMP) Liquid and Hazardous Waste Risk and Minimisation Report (Arcadis 2025)
Environmentally Safe Storage Store and contain industrial chemicals in an environmentally safe manner.	Packaged waste: Stored in sealed IBC containers Compartment 3 (fully bunded), and above the PMF Soils: Stored within designated bays bunded with urethane floor bunding (Section 6.2.3 of this OWMP) Liquid waste: Stored in Compartment 2 (fully bunded and lined with epoxy sealer) in dedicated tanks
Effective Response to Incidents Plan for and respond effectively and promptly to industrial chemical incidents.	Emergency Response Plan (Appendix B of OEMP)
Environmentally Responsible Waste Management Implement waste management for industrial chemicals in an environmentally safe manner in lien with the waste hierarchy and local requirements.	This OWMP

3.3 Development Consent

[Drafting note: This Section of the OWMP will be updated following the issuing of the Conditions of Consent]

A summary of relevant conditions which relate to the development of an OWMP have been provided in Table 3-2. The table also provides a cross reference to where the Condition has been addressed in the OWMP.

Table 3-2: Relevant Conditions of Consent *[Drafting note: To be updated once approval is received]*

Condition #	Requirements	Where addressed
TBC	The Applicant must prepare an Operational Waste Management Plan (OWMP) to the satisfaction of the secretary.	This Plan
TBC	[All applicable conditions to be specified]	TBC

3.4 Revised Environmental Management Measures

A summary of relevant Revised Environmental Management Measures (REMMs) which relate to the development of the OWMP are provided in Table 3-3. The table also provides a reference to where the REMM has been addressed in the OWMP.

Table 3-3: REMMs relevant to the OWMP

REMM	Requirements	Where addressed
G2	An Operational Environmental Management Plan (OEMP) will be prepared and implemented to guide environmental management and monitoring activities during operation as identified within the Environmental Impact Statement (EIS) in addition to further specific issues identified within the Table. Also refer to Section 16.2 of the EIS. Sub-plans to be prepared as part of the OEMP will include: - Operational Waste Management Plan - Operational Traffic Management Plan - Operational Noise and Vibration Management Plan (ONVMP) - Operational Air Quality Management Plan - Stormwater and Leachate Management Plan - Emergency Response Plan. The OEMP will be reviewed annually or more frequently on an as needed basis should there be a change in risk, legislative requirements, or non-compliance.	OEMP This Plan OTMP ONVMP OAQMP Stormwater and Leachate Management Plan Emergency Response Plan (Appendix B of OEMP)
MW1	The OEMP will include specific details on waste management practices on site, including: - Stockpile handling and management - Details of soil and sludge handling procedures (e.g. details on how often bioremediated soils will be mixed) - Sampling and analysis programs for each of the waste streams, including the remediation target levels and monitoring requirements during treatment - Contingency measures where materials do not respond to treatment methods - Weighbridge waste acceptance procedure	This Plan Section 6.2 Section 6.2 and 6.3 Appendix A Section 10.2 Section 5.5

REMM	Requirements	Where addressed
	Non-conforming waste procedure	Section 2.2.2 Section 5.8 Section 9.5
	Waste screening procedure	Section 5.3
	Batch control procedure	Section 5.2
	Material handling procedures – unloading and loading	Section 5.5
	Maintenance procedures	Section 7.5
	Verify licenses and permits for the handling, transportation, and disposal of waste	Section 3.5
	Inspection, monitoring, review and auditing	OEMP Section 9
	Site induction and training	Section 9.10
MW2	Waste Management will be included in the Site Induction.	Section 91
MW3	Signs will be erected around the Site providing direction for waste management and adopting the waste management hierarchy.	Section 91
MW4	Waste storage areas will be located within the building and as per the Liverpool City Council DCP Requirements.	Section 6
MW5	Operations on the Site will be planned to efficiently manage delivery and storage of materials, reduce waste and spoilage.	Section 5 Section 6 Section 7
MW6	Agreements with suppliers for ‘take back’ to be arranged where possible.	Section 5.5
MW7	General Waste and recycling skips will be made available and emptied regularly so as not to overflow.	Section 6.6
MW8	All wastes will be managed and properly disposed of in accordance with an appropriately licensed contractor.	Section 7.3
MW9	The following measures will be implemented to prevent waste spreading from the Site: - Loads covered until inside the building and before leaving the building. - A truck and wheel wash will be installed for trucks prior to exiting the building. - Entry and exit signage to advise transport operators of covering and loading and unloading procedures. - Unloading and loading of waste material will occur within the building.	Section 5.5 Section 5.7 Section 5.8
MW10	Sampling and Analysis Quality Plans (SAQPs) will be prepared for the treatment of soils and liquid waste at the Site. The SAQPs will be reviewed annually, or more frequently, on an as needed basis should there be a change in risk, legislative requirements, or non-compliance.	Appendix A
MW11	A feasibility application will be lodged with Sydney Water during detailed design that will detail the indicative water usage and liquid waste discharge for the Proposal.	Section 3.5

3.5 Permits and Licences

A summary of the key permits and licences applicable to the Facility, in addition to the Conditions of Consent, is provided in Table 3-4.

Table 3-4: Key permits and licences

Licence / Permit Number	Licence	Regulator	Issued Date	Review Date
TBC	Environment Protection Licence (EPL)	NSW EPA	TBC	TBC
TBC	Trade Waste Agreement	Sydney Water	TBC	TBC

3.6 Environmental Protection Licence

An Environmental Protection Licence is required for the operation of the Facility. Table 3-5 details the related waste management conditions and where they have been addressed within the Plan.

[Drafting note: EPL to be issued by EPA]

Table 3-5: Relevant waste management conditions of the Environmental Protection Licence

Licence / Permit Number	Licence	Regulator	Issued Date	Review Date
TBC	Environment Protection Licence (EPL)	NSW EPA	TBC	TBC

3.7 Risk Assessment

As per HiQ's Environmental Management System (EMS), key risks are to be identified and regularly reviewed regarding activities at the Facility. A Hazard Risk Assessment has been prepared for the Facility (Sherpa 2024) (Appendix L to the Amendment Report). Table 3-6 details the related risk assessments for the Facility. The operational risk register is provided in Appendix H of the OEMP.

[Drafting note: To be updated as the risk register is periodically reviewed and updated]

Table 3-6 Relevant risk assessments

Risk register / report	Prepared by	Reviewed by	Date
Risk Register	Sherpa	Daniel Blair (HiQ) Jason Welch (HiQ)	12/09/2024
Liquid and Hazardous Waste Risk and Minimisation Report	Arcadis	Dan Blair (HiQ) Jason Welch (HiQ)	30/05/2025

3.8 Waste Hierarchy

The general approach to the hierarchy of waste management for the Facility will be in accordance with the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (EPA, 2014a). The waste hierarchy provides guidance on the order of preference of approaches to achieve efficient resource use, as shown in Figure 3-1.

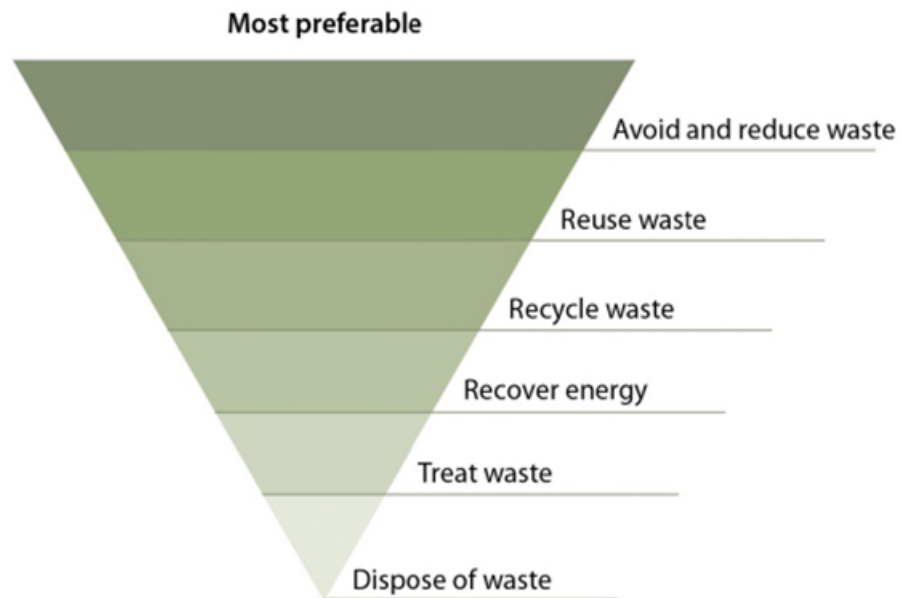


Figure 3-1: The waste hierarchy (Source: EPA, 2014)

4 WASTE TYPES

4.1 Waste classifications

Wastes proposed to be accepted at the Facility would be categorised by their nature and waste classification.

As per clause 49 of Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO Act) and in accordance with the EPA Waste Classification Guidelines Part 1: Classifying waste, the Facility will be receiving waste classified as:

- **Liquid waste:** Being any waste (excluding special waste) that has an angle of repose less than 5 degrees above horizontal, becomes free flowing at or below 60 degrees Celsius or when it is transported, is generally not capable of being picked up by a spade or shovel and is classified as liquid waste under an EPA gazettal notice.
- **General solid non-putrescible:** General solid waste (non-putrescible) refers to waste types that are not special, liquid, hazardous, restricted, or putrescible general solid waste. (putrescible). Non-putrescible materials typically do not readily decay under standard conditions, do not emit offensive odours, nor attract vermin or other vectors (such as flies, birds and rodents).
- **Restricted solid waste:** Waste is classified as restricted solid waste through chemical assessments to measure properties of waste. The SSC (specific contaminant concentration) and TCLP (toxicity characteristics leaching procedure) tests are used to determine whether the waste is classified as restricted. Waste is determined as restricted solid waste if any of the SCC or TCLP threshold values are exceeded for general solid waste, and if the values exceed the restricted solid waste thresholds then the waste is classified as hazardous (Table 3 EPA Waste Classification Guidelines Part 1: Classifying waste).
- **Hazardous waste:** Waste may be deemed to be hazardous waste if it has either been pre-classified as such (under the Waste Classification Guidelines) or because it possesses hazardous characteristics (typically determined by it being either a Dangerous Good or due to its specific contaminant concentration (SCC) and/or toxicity characteristics leaching procedure (TCLP) test values).

The contaminants to be accepted at the Facility, and their expected concentrations, are included in Appendix H.

4.2 Approved / Accepted Waste Types

Wastes that are accepted at the Facility are categorised by either their nature and/or by the treatment method that will be applied. Within these waste types there may be a high degree of variability in the specific waste received. All waste accepted at the Facility will be screened and will comply with the relevant waste receipt procedure prior to acceptance at the Facility.

Approved waste types that will be received at the Facility are summarised in Table 4-1, and an indicative breakdown of the tonnes per annum for each waste type by waste classification is provided in Table 4-2. It is noted that the proportion of waste volumes split between the different waste classifications may differ year on year, in response to market forces, however the total volumes for any waste type would not be exceeded.

Table 4-3 shows the intended volumes of treated waste following treatment.

Table 4-1: Waste material storage limits and locations

Waste type	Upper storage limit (at any one time)	Storage before treatment	Storage after treatment	Bay/ Pit No.	Approximate treatment time
Packaged wastes – including Dangerous Goods Class 8 PG II and III and Class 9 PG III*	400 t	Received and stored within containers – no treatment.	In IBCs or drums located adjacent to the office and amenities block, within the shed or within compartment 3.	F	~2-4 days
Packaged wastes – Non-Dangerous Goods		In intact IBCs or drums located within Compartment 3.	Skip bin up to 10 m ³ in capacity, removed for disposal as required.	F	
PFAS contaminated soils	300 t	N/A – no treatment	In designated bays – no treatment	E	Storage for up to 2 months
Bulk soils: <i>Inclusive of dried drill muds and ASS</i>	Acid sulfate soils: 2,000 t	Treated into specific, pre- allocated material bays	Post treatment, each batch is unloaded into specific, pre- allocated bay.	D	~4 days (ASS) ~3 weeks – 3 months (Bioremediation) ~1-3 weeks (Immobilisation)
	Bioremediation: 2,000 t			C/D	
	Immobilisation: 2,000 t			B/C	
Recovered recyclable materials (byproduct of physical soil screening)	50 m ³	N/A	Recovered recyclable materials will only be stored up to a maximum of 35t before removal. Bays within Compartment 3	F	~1-2 days
Drill muds	400 t	Unloaded directly into drill mud plant	Sediments to be stored in specific soil bays Liquid to be stored in holding tanks in bunded LWTP area	Pit A	~2 weeks

Waste type	Upper storage limit (at any one time)	Storage before treatment	Storage after treatment	Bay/ Pit No.	Approximate treatment time
Sediments and Sludges	400t	Sediments and sludges to be pumped into one of the sediment and sludges pits and then pumped to the dewatering plant.	Liquid to be stored in holding tanks in bunded LWTP area	Pit A	~2 weeks
Liquid waste	540 kL	Within holding tanks in bunded LWTP area. Liquid waste classified as DG Class 8, PG III would be transferred for immediate treatment.	Within holding tanks in bunded LWTP area	n/a	~2 days
Waste oils	1 t	N/A	1,000 L IBC located in bunded LWTP area	n/a	

* See additional limits in Section 4.3

Table 4-2: Waste type by classification – pre-treatment

Type of Waste	Management	Acid Sulfate Soils (indicative tpa)	Liquid waste (indicative tpa)	General solid non-putrescible (indicative tpa)	Restricted solid waste (indicative tpa)	Hazardous waste (indicative tpa)	Total Tonnes per Annum
Packaged waste – Liquid	Contaminated packaged waste: no treatment, only storage		35,000				40,000t
Packaged waste – Solid	Non-contaminated waste: shredding and offtake for disposal			5,000			
PFAS contaminated soils	Storage only				7,500		7,500t
Bulk soils	Various methods:				34,800	23,200	58,000t
Contaminated soils	Primarily immobilisation				30,000	20,000	50,000t
Contaminated soils	Primarily bioremediation				4,800	3,200	8,000t
ASS	Acid neutralisation in batches	26,000					26,000t
Drill muds	Dewatering and liquid waste treatment		200	1800			2,000t
Sediments and sludges	Dependent on moisture content of sludges – dewatering, liquid waste treatment and soil decontamination		700	700	2,800	2,800	7,000t
Liquid waste	Treated and validated in 50 kL batches through the LWTP		70 ML				70 ML
Total							210,500

Table 4-3 Waste type by classification - post treatment

Type of Waste	Management	Acid Sulfate Soils (indicative tpa)	Compliant trade wastewater	Liquid waste (indicative tpa)	General solid non-putrescible (indicative tpa)	Restricted solid waste (indicative tpa)	Hazardous waste (indicative tpa)	Total Tonnes per Annum
Packaged waste – Liquid	Contaminated packaged waste: no treatment, only storage			35,000				40,000t
Packaged waste – Solid	Non-contaminated waste: shredding and offtake for disposal				5,000			
PFAS contaminated soils	Storage only					7,500		7,500t
Bulk soils	Various methods:				34,800	23,200		58,000t
<i>Contaminated soils</i>	<i>Primarily immobilisation</i>				30,000	20,000		50,000t
<i>Contaminated soils</i>	<i>Primarily bioremediation</i>				4,800	3,200		8,000t
ASS	Acid neutralisation in batches				26,000			26,000t
Drill muds	Dewatering and liquid waste treatment		200		1800			2,000t
Sediments and sludges	Dependent on moisture content of sludges – dewatering, liquid waste treatment and soil decontamination		700		3,500	2,800		7,000t

Type of Waste	Management	Acid Sulfate Soils (indicative tpa)	Compliant trade wastewater	Liquid waste (indicative tpa)	General solid non-putrescible (indicative tpa)	Restricted solid waste (indicative tpa)	Hazardous waste (indicative tpa)	Total Tonnes per Annum
Liquid waste	Treated and validated in 50 kL batches through the LWTP		70 ML					70 ML
Total								210,500

4.3 Dangerous Goods

Some liquid waste and packaged waste that may be brought to site may meet the classification of Dangerous Goods Code Class 8, Packing Groups II and III. Additionally, some PFAS contaminated materials may be classified as Dangerous Goods Class 9 Packing Group III due to its potential to be an “environmentally hazardous substance”. Waste that meets these classifications would be transported to the Site in accordance with the requirements of the ADG Code.

A proportion of the liquid waste and packaged waste accepted at the Facility will meet the classification of Dangerous Goods Class 8, Packing Groups II and III and Class 9, Packing Groups III under the Australian Dangerous Goods Code (NTC, 2022). Once accepted onsite, the liquid waste will be delivered directly to the designated tank within the LWTP or a designated bay within the packaged waste storage area. These would be stored and handled in accordance with AS 3780-2008: *The storage and handling of corrosive substances*. Storage limits of Dangerous Goods for the application of SEPP 33 are presented in Table 4-4.

Table 4-4 Storage limits for Class 8 Dangerous Goods on Site

PG	Form	Bulk or packaged	Category	Maximum storage (tonne equivalent (te))	Total for PG (te)	Applying SEPP 33 threshold (te)
II	Liquid	Packaged	Reagent	10	23	25
		Bulk	Waste	10		
	Liquid or solid	Packaged	Waste	3		
III	Liquid	Bulk	Waste	40	45	50
	Liquid or solid	Packaged	Waste	5		

In addition, Caustic Soda and Hydrochloric Acid would be used within the LWTP, both of these reagents are classified as Dangerous Goods Class 8, PG II. The Safety Data Sheets (SDS) for these reagents are provided in Appendix C. These reagents would be stored separately from one another. Hydrochloric acid will be stored on its own within a locked safety cabinet in the reagent storage area located in Compartment 1. Appropriate signage will be used on the cabinet to denote it contains Hydrochloric Acid; only suitably authorised personnel will be provided access to the cabinet. Caustic Soda will be stored separately in the reagent storage area in Compartment 2.

As per the SDS, the following storage measures will be put in place for each of the reagents (Table 4-5).

Table 4-5 Storage requirements for Caustic Soda and Hydrochloric Acid

Reagent	Storage Requirements
Caustic Soda	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep containers securely sealed. Check regularly for spills and leaks. Keep away from heat and sources of ignition – no smoking. Keep away from foodstuffs and incompatible materials. Must be stored separate from acids. Keep only in original container or corrosive resistant container/container with a resistant inner liner. Do NOT use aluminium, galvanised or tin-plated containers.

Reagent	Storage Requirements
Hydrochloric Acid	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Containers should be labelled and protected from damage. Keep away from heat and sources of ignition – no smoking. Keep away from foodstuffs and incompatible materials. Must be stored separate from caustic soda. Store locked up. If stored indoors, building floors should be acid resistant with drains to a treatment system. Electrical equipment should be flameproof and protected against corrosive action. Keep only in original container or suitable material, i.e. rubber lined steel, PVC/FRP, FRP. Containers should have a safety relief valve – care should be taken to release any internal pressure slowly.

5 WASTE RECEIVAL

All wastes received at the Facility are to be tracked from the waste generator through to final destination facility (e.g. landfill), consistent with the *Protection of the Environment Operations (Waste) Regulation 2014*.

The waste generator is responsible for generating and providing a Consignment Authorisation (CA), any UN Hazard Code (if applicable for dangerous goods) and Dangerous Goods classification (class and packing group, if applicable), and waste form, in accordance with regulatory requirements. No wastes classified as Dangerous Goods under the ADG Code, other than liquid waste and packaged waste that are classified as Class 8 PG II and III, and PFAS contaminated materials classified as Class 9 PG III will be accepted on Site. No waste that has flammable characteristics will be accepted on Site. Tracking will be undertaken using the waste generators' CA, waste form and code and Unique Identification Number (UIN) allocated by HiQ (see further detail below). The UIN will be used to track the waste through the Facility and to its ultimate disposal.

Analytical data provided by the waste producer will be reviewed on arrival at the entry weighbridge to ensure the classifications provided are correct. Wastes that do not match the description on the waste form and code and the UIN will not be accepted at the Facility.

Figure 5-1 shows the key steps that will be followed prior to waste receipt and unloading of waste at the Facility. The key steps are described in the Sections below.

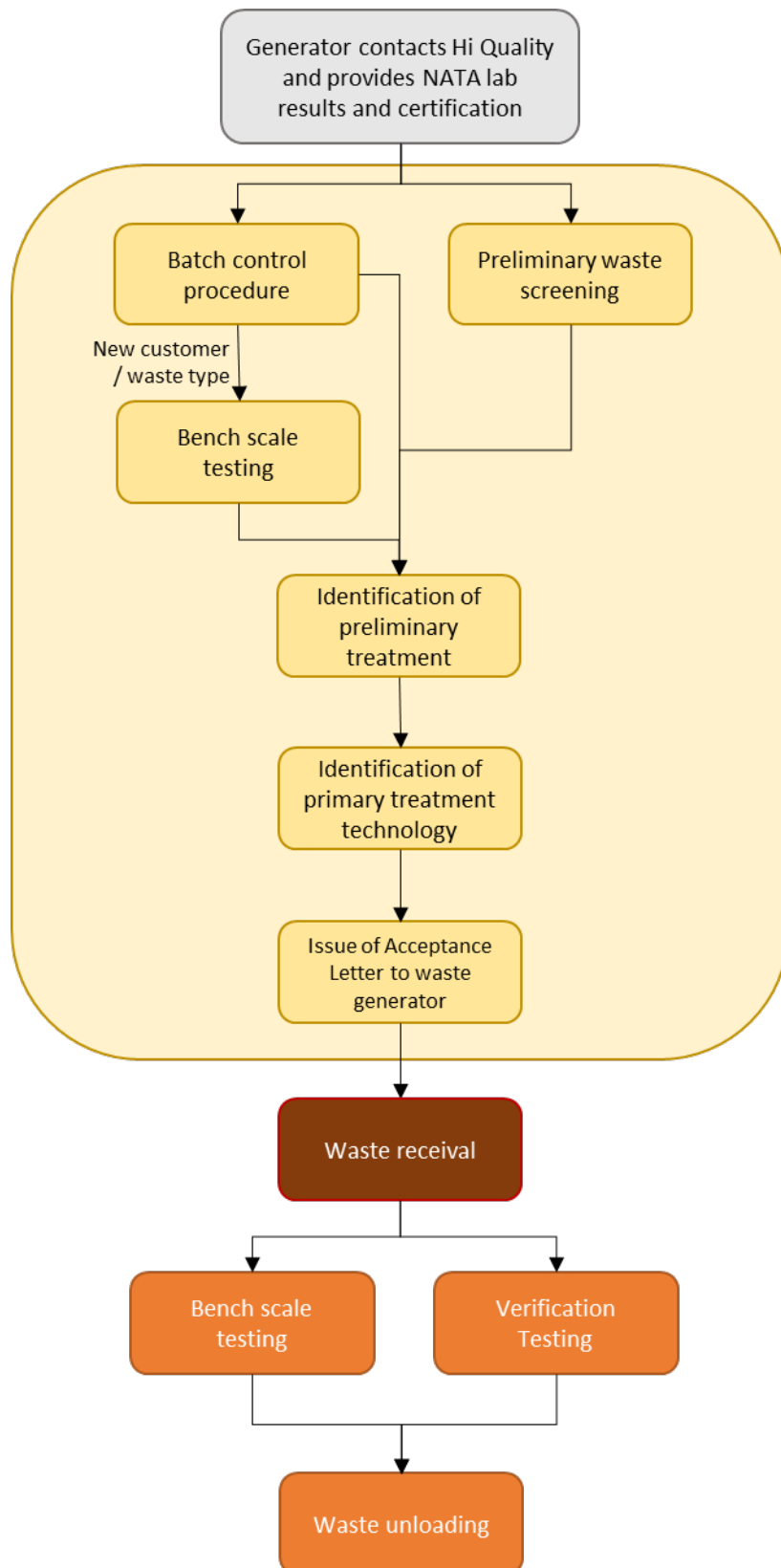


Figure 5-1: Characterisation and screening of waste and treatment technology

5.1 Characterisation of Waste by the Waste Generator

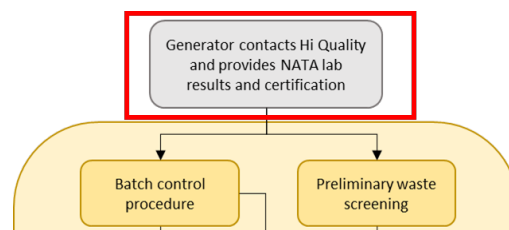
Prior to accepting wastes at the Facility, a number of general requirements need to be met by the waste generator (source of waste stream) to ensure compliance with the NSW EPA requirements for handling and receiving wastes (EPA, 2014b) and the transport of waste in accordance with the ADG Code.

This will require demonstration of compliance with the physical and chemical test criteria or assessment against previous results for a similar waste batch.

Where similar wastes have previously been received and successfully treated a reduced frequency of sub batch analysis may be appropriate, to demonstrate compliance with the waste batch control procedure and validation / reporting requirements.

The waste generator is responsible for providing adequate data from a NATA-accredited laboratory to enable an appraisal of treatability of the waste to be completed. HiQ will review the data and determine whether further analysis and /or bench scale testing is required to confirm treatability of the waste at the Facility.

HiQ will retain on file the NATA-registered laboratory analytical results for each consignment and will issue an 'Acceptance Letter' and Unique Identification Number (UIN) upon satisfaction of waste characterisation in line with accepted waste types at the Facility. The Acceptance Letter will include characterisation of the waste in accordance with the NSW EPA *Waste Classification Guidelines*. The CA and Acceptance Letter will be captured in the electronic data management system for WTF.



5.2 Batch Control Procedure

The Batch Control Procedure commences concurrently with the Preliminary Waste Screening Procedure and is the mechanism for tracking waste through the WTF. The procedure is outlined in Table 5-1.

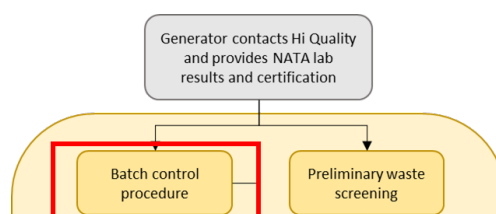


Table 5-1 Batch Control Procedure

Batch Control Procedure	
1.	The NATA testing results from the preliminary waste screening are to be assigned a unique batch number (6 digit code)
2.	A waste tracking number is to be provided
3.	The quantity of waste in the batch will be recorded and sub batches will be identified (based on volume/tonnage estimates)
4.	The packing/delivery requirements will be communicated with the customer
5.	The waste will then be assigned an appropriate treatment procedure based on the results of the preliminary screening completed by the customer
6.	Undertake verification testing to confirm material properties
7.	The final destination for the waste materials following treatment will be identified.

Batch Records

All records including forms, treatment notes, and NATA certified results (pre and post treatment) for any activity related to the treatment of waste will be kept by HiQ indefinitely within the electronic data management system. The following is a summary of the records to be kept for all waste treated by the facility:

- Batch Number (UIN) – A six (6) digit code
- Waste tracking number/soil tracking number
- Date received
- Quantity
- Waste type (packaged waste, soils, sediments and sludges or liquid waste)
- Analysis/Safety Data Sheet supplied by customer
- Analysis results of pre-treatment testing (if applicable)
- Treatment methodology (including reagent volumes and relevant treatment notes)
- Location of treatment (pit number for sludges, bay number for bulk solids)
- Storage/curing location
- Sampling details (including methodology, sampler and date)
- Results of analysis
- Date of offsite disposal
- Location of offsite disposal
- Waste tracking for offsite disposal (as appropriate).

5.3 Preliminary Waste Screening Procedure

The Preliminary Waste Screening Procedure is outlined in Table 5-2.

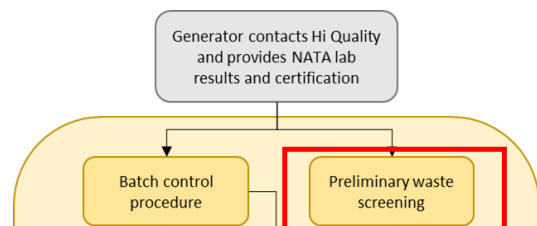


Table 5-2 Preliminary Waste Screening Procedure

Preliminary Waste Screening Procedure

The Preliminary Waste Screening Procedure involves recording the following information for each waste load within the electronic data management system:

- Source of waste
- Waste type and applicable waste code
- Contaminants of Potential Concern (COPCs) summarised
- Volumes
- Physical & chemical criteria
- Odour
- Data interpretation:
 - Review of analytical test data & frequencies
 - Preliminary appraisal against test history (if similar batches tested previously)
- Summarise physical and chemical conditions
- Identify primary contaminant of concern
- Recommend scope of bench scale testing to be conducted at the laboratory onsite
- Does the solid waste contain perfluoroalkyl and polyfluoroalkyl substances (PFAS)? (Y/N)
- Does the waste contain Acid Sulfate Soils (Y/N)
- Does the ASS contain anthropogenic materials?

-
- | |
|--|
| <ul style="list-style-type: none">• Is the waste a Dangerous Goods (Class 8 PG II or III, or Class 9 PG III) – refer Section 5.3.1 for applicable waste codes• Does the waste have potential to be a Dangerous Good (Y/N) – refer Section 5.3.1 for applicable waste codes. If Y review of further analytical test data to confirm it does not constitute a Dangerous Good and therefore is permitted to be accepted. |
|--|

5.3.1 Preliminary waste screening for Dangerous Goods

As noted in Section 4.3, some waste received at the Facility may constitute Dangerous Goods Class 8 PG II and III. This includes the following waste codes:

- D120 Mercury, mercury compound
- C100 Basic solutions or bases in solid form
- B100 Acidic solutions or acids in solid form
- D140 Chromium compounds (VI).

Additionally, PFAS contaminated materials may be classified as Dangerous Goods Class 9 PG III, this includes the following waste codes:

- M270 Per- and poly fluoroalkyl (PFAS) contaminated materials including waste PFAS containing products and contaminated containers (soils & liquid streams).

Incoming waste that constitutes a Dangerous Good will have been identified as such prior to acceptance at the Facility.

Other waste codes that may be received at the Facility may only be received if they do not meet the definition of a Dangerous Good. The following waste codes have been identified as having the potential to be classed as dangerous goods if certain properties are met, and would not be received if determined to be a Dangerous Good:

- D220 Lead, lead compounds
- D150 Cadmium; cadmium compounds
- D130 Arsenic; arsenic compounds.

The Australian Dangerous goods Code (2022) sets out specific concentration thresholds that characterise certain substances as being dangerous. Several factors determine whether a substance is deemed to be dangerous (its concentration, chemical properties as well potential hazards such as toxicity or flammability). Specific testing will be carried out for any waste with potential to be considered a Dangerous Good, and the waste load will be rejected if it is found to have the concentrations/characteristics that would deem it to be dangerous.

5.4 Identification of a Preliminary and Primary Treatment Technology Procedure

The procedure for identifying the preliminary and primary treatment technology for a waste load is outlined in Table 5-3.

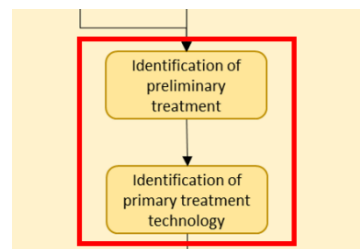


Table 5-3 Identification of a Primary Treatment Technology Procedure

Identification of a Preliminary and Primary Treatment Technology Procedure
- Identify the principal contaminants of concern - Identify preliminary treatment options, if deemed necessary, including physical and chemical separation (Preliminary Treatment) - Assign a contaminant group - Shortlist the preferred treatment technology - Summarise the optimum treatment technology and process requirements (e.g. review of previous results) - Preliminary dosage rates for solids / sludges - Mixing requirements and the need to add chemical separation agents (bioremediation) - Preliminary dosage rate for liquids - Shortlist suitable treatment reagents - Summarise the target treatment criteria and validation parameters - Determine whether the material requires treatment via immobilisation, if a specific immobilisation approval is required commence application process using the template provided in Appendix D.
Additional screening for soils identified for bioremediation
The following chemical screening will be used to determine the engineered bacteria and/or nutrient loadings required for soils that are identified as treatable through bioremediation: - Determine the likely distribution of contamination within the soils fractions - Identify recalcitrant hydrocarbon compounds that may not be readily degradable - For fine grained soils, an assessment of bioavailability may be required - Identify the presence of any contaminants that will not bioremediate within practicable timeframes, including: - Chlorinated aliphatic hydrocarbons - The presence of some heavy metals - Presence of high molecular weight Polycyclic Aromatic Hydrocarbons (PAHs); and - Presence of aged petroleum products of low bioavailability. - Check for the presence of inorganic nutrients in oils such as ammonia, nitrate and nitrite - Estimate the molar ratios of carbon, nitrogen and phosphorous - pH levels (preferred pH in the range 5.5 to 8.5) - Redox potential - Estimate the required nutrient loading to be added - Dissolved oxygen in pore water to assist in determining the necessity of oxygen addition - Soil water holding capacity.

Additional information to be provided for soils identified for immobilisation under a Special Immobilisation Approval (SIA)

For waste batches that are identified as requiring treatment via immobilisation (refer Section 6.2.1.4) and that would be subject to an SIA, the following additional information would be requested to be provided by the customer:

- Information regarding the origin of the waste, including the history of the site and the source of contamination
- Information regarding whether the waste is likely to continue to be generated, or if the waste batch is a one-off delivery
- Provide authorisation to HiQ to treat the batch.

5.5 Waste Receipt

Once an approval letter has been issued to the waste generator, waste can be scheduled for receipt at the Facility. The weighbridge office will be responsible for all waste acceptance at the Facility. Waste will be received from contaminated sites within the Sydney region. The weighbridge operator will ensure that all incoming wastes are weighed, recorded and that waste delivery matches the waste classification and screening records as recorded on the batch number, Acceptance Letter and CA. If inconsistencies exist and/or the wastes are not consistent with the delivery expectations the waste load will be rejected. The procedure is outlined below in Table 5-4.

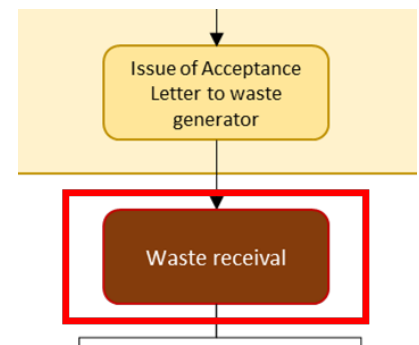


Table 5-4 Weighbridge operator procedure

Booking Calendar
All major account holders are required to provide a tip request for every truck, specifying which truck registration is authorised to tip which material, and on what job number. Each tip request must be booked in on the booking calendar via Outlook for Sales/Operations to see. The booking calendar must be kept up to date throughout the day. In the event the weighbridge operator needs to leave urgently, it is imperative the replacement operator can quickly and easily find all necessary information. The weighbridge operator must complete a proper handover with the staff member taking over. If proper handover does not occur this will cause delays in processing trucks. Once the job is complete in the calendar it should be colour coordinated, for example: • Blue for complete • Orange for same day delivery • Red for unannounced • Purple for no show This record must be kept up to date as the chemist will use this record to track volumes, sampling, and other matters.
Period of operational shut-down
In some circumstances operations at the Facility may be required to cease. This may occur in response to an internal incident (e.g. machinery shutdowns, spills etc) or external events (e.g. extreme weather event, flooding etc). In the event that an unscheduled operational shutdown occurs, the weighbridge operator would contact all in-bound waste deliveries and notify drivers/waste generators that waste temporarily cannot be received. No new bookings would be accepted until operations have resumed.
Unannounced Trucks
Do not process any unannounced trucks until the Site Manager has assessed the situation.
'Take back' arrangements

Take back arrangements would be established with customers in the unlikely event that the Facility cannot accept waste as scheduled. Future bookings would also be adjusted as necessary.

Weighbridge

The WTF has two weighbridges used for entry, and one exit weighbridge. Entry and exit signage to advise transport operators of covering and loading and unloading procedures.

Once a delivery arrives, the EPA records must be completed using the electronic data capture system and must include capture of the following information (in accordance with Clause 27 of the Protection of the Environment (Waste) Regulation):

- (a) the amount of any waste contained in the load, its waste type and (except where the waste is trackable liquid waste) its waste stream
- (b) the amount of any other material contained in the load and a description of the nature of that other material
- (c) the amount of any waste contained in the load that is spoil generated by dredging activities
- (e) the date and time the load is transported from the facility
- (f) the registration number of the vehicle used to transport the load
- (g) the customer name, address and ABN
- (h) the purpose of the deliver (waste delivery, service vehicle, visitor)
- (i) the name and address of the place to which the load is transported and the code or number of any environment protection licence for that place
- (j) in the case of waste or other material in the load that is removed from a stockpile required to have a unique identification number
- (k) in the case of an occupier who is required to pay contributions under section 88 of the Act—details of any recycling, mixing, blending or processing of any waste in the load, including the composition as a proportion of waste and other material in any waste-derived material in the load.
- (l) the location within the Facility where the waste is being delivered

Tracked liquid wastes will be reported on the EPA's online waste tracking system (or an alternative system approved by the EPA in writing).

The following information will also be captured in the electronic data management system for each waste load: HiQ's licence and address details, treatment type, net tonnage of the load (expressed in kilograms), the weighbridge operators name and signature, and the date.

This is to be completed whilst the truck is on the bridge. The original copy of this information is to be sent to the EPA by HiQ, duplicate copies are to be retained onsite in a dedicated binder.

If the waste load matches the Acceptance Letter, issued batch number and CA they will be directed by the weighbridge operator into the building and assigned an appropriate unloading area.

If inconsistencies exist and/ or the wastes are not consistent with the Acceptance Letter and delivery expectations the waste load will be rejected, the incidence will be recorded within the rejected loads register.

The weighbridge officer will visually inspect the incoming vehicle, if any leaks or overloading of the vehicle are identified the customer will be notified and required to rectify the situation.

When loads of non-conforming waste are identified during the initial inspection, the customer will be asked to leave the Facility immediately with the load, and the weighbridge operator will record the information in the 'Rejected Loads Register'.

Payment Method

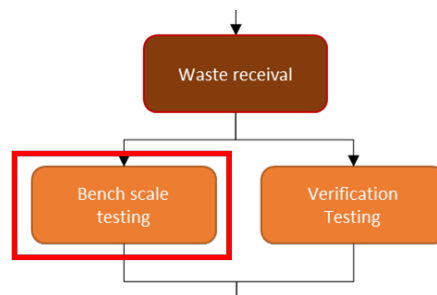
For all cash on delivery loads, ensure the customer's business name is noted in addition to the suburb the material came from. Cash on delivery dockets are then filed at the end of each day in the payment record ring binder.

A 'settlement' of the EFTPOS machines will be completed at the ends of each day, and a print out of all transactions will be filed in the electronic data management system.

5.6 Bench Scale and Verification Testing

5.6.1 Bench Scale Testing Procedure

For new customers or new waste streams HiQ will require the waste generator to have completed bench scale testing prior to receipt of waste at the Facility. Where the generator has developed a track record of meeting environmental/waste acceptance criteria for a particular waste stream, then pre-treatment bench scale testing can be bypassed and may, instead, be completed onsite at the Facility.



Bench scale testing is designed to provide the treatment performance of the wastes under a range of realistic scenarios, with leaching likely to be one of the most important parameters. The procedure for bench scale testing carried out at the Facility is included in Table 5-5.

Table 5-5 Bench Scale Testing Procedure

Personal Protective Equipment
Prior to bench scale testing, appropriate personal protective equipment (PPE) is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls in place during bench scale testing include: - Ventilation system to be managed in accordance with the OAQMP during handling of material - Access to spill kits - Operator training on the emergency/spill response procedure as outlined in the OEMP - Access to an emergency shower in the event that an individual comes into contact with reagents - Leachate system which will capture any spilt reagents. - Bench Scale Testing to be performed/supervised by the onsite Suitably Qualified Chemist.
Leach and Physical Tests
A range of standardised leach and physical tests will be carried out by the Facility Chemist, to include as a minimum, subject to the contaminant of interest: - Total contaminant concentration and Toxic Characteristic Leaching Procedure (TCLP) testing. TCLP is considered the most appropriate test method for landfill disposal of treated wastes - Australian Standard Leaching Procedure - LEAF testing (USEPA Methods 1313, 1314, 1315 and 1316); and - Unconfined compressive strength testing (for soils be treated via immobilisation)
Australian Standard Leaching Procedure & TCLP Test
The Australian Standard Leaching Procedure & TCLP test will be used as the primary test methods for determining leach and assessing treatment performance. The TCLP test will be run under the following assumptions: - For waste liquids with a low solids content (<0.5% solid) the liquid test represents the extract concentration - If a total contaminant concentration as reported by total analysis demonstrates an individual contaminant is not present in the waste, or present in levels that could not possibly exceed the regulatory thresholds for waste disposal, then the full TCLP extract will not be performed for that particular contaminant - For wastes that are 100% solid, the maximum theoretical leachate concentration is 1/20 of the total concentration in the waste. If this value is below the regulatory threshold, full TCLP is not required.
Restricted Solid Waste and Hazardous Waste

Solid waste may be deemed to be Restricted or Hazardous based on the TLCP and SCC characteristics of the waste. Table 2 in the Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014) prescribes the limits which outlines waste as being either General Solid Waste, Restricted Solid Waste or (if above these limits) hazardous.

In some cases, soil to be received at the facility (code N120) may present the TCLP and SCC characteristics that would deem it to be Restricted Solid Waste or Hazardous Waste. Wastes accepted at the Facility that are deemed to be Hazardous would be treated to the point where they are reclassified as Restricted. These materials would then be transferred to a Facility that is permitted to accept the material for further treatment or disposal.

Waste accepted at the Facility that is deemed to be Restricted Solid waste would be treated down to General solid waste criteria prior to disposal.

Reagents

A wide range of reagents have been proposed for use at the Facility. The preferred reagent and the establishment of dosing rates will be identified during Bench Scale Testing. Multiple reagents may be considered to enhance operational treatment times, and lower contaminant mass throughout the batch of waste. Reagents used at the Facility include:

- Ferrous sulphate (powdered)
- Bacteria (stored in liquid form)
- Urea
- Super phosphate (powdered)
- Biodegradable surfactant
- Polymer (powder or liquid)
- Aglime
- Primary cementitious stabilising agents (Ordinary Portland Cement (OPC), Ground Granulated Blast-furnace Slag (GGBFS), pulverised fuel ash, cement kiln dust)
- Secondary stabilising agents (Lime, sodium silicate, carbons, organophilic clays, natural pozzolans, bentonites)
- Aluminium sulphate (28% w/w or powdered)
- Hydrochloric acid (37% w/w) (DG Class 8)
- Caustic soda (30% w/w) (DG Class 8)
- Magnesium oxide (powdered)

LWTP reagents comprise:

- Hydrochloric acid
- Caustic soda
- Aluminium sulfate
- Polymer
- Activated Carbon
- Magnesium Oxide
- Ferrous sulfate

For soils that will be treated via immobilisation, the preferred dosing rates for reagents will be confirmed as part of the bench scale testing.

In some cases, pilot testing to determine suitability/efficacy of either immobilisation or bioremediation may also be required.

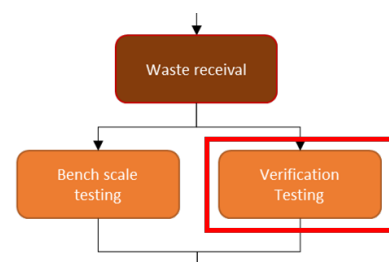
Waste treatment procedure – records

The preferred treatment technology will be documented within the electronic data management system by the Facility Chemist.

The applicable SAQP will be reviewed by the Facility Chemist and its applicability confirmed and referenced in the electronic data capture system. If the Facility Chemist determines that updates are required to the SAQP for the waste batch the SAQP will be updated and saved on the electronic data capture system.

5.6.2 Raw Material / Validation Sampling Procedures

Each load will undergo a raw material sampling procedure. This may occur instead of, or as well as, Bench scale testing (pending prior testing) The procedure for each waste type is outlined in the following sections.



5.6.2.1 Soils

The raw material sampling procedure for soils is outlined in Table 5-6.

Table 5-6 Soil sampling procedure

Preparation
The Facility Chemist is to wear the appropriate PPE in accordance with the Health and Safety Plan for the Facility (long sleeved hi-vis shirts, trousers, boots, eye protection, gloves and a respirator). The Facility Chemist is to collect the sampling equipment (spade, bucket and a jar) and to ensure that these are clean and ready for use.
Environmental controls
The following environmental controls will be in place during the soil sampling procedure: • Ventilation system to be managed in accordance with the OAQMP during handling of material • Access to spill kits • Operator training on the emergency/spill response procedure as outlined in the OEMP.
Soil Delivery
The soil load is delivered and the truck exits the Facility. For non-PFAS contaminated soil it will be tipped for temporary storage and validation testing in Bay G. PFAS contaminated soil will be deposited directly into Bay E. The Facility Chemist must collect the sample prior to a loader moving the pile, to minimise any risk of cross contamination.
Sampling
The Chemist will use a small spade to collect approximately 200g of soil into a bucket from three separate locations in the soil pile. The sub-samples are homogenised in the bucket and a representative sample is then collected.
Sample Storage
The sample is to be stored in a jar labelled with the date of collection and UIN that matches the waste load documentation. Samples collected will be retained for at least one month from the date of acceptance of the waste. These will be available for examination by an authorised person if required.
Record Keeping
The electronic data capture system will be updated by the Facility Chemist to identify that a sample has been collected. On the first working day of each month, all samples from the month prior will be discarded into solid waste piles with matching soil contaminants, ready for treatment.

5.6.2.2 Sludges

The raw material sampling procedure for sludges is outlined in Table 5-7.

Table 5-7 Sludge sampling procedure

Preparation
The Facility Chemist and Operator are to wear the appropriate PPE in accordance with the Health and Safety Plan for the Facility (e.g. long sleeved hi-vis shirts, trousers, boots, eye protection, gloves and a respirator).

The Facility Chemist is to collect the sampling equipment (spade, bucket and a jar) and to ensure that these are clean and ready for use.
Environmental Controls
The following environmental controls will be in place during the sludge sampling procedure: • Ventilation system to be managed in accordance with the OAQMP during handling of material • Access to spill kits • Operator training on the emergency/spill response procedure as outlined in the OEMP • Leachate system which will capture any spilt sludges.
Sludge Delivery
The Operator will direct the tankers to reverse up to the assigned sludge pit. Prior to opening the discharge valve, the Chemist will hold a bucket under the sample valve and drain approximately 500mL from the tanker into a bucket.
Sampling
• After the line has been bled of any previous contamination, the Chemist will turn off the sample point valve and place a new bucket underneath. Approximately 200mL will be drained into the bucket. This is the first sub-sample. • The sub-sample will then be taken back to the laboratory and tested for pH and flash point. It will also be confirmed if the material received possesses the physical characteristics that would be expected of this load of waste. • After pre-unloading testing has confirmed that waste is acceptable, bulk unload will begin. • Another 200mL sub-sample will be taken approximately halfway through the unload and then one more 200mL sub-sample will be taken towards the end. • The Chemist will stir the sub-sample bucket in order to homogenise the sample.
Sample Storage
The sample is to be stored in a jar labelled with the date of collection and UIN that matches the waste load documentation. Samples collected will be retained for at least one month from the date of acceptance of the waste. These will be available for examination by an authorised person if required.
Record Keeping
The electronic data capture system will be updated by the Facility Chemist to identify that a sample has been collected. On the first working day of each month, samples from the month prior will be discarded into sludge pits or soil piles with matching contaminants, ready for treatment.

5.6.2.3 Liquid waste

The raw material sampling procedure for liquid waste is outlined in Table 5-8.

Table 5-8 Liquid waste sampling procedure

Preparation
The Facility Chemist and Operator are to wear the appropriate PPE in accordance with the Health and Safety Plan for the Facility. The Facility Chemist is to collect the sampling equipment (spade, bucket and a jar) and to ensure that these are clean and ready for use.
Environmental Controls
The following environmental controls will be in place during the liquid waste sampling procedure: • Ventilation system to be managed in accordance with the OAQMP during handling of material

- Access to spill kits
- Operator training on the emergency/spill response procedure as outlined in the OEMP
- Leachate system which will capture any spilt liquid waste.

Liquid waste Collection

The Operator connects the pipework from the tanker to the LWTP fill pump and opens the valves. Prior to turning on the pump, the Chemist will hold a bucket under the sample point at the bund wall and drain approximately 500mL from the tanker into a bucket.

Sampling

- After the line has been bled of any previous contamination, the Chemist will turn off the sample point valve and place a new bucket underneath. Approximately 200mL will be drained into the bucket. This is the first sub-sample.
- The sub-sample will then be taken back to the laboratory and tested for pH and flash point. It will also be confirmed if the material received possesses the physical characteristics that would be expected of this load of waste.
- After pre-unloading testing has confirmed that waste is acceptable, bulk unload will begin.
- Another two 200mL samples will be collected.
- The Chemist will stir the sub-sample bucket in order to homogenise the sample.

Sample Storage

The sample is to be stored in a jar labelled with the date of collection and UIN that matches the waste load documentation.

Samples collected will be retained for at least one month from the date of acceptance of the waste. These will be available for examination by an authorised person if required.

Record Keeping

The electronic data management system will be updated by the Facility Chemist to identify that a sample has been collected.

On the first working day of each month, all samples from the month prior will be discarded into a liquid waste tank with matching contaminants, ready for treatment.

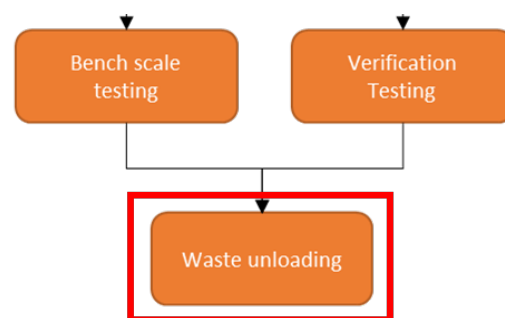
5.7 Waste Unloading

Once a waste load is accepted at the Facility it will be directed to an appropriate unloading area (Figure 2-1). The unloading area will be dependent upon the waste type and waste treatment.

5.7.1 Soils Unloading Procedure

The soil unloading procedure is outlined in Table 5-9.

Table 5-9 Soil unloading procedure



Preparation
• The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator • The Weighbridge Operator notifies Operations via UHF on the designated frequency • The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck unloading • The spotter notifies Facility personnel of the incoming truck • The spotter confirms that the ventilation system is switched on • Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery • The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle • The spotter directs the truck to the unloading position, ensuring that there are no obstructions for the tray when raised
Environmental Controls
The following environmental controls will be in place during the soil unloading procedure: • Ventilation system to be managed in accordance with the OAQMP during unloading of material • Application of water for dust suppression during unloading of material via a hose system • Visual inspection of the storage area on completion of unloading to confirm all material is in the relevant bay. Use brooms or shovels to move material within the bay if observed outside of the bunded area • Traffic movements internal to the Facility would be managed in accordance with the OTMP.
Unloading of soils
• Communication between the truck driver and spotter will be via UHF radio • The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the unloading process • The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility • The spotter stands in the designated spotter zone located 20 metres from the truck, from this point they are visible to the driver • The vehicle pulls up to the unloading areas adjacent to the temporary storage bays (Bay G) and unload by tipping the waste into a stockpile in front of the bays • For PFAS contaminated soil unloading will be direct to Bay E • Once the load has been emptied, the spotter instructs the driver to lower the tray • The truck then leaves the Facility • The stockpile is then tested via the procedure outlined in Section 5.6.2.1 • An excavator and/or front-end loader then moves the material from in front of the bays into one of the bulk soil receival bays. • Stockpile heights will be limited to 4 metres

The temporary unloading area would be swept down and decontaminated if required between batches.
Cleaning and exit
- Once the tray has been lowered the spotter will guide the truck driver through the wheel wash and hose out bay - The spotter will open the door for the truck to exit the facility and close it once the truck is clear - The spotter will notify the weighbridge operator via UHF that the truck has left the building.

5.7.2 Sediment and Sludges Unloading Procedure

The sediment and sludge unloading procedure is outlined in Table 5-10.

Table 5-10 Sediment and sludge unloading procedure

Preparation
- The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator - The Weighbridge Operator notifies Operations via UHF on the designated frequency. - The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck unloading - The Production Manager and Chemist identify the appropriate sludge pit or LWTP for the tank truck to be unloaded into - The spotter notifies Facility personnel of the incoming truck - The spotter confirms that the ventilation system is switched on - Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery - The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle - The spotter directs the truck to reverse into the designated pit or the LWTP - The spotter places platform over designated pit or LWTP, ensuring that it is locked into the guides and sitting firmly on the front edge of the pit or LWTP.
Environmental Controls
The following environmental controls would be in place during the sediment and sludge unloading procedure: - Ventilation system to be managed in accordance with the OAQMP during unloading of material - Visual inspection of the storage area on completion of unloading to confirm all material is in the relevant pit. Use brooms or shovels to move material within the relevant pit if observed outside of the bunded area - Supporting supervisor onsite during all unloading - Leachate management system which will capture any spilt materials
Unloading
- Communication between the truck driver and spotter will be via UHF radio - The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the unloading process - The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility - The spotter stands in the designated spotter zone located 20 metres from the truck, from this point they are visible to the driver - The spotter allows the truck driver to open the rear drain valve and empty the waste through the grate and into the pit or LWTP. - Samples are to be collected as per the procedure outlined in Section 5.6.2.2 during the beginning, mid point and towards the end of unloading.
Cleaning and exit

- The driver then closes the rear gate to the vacuum truck and prepares to exit
- The spotter will guide the truck driver through the wheel wash and hose out bay
- The spotter will open the door for the truck to exit the facility and close it once the truck is clear
- The spotter will notify the weighbridge operator via UHF that the truck has left the building
- The spotter washes any dirt/grit/residue from the platform grate to avoid cross contamination and enable prolonged use.

5.7.3 Drill Mud Unloading Procedure

The drill mud unloading procedure is outlined in Table 5-11.

Table 5-11 Drill mud unloading procedure

Preparation
• The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator • The Weighbridge Operator notifies Operations via UHF on the designated frequency. • The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck unloading • The Production Manager and Chemist confirm the drill mud plant is available • The spotter notifies Facility personnel of the incoming truck • The spotter confirms that the ventilation system is switched on • Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery • The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle • The spotter directs the truck to reverse up to the drill mud plant The spotter places platform over the drill mud plant, ensuring that it is locked into the guides and sitting firmly on the front edge of the drill mud plant.
Environmental Controls
The following environmental controls would be in place during the drill mud unloading procedure: • Ventilation system to be managed in accordance with the OQMP during unloading of material • Visual inspection of the storage area on completion of unloading to confirm all material is in the drill mud plant • Supporting supervisor onsite during all unloading • Leachate management system which will capture any spilt materials
Unloading
• Communication between the truck driver and spotter will be via UHF radio • The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the unloading process • The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility • The spotter stands in the designated spotter zone located 20 metres from the truck, from this point they are visible to the driver • The spotter allows the truck driver to open the rear drain valve and empty the waste into the drill mud plant. • Samples are to be collected as per the procedure outlined in Section 5.6.2.2 during the beginning, mid point and towards the end of unloading.
Cleaning and exit
• The driver then closes the rear gate to the vacuum truck and prepares to exit • The spotter will guide the truck driver through the wheel wash and hose out bay

- The spotter will open the door for the truck to exit the facility and close it once the truck is clear
- The spotter will notify the weighbridge operator via UHF that the truck has left the building
- The spotter washes any dirt/grit/residue from the platform grate to avoid cross contamination and enable prolonged use.

5.7.4 Liquid Waste Unloading Procedure

The liquid waste unloading procedure is outlined in Table 5-12.

Table 5-12 Liquid waste unloading procedure

Preparation
• The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator • The Weighbridge Operator notifies Operations via UHF on the designated frequency • The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck unloading • The spotter notifies Facility personnel of the incoming truck • The spotter confirms that the ventilation system is switched on • Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery • The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle • The spotter directs the truck to reverse in front of the designated liquid waste treatment plant
Environmental Controls
The following environmental controls will be in place during liquid waste unloading: • Ventilation system to be managed in accordance with the OAQMP during unloading of material • All tanks include overflow protection and alarms • Supporting supervisor onsite during all unloading • Leachate management system which will capture any spilt materials.
Unloading
• Communication between the truck driver and spotter will be via UHF radio • The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the unloading process • The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility • The spotter stands in the designated spotter zone located 20 metres from the truck, from this point they are visible to the driver • The Facility chemist and Operator collect a sample for testing as per the procedure outlined in Section 5.6.2.3 • Once the laboratory testing has confirmed the waste is acceptable, bulk unload will begin • Another two 200ml samples will be collected • The spotter allows the truck driver to open the rear drain valve and empty the waste through the grate and into the liquid waste treatment plant.
Cleaning and exit
• The spotter will guide the truck driver through the wheel wash • The spotter will open the door for the truck to exit the facility and close it once the truck is clear • The spotter will notify the weighbridge operator via UHF that the truck has left the building

5.8 Non-conformance and waste rejection

Examples of non-conforming waste may include:

- Waste that does not meet the description and the paperwork accompanying the delivery
- Waste not conforming to pre-acceptance criteria (i.e. that waste type permitted as per Table 5-13)
- Waste containers (notably for packaged waste) are damaged or poorly stowed on a vehicle
- Waste loads are not suitably covered or secured
- Loads/drivers that do not have the correct paperwork or documentation with them
- Loads that arrive on site unscheduled.

Non-conforming waste types and the procedures for managing non-conforming waste are provided in Table 5-13.

The following materials will not be received at the Facility and would be automatically rejected:

- Scheduled PCB contaminated material as defined by the Polychlorinated biphenyl chemical control order (1997)
- PFAS contaminated soil above the restricted solid waste criteria
- Asbestos containing material
- Wastes classified as Dangerous Goods, other than liquid waste and packaged waste classified as Class 8 PG II or III, or PFAS contaminated material that meets the definition of Class 9 PG III.

In the unexpected event that materials received at the Facility meet the classification of Asbestos Containing Material, the material will be subject to an unexpected finds procedure (refer to Appendix C of the OEMP) and removed from the Facility for appropriate disposal.

Table 5-13 Non-conforming waste procedure

Non-conforming waste identification
• Waste would be identified as non-conforming by either the weighbridge operator (e.g. not properly secured/covered waste loads) or by the Site Chemist (during bench scale or validation testing) • The Site Manager would be immediately notified of non-conforming waste • The Site Manager would categorise the waste as either: - Loads that can be processed and accepted onto the site - Loads that cannot be accommodated and are to be rejected.
Loads that can be processed
• Where a waste type can still be accepted and processed (e.g. for a first time customer minor non-conformance) the waste will be received via normal procedure • A non-conformance report will be raised and the customer notified of the non-conformance
Rejected loads
• For major non-conformances (e.g. unapproved waste types arriving on site, unscheduled waste, or repeated customer non-conformances) the Site Manager will reject the waste load • An assessment of the rejected load will be made to ascertain whether it is suitable and safe to return to the road network. If safe to do so, the driver will be immediately redirected from the Facility and will not be permitted to unload the waste load • The EPA would be notified immediately if a rejected waste load is received at the Facility that is deemed not safe for transport and an Action Plan will be prepared in consultation with the EPA. The rejected waste load would be transferred to a suitable location separated from other waste streams (depending on the nature of the waste)

-
- If a load is deemed to be rejected but has already been unloaded and the driver has left the Facility, the weighbridge operator or Site Manager would contact the driver or customer (pending duration of time passed since the waste was unloaded) to return to collect the load

Non-conformance report

- A non-conformance report will be raised for all non-conforming waste (whether accepted or rejected)
- The load is to be recorded on the Rejected Loads Register
- The report will document the UIN, driver details, details of the non-conformance, date, time and customer details.
- A near miss/hazard will be raised in the EMS incident register.
- A copy of the report is to be issued to the customer within 24 hours, including any actions required by the customer
- Repeated non-conformances or severe non-conformances may result in future customer refusal
- Major incidents will be reported to the EPA as required
- Additional charges may be applied to the customer pending the nature of the non-conformance.

6 WASTE TREATMENT AND MANAGEMENT PROCESSES

The following sections set out the waste treatment and management procedures that will be undertaken at the Facility. General processing activities and associated volumes are summarised in Figure 6-1 and an overview of treatment options for each waste type is provided in Table 6-1.

[Drafting note: Section to be revised following approval to ensure compliance with any applicable conditions of consent]



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Table 6-1: Waste treatment overview

Waste Type	Description	Treatment Methodology	Section
Packaged Waste (solid, liquid, sludge)	Non-contaminated solid packaged waste for destruction	Shredding and storage	Section 6.1.1
	Non-contaminated liquid packaged waste for storage	Storage only	Section 6.1
	Packaged industrial chemical waste	Storage only	Section 6.1
Sediments and Sludges	PFAS Contaminated Soil	Storage only	Section 6.2.3
	Total Petroleum Hydrocarbons (TPH)	Physical separation/screening Chemical separation Bioremediation Storage	Section 6.2.1.3 Bioremediation Management Plan (Appendix G)
	Soils containing Total Recoverable Hydrocarbons (TRH) and Benzene, Toluene, Ethylbenzene, Xylenes and Napthalene (BTEXN)	Bioremediation Storage	Section 6.2.1.3 Bioremediation Management Plan (Appendix G)
	Coal Tar Contaminated Soil from Former Gasworks Sites	Immobilisation Storage	Section 6.2.1.4
	Material containing heavy metals, e.g.: - Lead - Chrome - Copper - Arsenic - Nickel	Immobilisation Storage	Section 6.2.1.4
	Sludges	Dewatering Liquid waste treatment Contaminated soil treatment	Section 6.3.1
	Acid Sulfate Soils	Contaminated soil treatment (if required) Acid neutralisation	Section 6.2.2 Acid Sulfate Soils Plan (Appendix F)
Non-Contaminated Drill Muds	Non-contaminated soil and water slurry from hydroexcavation works	Dewatering and separation into liquid waste (liquid waste treatment) and soils Further treatment of water in LWTP Testing against Treated Drilling Mud RRO/RRE (2014)	Section 6.3.2



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Waste Type	Description	Treatment Methodology	Section
Liquid Wastes	Contaminated liquid, water outputs of slurry and drill mud dewatering	Liquid waste treatment	Section 6.4

6.1 Packaged Waste

Different types of packaged waste will be received at the WTF and will be subject to different management and treatment methodologies. Broadly, there are two categories:

- Packaged Waste for Product Destruction
- Packaged Chemical Waste.

These are described in the following sections.

6.1.1 Packaged Waste for Product Destruction Procedure

This includes consumer products that do not pass quality control. Packaged waste received at the Facility for destruction includes waste that is non-contaminated, inert, and pre-classified as general solid waste. The procedure for packaged waste destruction is outlined in Table 6-2.

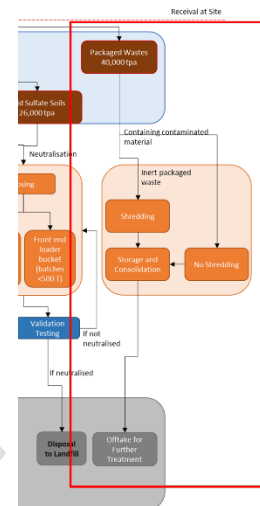


Table 6-2 Packaged Waste Product Destruction Procedure

Personal Protective Equipment
Prior to handling of packaged wastes, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the storage of packaged waste will include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay.
Packaged Waste Product Destruction Procedure
• Packaged waste will be delivered to the Facility on flatbed trucks • Packaged waste would be transferred via excavator/front end loader to Compartment 3 into a designated storage Bay (Bay F) • Packaged waste for product destruction and empty packaging will undergo destruction via the Brentwood AZ50HD dual shaft shredder (or similar equipment type), which has a throughput of 7-8 tonnes per hour, prior to offsite disposal at an appropriately licensed facility • The Brentwood AZ50HD dual shaft shredder manual must be read by all staff who are in charge of installing, running and carrying out maintenance of the shredder and its dismantling • The working area is to be kept clear and tidy of any unnecessary material that may interfere with the operators freedom of movement, nor prevent access to the control panel in case of an emergency • Only approved materials are to be fed through the shredder • No more than 400 t of packaged waste is to be stored at the Facility at any given time



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Testing and validation

Testing and validation will be carried out in accordance with the relevant SAQP (Appendix A).

Offtake Procedure

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once an EPA approved treatment facility has been identified to accept the packaged waste, the material will be redirected to the approved facility.

The trucks will be loaded via the loading procedure detailed in Section 7.4.

6.1.2 Packaged Chemical Waste Procedure

Table 6-3 Packaged chemical waste procedure

Personal Protective Equipment

Prior to handling of packaged wastes, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.

Environmental Controls

The following environmental controls will be implemented to manage any potential impacts arising from packaged waste treatment:

- Ventilation system to be managed in accordance with the OAQMP during loading and unloading
- Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay.
- Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area to be in compliance with AS3780 and AS4681 for the storage and handling of Class 8 and Class 9 liquids to prevent any spills exiting the Facility.

Initial verification testing

Verification testing would be carried out by the Facility chemist to confirm the substances present within the packaged waste. A sample will be taken from the IBC drum using a dip tube and tested onsite to confirm the expected physical and chemical properties of the material. If the material does not match the description provided by the waste generator the load would be rejected and recorded within the rejected loads register (refer Section 5.8).

Packaged Chemical Waste Procedure

- These wastes will be stored at the Facility until a suitable treatment or destruction facility is able to accept the materials within NSW or interstate
- Packaged wastes classified as Class 8 PG II or PG III will be stored in the designated location within Bay F for Class 8 Dangerous Goods and in accordance with AS 3780-2008: The storage and handling of corrosive substances, located above the Probable Maximum Flood level
- Packaged waste found to have a low (acidic) pH and those with a high (alkaline) pH would be stored in separate bays in Bay F
- Portable containment bunding to be maintained in place within each Bay underneath storage shelving
- Do not overcrowd storage or place chemical waste close to shelf edges where they can be knocked or pushed off
- All containers for storing chemical waste must be properly sealed and undamaged in accordance with Australian Standards (AS) and the ADG Code for packaged liquid waste classified as Class 8 PG II and III.
- Following validation testing, containers will remain securely sealed. The substances will not be removed from their original container.



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Testing and Validation

Testing and validation will be carried out in accordance with the relevant SAQP (Appendix A).

Offtake Procedure

Once an EPA approved facility has been identified to accept the packaged hazardous chemical waste, the material will be redirected to the approved facility.

The trucks will be loaded via the loading procedure detailed in Section 7.4.

6.2 Soils

As described in Section 5, each batch of waste received at the Facility will be assigned an UIN, batch number and sub-batch number (if required). Each batch of soil waste will be received onsite and moved into designated receival bays prior to being moved to the appropriate treatment bay, for treatment or storage. The UIN will be used to track waste batches as they are transferred between bays within the WTF. Between loads, bays will be cleaned to remove all visible material prior to the next load being received or treated within a bay.

PFAS contaminated soil will be stored in designated bays (Bay E) which will not be used for the storage of any other material. Figure 6-2 provides an overview of the management and treatment processes for soils and sludges accepted at the WTF.

Prior to the removal of soil from the WTF appropriate criteria limits will be met whether it be for material reuse or landfill acceptance criteria. The following sections describe the treatment procedures for soils, sediments and sludges.

Appendix H provides a table of the maximum concentrations for each contaminant that could be accepted at the Facility.

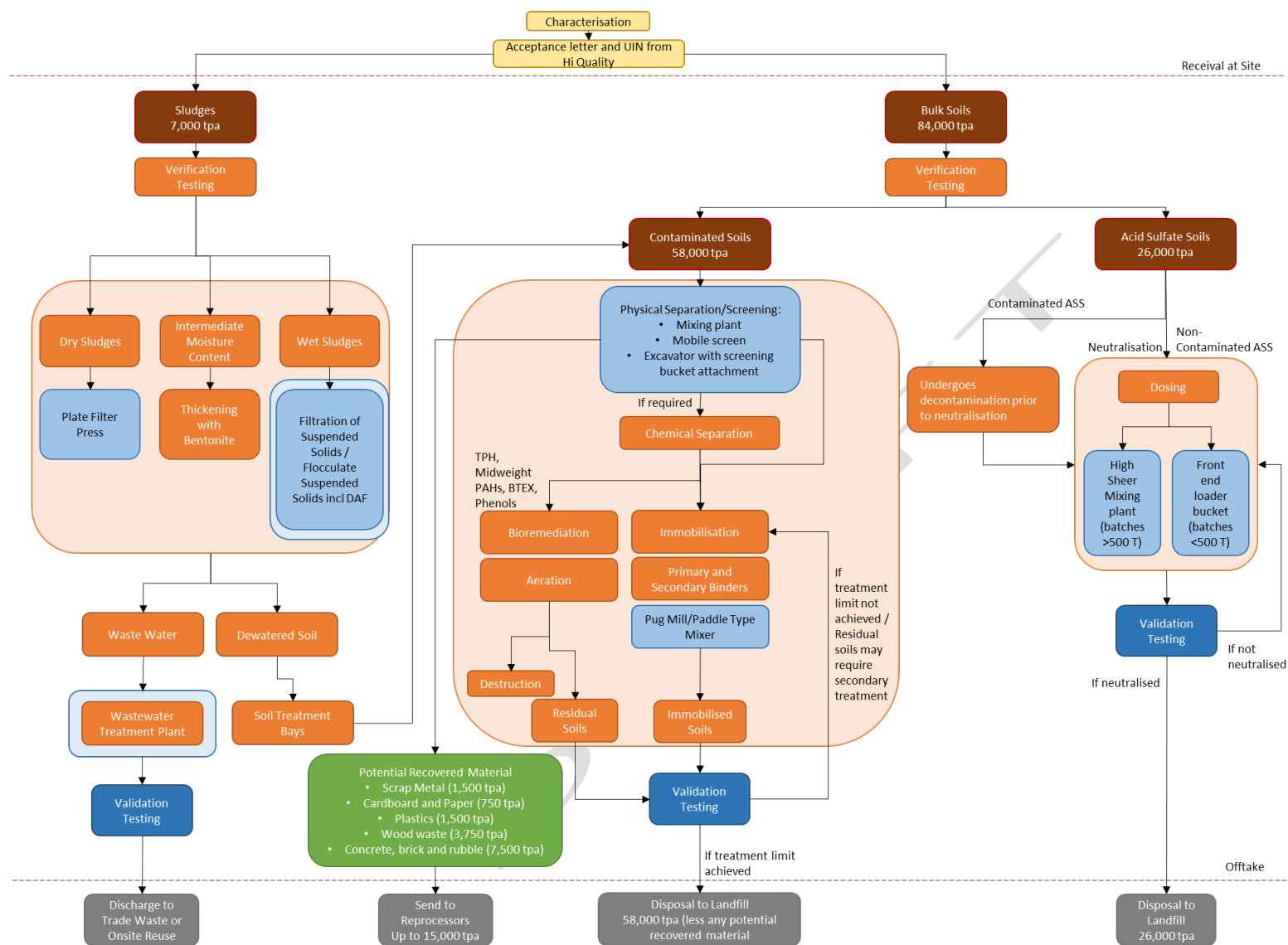


Figure 6-2: Management and treatment process overview for soils and sludges



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6.2.1 Bulk Soil Treatment

Once an 'Acceptance Letter' and UIN for a consignment is issued by HiQ, incoming bulk soils will be delivered by tipper truck or truck and dog and unloaded directly in front of the specific material bay, a front end loader or excavator will then be used to move the material into the bay itself. Verification testing will be undertaken following receipt to ensure contaminants align with the characterisation provided by the waste generator.

Each load will be assigned a separate bay, with no mixing of loads permitted. Dedicated bays are allocated for storage, conditioning and final validation of materials as detailed in Figure 2-1. The following processes will be undertaken to treat soils.

6.2.1.1 Physical Screening

Bulk soils will undergo physical separation to remove oversize and non-soil materials, such as plastics, metals, timber, concrete and aggregate, and cardboard and paper. This will be achieved through use of the mixing plant, a mobile screen, or an excavator with a screening bucket attachment. The mixing plant will also be utilised to break up clods in soils and clay, to improve the performance of further processing technologies. The procedure for the physical screening of bulk soils is provided in Table 6-4.

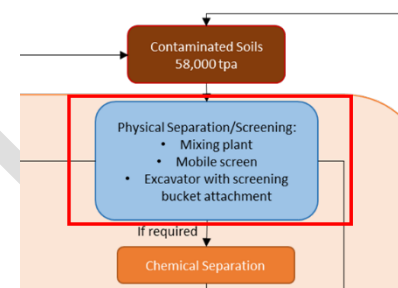


Table 6-4 Physical Screening of Bulk Soils Procedure

Personal Protective Equipment
Prior to physical screening, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Ventilation system to be managed in accordance with the OAQMP during handling of material
Physical Screening Procedure
The type of screening technology used will be dependent on the particle size distribution and the grading of the materials. It is anticipated that cohesive materials or soils containing greater than 15% fines (silt and clay) will not be suitable for physical separation and may be more suited to chemical separation (Section 6.2.1.2). Three types of physical screening technology will be deployed, as follows: • The high shear mixer chemical stabilisation / mixing plant comes fitted with a screen to remove oversize materials which will be separated prior to stabilisation commencing • A mobile screen • An excavator / loader with rilling / screening bucket attachment that will enable physical separation prior to treatment for soils not passing through the high shear mixer • The contaminated material will be loaded into the respective physical screening technology via an excavator or front-end loader.
Oversize and Non-Soil Materials



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Non-soil materials that have been separated out during physical screening will be transferred to the storage and transfer bay (Figure 2-1) via an excavator or front-end loader. These materials will be tested to confirm they are not contaminated prior to being transported to a suitable facility for recycling. Should testing identify that contamination is present they will be classified in accordance with the Waste Classification Guidelines and disposed of at an appropriately licensed facility.

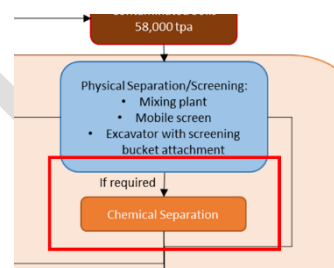
Decontamination

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The used bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.2.1.2 Chemical Separation

The application of surfactants will be used where heavier tar / hydrocarbon fractions that are not conducive to bioremediation can be separated or as a pre-treatment. The procedure for chemical separation of bulk soils is provided in Table 6-5.

Table 6-5 Chemical Separation of Bulk Soils Procedure



Personal Protective Equipment

Prior to chemical separation, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.

Environmental controls

Environmental controls for the chemical separation of soils include:

- Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material
- Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment
- Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area
- Leachate collection system and grading of bays to capture leachate
- Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area.

Chemical Separation Procedure

- Soils requiring chemical separation will be identified during the waste screening procedure. Soils to be treated would generally contain heavier tar / hydrocarbon fractions not amenable to aerobic bioremediation
- Soils for chemical separation would be deposited in the treatment bay (after preliminary screening) where they would undergo secondary treatment (e.g. bioremediation bay or immobilisation bay) in accordance with the waste unloading procedure
- A surfactant solution would be applied to the soils to lower the interfacial tension of LNAPL and encourage desorption of LNAPL from soil particles prior to bioremediation or immobilisation treatment occurring



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- The surfactant solution/runoff may be collected and recirculated to the soil pile as tar/hydrocarbons are removed. Observations of the resulting surfactant solution/runoff will be made (i.e. colour change, sheen) to determine when fresh surfactant solution is added, and when soils require additional mixing
- To ensure contact throughout the soil pile, the soil would be turned using the front-end loader as needed and surfactant solution added to continue removal, with additional observations of the surfactant solution/runoff to determine when complete
- The soil would be left in the bay until no further surfactant solution/runoff was coming off the pile prior to commencement of further treatment
- Liquid generated during this process would be directed to the leachate collection pits for collection and disposal
- Soils would undergo final treatment in the bioremediation or immobilisation bay to achieve final disposal criteria.

Decontamination

Once chemical separation is complete the used bay and any machinery would be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water would be used. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.2.1.3 Bioremediation

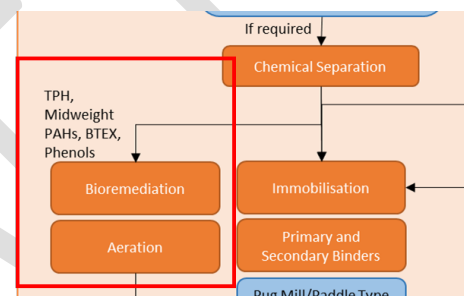
Bioremediation utilises microorganisms or their metabolic products to degrade organic compounds in soils.

Bioremediation will be used to treat soils contaminated by organic compounds (such as TPH) and will involve aerobic techniques such as landfarming and/or biopiles. The soils need to be aerated regularly during treatment to ensure longevity of the microbes. The process will be undertaken on a sealed surface to prevent leaching directly into soils and groundwater.

Bench scale testing and pilot trials will be used to determine the suitability of treatment via bioremediation for the specific contaminants present within the waste type.

Material for bioremediation will be accepted with total recoverable hydrocarbons (TRH) of up to 5% TRH w/w for treatment through bioremediation. The Facility is expected to treat 8,000 tonnes of soil material via bioremediation annually.

Following acceptance of a waste for bioremediation, and determination of potential carbon food source for microbes, water content and soil blending requirements (aeration), the bioremediation process will be finalised. Bioremediation will occur until the completion of treatment has been validated through laboratory testing to confirm suitable thresholds of contaminant load has been achieved. The timeframe for treatment will be dependent on the nature of the contamination, concentration of the contaminants and the type and volume of soil. Bioremediation volume limits will be strictly adhered to; HiQ will not accept additional wastes for treatment via bioremediation until any existing materials have been treated, validated, and removed from the Facility for disposal. The bioremediation procedure is summarised below in Table 6-6, a detailed process description is provided in the Bioremediation Management Plan (Appendix G).





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Table 6-6 Bioremediation Procedure

Personal Protective Equipment
Prior to bioremediation, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the bioremediation of soils include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material. The gas collection system (part of the HVAC system onsite) will be used to capture gasses and gasses passed through an activated carbon scrubber • Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area. • Removeable fabric curtains would be used on each of the bioremediation bays to contain minor contaminant generation from the handling and the turning process • Leachate collection system and grading of bays to capture leachate • Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area.
Process Description
• The mobile soils screen will be used to sieve and aerate the soil as it is unloaded into the bioremediation bay • Soil conditioning will be undertaken by improving soil texture through the addition of additives such as straw, saw dust etc (if required) and water spraying to maintain moisture levels • Nutrients and surfactants will be incorporated and soils aerated periodically. The additives will be based on the benchmark testing results. • Soils will be treated in stockpiles with GORE cover system (or similar) with introduction of air by mechanical means (bioventing) or turning of soils for aeration. Water will be gently applied using methods such as sprinklers or misters and the stockpile aerated using a blower or turning of the material using the rotary mixer or excavator, should monitoring indicate that moisture and oxygen levels have fallen below optimal. • The temperature, moisture and oxygen content of the soil will be checked and, if at the correct levels (as per the Primary Treatment Procedure) a GORE cover (or similar) will be applied to the pile. • The material will be monitored in accordance with the SAQP and Primary Treatment Procedure to confirm that soil moisture, temperature and oxygen levels remain optimal during the treatment, until validation sampling has confirmed the bioremediation is complete.
Testing and Validation
• Wastes accepted at the Facility that are deemed to be Hazardous would be treated to the point where they are reclassified as Restricted Solid waste • Waste accepted at the Facility that is deemed to be Restricted Solid waste would be treated down to General Solid waste criteria prior to disposal . The following validation testing will be undertaken both during and after completion of bioremediation: • Summarise the moisture content before and after bioremediation, soils moisture content of 25-80% is optimum for effective bioremediation



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- Finalise any amendment materials to be added to the biopiles before and during bioremediation. Consideration should be given to whether the materials are to be reused or not following bioremediation
- Monitor the temperature, moisture content and oxygen content (if covered) to maintain an aerobic biopile
- Complete validation sampling to confirm the contaminants of concern have met the validation criteria nominated in the SAQP have been met.

Testing and validation will be carried out in accordance with the relevant SAQP (Appendix A).

Offtake Procedure and Bay Decontamination

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once an EPA approved landfill facility or suitable reuse location has been identified to accept the treated soils (Table 7-3), the material will be redirected to the approved facility. The trucks will be loaded via the loading procedure detailed in Section 7.4.

Once the soils have been removed from the Facility, the used bay and machinery would be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water would be used. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.2.1.4 Immobilisation

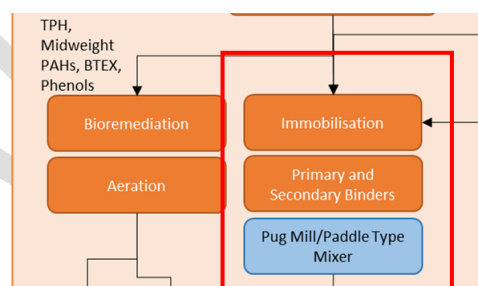
Immobilisation will be used to treat soils where there is no alternative treatment available, such as soils contaminated by coal tar and heavy metals from former gasworks sites. Bench scale testing and pilot trials will be used to determine the suitability of treatment via immobilisation for the specific contaminants present within the waste type. Immobilisation involves mixing soil with cement, lime, or other pozzolonic reagents, and will be undertaken in accordance with the POEO (Waste) Regulation and a NSW EPA General or Specific Immobilisation Approvals will be applied for through the NSW EPA if required. The Facility will treat wastes existing immobilisation technologies, reagents and processes used in Australia and globally that have demonstrated scientific basis for immobilisation ¹.

Appendix H outlines the contaminant types that would be treated via immobilisation.

6.2.1.4.1 General Immobilisation Approvals

As described in Section 5.4 General Immobilisation Approvals (GIA) would be used to classify and treat (where required) wastes in accordance with the EPA guidelines. The following GIAs would be the predominant GIAs used at the Site:

- Cattle-dip contaminated soil
- Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated materials



¹ Immobilisation at the Facility will predominantly use solidification / stabilisation technology, which has been identified as effective for treatment of the selected contaminants, see *ITRC – Development of Performance Specifications for Solidification/Stabilization* (IRTC, July, 2011)



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- Used oil absorbent materials
- Copper-Chrome-Arsenate (CCA) treated timber

Other GIAs may be utilised subject to the waste types being approved for receipt at the Facility.

Coal Tar Contaminated Soil from Former Gasworks Sites (less than 1% (by weight) of coal tar or coal tar pitch waste) Table 6-7 describes the requirements for the GIAs that are based on natural immobilisation of contaminants. Materials subject to these GIAs would be stored and tested on Site. Testing of materials subject to GIAs will be carried out in the bays identified for immobilisation in Figure 2-1. Immobilisation will then be carried out within the high shear mixer prior to depositing the treated soil back into its allocated immobilisation bay before offtake.

Table 6-8 describes the requirements for the GIAs that require soil treatment and sets out the contamination concentrations for the untreated waste, the treated waste and the immobilisation reagents and indicative dosing rate for the contaminants.

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Table 6-7: General Immobilisation Approvals for natural type immobilisation

Approval Number	Specification of Waste Stream	Contaminants Approved as Immobilised	Type of Immobilisation / Mechanism of immobilisation	Validation sampling	Disposal Restrictions	Notification and Record Keeping Requirements
1999/03	Cattle-dip contaminated soil	Arsenic	Natural Arsenic compounds are mineralised through adsorption and incorporation onto and within the naturally occurring minerals present in the cattle-dip contaminated soil.	- Soils would be validated to confirm that the leachable concentration (TCLP) values meet the landfill disposal criteria under the Waste Classification Guidelines and in accordance with the SAQP - If the TCLP criteria are not met a secondary treatment process (such as immobilisation) would be developed	Cattle-dip contaminated soil subject to this GIA must not be co-disposed with putrescible waste (monocell or monofil disposal is recommended).	The Site Manager will keep records of the management and disposal of Cattle-dip contaminated soil for a period of at least 3 years from the date which the contaminated soil is disposed of offsite.

Approval Number	Specification of Waste Stream	Contaminants Approved as Immobilised	Type of Immobilisation / Mechanism of immobilisation	Validation sampling	Disposal Restrictions	Notification and Record Keeping Requirements
1999/05	Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated materials	Benzo(a)pyrene (BaP) and Polycyclic aromatic hydrocarbons (PAHs)	Natural	- Soils would be validated to confirm that the leachable concentration (TCLP) values meet the landfill disposal criteria under the Waste Classification Guidelines and in accordance with the SAQP - If the TCLP criteria are not met a secondary treatment process (such as immobilisation) would be developed	Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated materials subject to this approval that meet the requirements of the Waste Guidelines for classification as 'inert waste' or 'solid waste' may only be disposed of at solid waste landfills or industrial waste landfills which have currently operating leachate-management systems and which are licensed to receive that particular class of waste, and that have licence conditions to receive waste subject to immobilisation approvals with this type of disposal restriction. Ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated materials subject to this approval that are classified as 'industrial waste' must be disposed of at industrial waste landfills.	The Site Manager will keep records of the management and disposal of ash, ash-contaminated natural excavated materials or coal-contaminated natural excavated materials for a period of at least 3 years from the date which these wastes are disposed of offsite.

Approval Number	Specification of Waste Stream	Contaminants Approved as Immobilised	Type of Immobilisation / Mechanism of immobilisation	Validation sampling	Disposal Restrictions	Notification and Record Keeping Requirements
1999/06	Used oil absorbent materials	Total petroleum hydrocarbons C ₁₀ – C ₃₆	Natural	- Soils would be validated to confirm that the leachable concentration (TCLP) values meet the landfill disposal criteria under the Waste Classification Guidelines and in accordance with the SAQP - If the TCLP criteria are not met a secondary treatment process (such as immobilisation) would be developed	Used oil absorbent materials subject to this approval that meet the requirements of the Waste Guidelines for classification as 'inert waste' or 'solid waste' may only be disposed of at solid waste landfills or industrial waste landfills which have currently operating leachate-management systems and which are licensed to receive that particular class of waste, and that have licence conditions to receive waste subject to immobilisation approvals with this type of disposal restriction. Used oil absorbent materials subject to this approval that are classified as 'industrial waste' must be disposed of at industrial waste landfills.	The Site Manager is required to keep records of the management and disposal used oil absorbent for a period of at least 3 years from the date which these wastes are disposed of offsite.

Approval Number	Specification of Waste Stream	Contaminants Approved as Immobilised	Type of Immobilisation / Mechanism of immobilisation	Validation sampling	Disposal Restrictions	Notification and Record Keeping Requirements
2001/11	Copper-Chrome-Arsenate (CCA) treated timber	Chromium (VI), Arsenic and C ₁₀ – C ₃₆ petroleum hydrocarbons	Natural	- The timber would be sampled in accordance with the SAQP and confirmed that the TCLP values in the Waste Guidelines for arsenic and chromium (VI). - Other contaminants would be assessed in accordance with Technical Appendix 1 of the Waste Guidelines and against the criteria set out in Table 4 of the Waste Guidelines.	CCA-treated timber waste subject to this approval that meets the requirements of the Waste Guidelines for classification as 'inert waste' or 'solid waste' may only be disposed of at solid waste landfills or industrial waste landfills which have currently operating leachate management systems and which are licensed to receive that particular class of waste, and that have licence conditions to receive waste subject to immobilisation approvals with this type of disposal restriction. CCA-treated timber waste subject to this approval that is classified as 'industrial waste' must be disposed of at industrial waste landfills.	The Site Manager is required to keep records of the management and disposal of CCA treated timber waste for a period of at least 3 years from the date which the timber waste is disposed of offsite.



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6.2.1.4.1.1 Coal tar contaminated soils

A procedure for the immobilisation of coal tar contaminated soils is provided in Table 6-8 and would be carried out to achieve compliance with the GIA for coal tar contaminated soils.

Table 6-8 General Immobilisation Approval – treatment of soils

Personal Protective Equipment
Prior to immobilisation, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the immobilisation of soils include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material • Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area.
Acceptance Onsite
• Trucks will enter the facility and unload the soil for immobilisation into one of the designated bays as per the soils unloading procedure (Section 5.7). • Each batch is to be assigned its own bay, there is to be no mixing of batches. • The bay area is bunded to avoid any spread of contaminated soils.
Coal tar contaminated soils immobilisation
• Batches of the soil will be loaded into mobile high shear mixer for treatment using a front-end loader or excavator • If free non-aqueous phase liquid (NAPL) is visible soils would be pre-mixed using the excavator or rotary mixer to incorporate the NAPL. • A rotary mixer would be used to mix calcium or magnesium oxide based cement at a maximum ratio not exceeding 2 parts cement to 1 part waste soil • The moisture content of the material would be tested prior to mixing. Reagent will either be delivered dry if total water to cement (w/c) ratio of the combined soil/cement exceeds 0.5 to ensure cement hydration. If the estimated w/c ratio is expected to be less than 0.5, additional water will be gently added to the waste materials until the w/c ratio is greater than 0.5 • Water may be added during mixing as well to effectively homogenize the materials to a maximum w/c ratio of 1.0. • Once immobilisation has occurred, treated soils to be transferred from the high shear mixer to a designated storage bay using an excavator or front-end loader and left to cure. • After curing, the batches are to be validated and classified for offsite disposal.
Contaminant levels and sampling
Soils from former gasworks sites with contaminants of less than the following concentrations would be dealt with under this exemption: • Polycyclic aromatic hydrocarbons (PAHs): 13,000 mg/kg • Benzo(a)pyrene (BaP): 500 mg/kg



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- Non-halogenated phenols: 2,000 mg/kg
- Total cyanide: 4,000 mg/kg

Post treatment soils would be validated in accordance with the SAQP, which would require monitoring of the following:

- Total concentration of each of the contaminants listed above in the untreated waste
- Total concentration of each of the Contaminants listed above in the treated waste
- Leachable concentration of each of the contaminants listed above in the treated waste
- Unconfined Compressive Strength of the treated waste (this must be greater than 1 Mpa)
- The composition of the reagent(s) used
- The ratio of reagent to untreated waste (mass/mass) used in treatment (this must be 2:1 or less).

Disposal Restrictions

Treated waste that complies with all of the conditions of this GIA and that satisfies the requirements of the Waste Guidelines for classification as inert waste or solid waste may only be disposed of at solid waste landfills or industrial waste landfills which have currently operating leachate management systems and which are licensed by the EPA to accept that particular type of waste. Treated waste that complies with all of the conditions of this Approval and that satisfies the requirements of the Waste Guidelines for classification as industrial waste may only be disposed of at industrial waste landfills which have currently operating leachate management systems and which are licensed by the EPA to accept that particular type of waste.

The Site Manager must ensure that the landfill receiving the treated waste:

- has a licence that allows the landfill to receive waste subject to immobilisation approvals with this type of disposal restriction; and
- monitors landfill leachate and groundwater for PAH (or BaP as an indicator of PAH), if the total concentration of the PAH/BaP in the treated waste exceeds SCC2, for solid waste landfills, or SCC3, for industrial waste landfills.

The Site Manager must advise the disposal facility in writing that the treated waste to be disposed of has been treated and classified in accordance with all of the conditions of this approval.

Notification and Record keeping Requirements

The Site Manager will notify the EPA in writing of its intention to have the coal tar contaminated soil treated for disposal under this approval at least 28 days before it commences treatment of the waste. The notification must include details of the reagent to be used, any substances to be added to the reagent, the amount of coal tar contaminated soil proposed to be treated and the premises at which treatment will take place.

For treated waste disposed of under this GIA, the Site Manager is required to keep all test results and disposal documentation for a period of at least 3 years from the date on which the treated waste is disposed of offsite.

The Site Manager is required to notify the EPA in writing within 48 hours of becoming aware of a test result which shows that the treated waste does not meet the requirements for disposal under this approval.

Bay Decontamination

Once the soils have been removed from the Facility, the used bay and rotary mixer or excavator would be decontaminated using Decon 90 or Liquinox. If using Decon 90, A 2% to 5% solution of Decon 90 with water would be used. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.



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6.2.1.4.2 Specific Immobilisation Approvals

Contaminated soils that are required to be immobilised prior to disposal to landfill and are not covered by existing general immobilisation approvals require a specific immobilisation approval (SIA) from the NSW EPA. The EPA issues immobilisation approvals in accordance with clause Part 10 of the *Protection of the Environment Operations (Waste) Regulation 2014*.

Immobilisation under a SIA will be sought for the treatment of metals, metalloids, and some PAH impacted material (refer to Section 6.2.1.4.2.1 and 6.2.1.4.2.2 for indicative treatment processes). The specific processes used to immobilise these materials will be outlined as part of the application for the SIA.

Appendix D provides a template SIA Application with guidance notations regarding the information to be provided within each Section.

Table 6-9 Procedure for applying for an SIA

SIA Application process
All applications for a specific immobilisation approval are required to be made on-line through the NSW EPA eConnect portal. The key considerations and steps that will be completed as part of the SIA process are outlined below. Appendix D provides a guidance template SIA Application. As per the Waste Classification Guidelines Part 2: Immobilisation of Waste (EPA, 2014c), the following will be confirmed prior to applying for an SIA • The waste has been characterised through appropriate testing (refer Table 5-1) and their contaminants of concerns have been identified • That the waste batch is free of liquid • Confirm the waste cannot be reused, recycled or reprocessed (refer below) • Confirm a GIA is not available for the proposed waste type and treatment option (refer Section 6.2.1.4.1)
Demonstrate that it is not possible to reuse, recycle or reprocess the waste and that treatment to remove or destroy the contaminants is not feasible
For soils to be suitable for reuse they must meet the requirements of a Recovered Soil Order or Exemption. All soils directed to the Facility would constitute soil meeting the definition of Waste Code 120, being soils contaminated with a substance or waste referred to in Parts 1 or 2 of Schedule 1 of the <i>Protection of the Environment Operations (Waste) Regulation 2021</i> and therefore are not suitable for reuse under a Recovered Soil Order or Exemption. As per the Waste Classification Guidelines Part 2: Immobilisation of Waste (EPA, 2014c), and the approved waste types to be received at the Facility, immobilisation will only be applied to waste characterised as restricted solid waste or hazardous waste (as per the SCC and TCLP levels within the waste and in accordance with the Waste Classification Guidelines: Part 1 Classifying Waste). Immobilisation will be used to treat soils where there is no alternative treatment available (such as bioremediation) and the soil is not suitable for reuse due to the nature and level of contaminants present. This includes soil contaminated with: • Metals and metalloids:



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- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury
- Silver
- Polycyclic aromatic hydrocarbons (PAHs)

A description of the unsuitability of the waste for reuse or alternate treatment options will be provided against [Question 1 under the Waste and Proposed Treatment/Immobilisation Mechanism of the eConnect SIA Application](#).

Check that the waste, including the contaminants of concern, is not already covered by a general immobilisation approval. If the waste is not covered by a general immobilisation approval, but is similar to waste covered by a general immobilisation approval, contact the EPA as it may be possible to submit an abridged application based on the general immobilisation approval.

Where possible, soil requiring treatment via immobilisation will utilise a GIA. Section 6.2.1.4.1 describes the waste types that will be received at the Facility that can be treated via a GIA. An SIA will only be sought where a GIA is not available.

Characterise the waste, including identifying the contaminants of concern and their variability. Test and assess the waste in accordance with the Waste Classification Guidelines to determine which contaminants ('the contaminants of concern') make the waste unsuitable for landfill disposal.

Section 5 outlines the processes that will be implemented to characterise waste. Prior to receipt at the Facility, then confirmed onsite via either Batch Scale and/or Verification testing, the following information for each waste batch will be compiled (refer Section 5.4) (the information would be recorded under the required Question under the [Waste and Proposed Treatment/Immobilisation Mechanism of the eConnect SIA Application](#)):

- Characterisation of the waste in accordance with the Waste Classification Guidelines
- The Waste Generator (Table 5-1) – to be recorded against [The Waste Generator Details section of eConnect SIA Application](#).
- The quantity of the waste in the batch, including where it is a one-off supply, and the unit (tonnes or m³) (Table 5-2) – to be recorded against [Question 2](#)
- The form of the waste (namely soil or sludge) (Table 5-2) – to be recorded against [Question 3](#)
- Origin of the waste, including a description of the history of the site and the source of contamination (Table 5-3) – to be recorded against [Question 4](#)
- Authorisation of the customer to treat the waste (Table 5-3) – to be recorded against [Question 4](#)
- Whether there is likely to be ongoing generation of the waste (Table 5-3) – to be recorded against [Question 4](#)
- The chemical composition and physical nature of the waste including NATA results, pH, test for ASS, presence of liquid, presence of anionic species of metals, presence of any inhibitory compounds that may affect the immobilisation process (e.g. sulfate, separate phase oils, phenols), solid/moisture content, TCLP (Table 5-2 and Table 5-5), – to be recorded against [Question 5](#)
- Contaminants of concern (Table 5-2) – to be recorded against [Question 6](#)



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Explain the scientific basis for claiming that the contaminants are immobilised.

Describe the treatment method or process, if any, you propose to use to achieve the immobilisation of the contaminants, with a detailed account of the materials, methods and equipment to be used in the process. Please indicate the ratio of reagents to be used, final pH of the treated waste and moisture content before and after treatment, if available)

For each waste batch the specific method for immobilisation demonstrate the means by which the contaminants will be immobilised:

- Natural immobilisation
- Chemical fixation
- Micro-encapsulation, and/or
- Macro-encapsulation

The Facility would utilise micro encapsulation only, via the mixing of soil with cement, lime or other pozzolonic reagents - to be recorded against [Question 7](#)

For each waste batch the specific method for immobilisation will be detailed including:

- Identify the mechanism by which the contaminants of concern will be micro-encapsulated and provide Unconfined Compression Strength UCS) test data (refer Table 5-5) - to be recorded against [Question 7](#)
- Description of the material, methods and equipment to be used (refer Section 6.2.1.4.2.1) – to be recorded against [Question 7](#)
- The ratio of reagents to be used and dosing rates (to be determined on a batch by batch basis (refer to Section 5.6) – to be recorded against [Question 7](#)
- Final pH levels to be achieved (refer Section 6.2.1.4.2.1) - to be recorded against [Question 7](#)
- Moisture content levels before and after treatment (refer Section 6.2.1.4.2.1) – to be recorded against [Question 7](#)

Scientific evidence/justification

The SIA Application should outline - to be recorded against [Question 8](#)

- The physical mechanism and/or chemistry of immobilisation, including the formation of chemical compounds during treatment which are claimed to result in the immobilisation of some or all of the contaminants.
- Reliable documentary evidence of the successful application, in Australia or overseas, of the treatment process proposed to be used for the immobilisation of the contaminants in a similar waste type.
- Copies of articles from reputable scientific or engineering journals supporting the successful immobilisation of the contaminants (either natural or as a result of using the proposed process)

As per the 'EPA Immobilization Technical Note 2' cement based Solidification/Stabilisation treatment is a viable waste immobilisation treatment process for certain contaminants. This technique essentially involves the use of cement as a binding reagent to micro encapsulation the contaminants.

ITRC – Development of Performance Specifications for Solidification/Stabilization (Interstate Technology & Regulatory Council (IRTC), July 2011 provide further detail on solidification/stabilisation techniques.



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Lime and organophilic clays can be used as secondary stabilising agents to the primary cementitious binders to enhance the cement stabilisation process of immobilising hydrocarbons in soil (UK Environment Agency, Science Report SC980003/SR2m Review of Scientific Literature on the use of stabilisation / solidification for the treatment of contaminated soil, solid waste and sludges). Organophilic clays are clays that are dosed with quaternary ammonium salt to align and widen the interspatial distance between clay platelets in a parallel orientation to permit absorption of larger organic hydrocarbons (e.g. PAH>4 benzene rings). It is generally acknowledged that organophilic clays are best used as preconditioning agents prior to cement stabilisation binder addition. The combinations of such treatment processes would be dependent on the contaminants of concern being treated.

Lime, particularly quicklime mixed with clayey soils as a pre-treatment can be used to stabilised cationic metals effectively (Dermatas & Meng, (2001) "Leaching of metals from soil contaminated by mining activities Journal of Hazardous Materials" 87((1-3):289-300).

Bentonites have also had application as secondary stabilising agents for use as strong absorbents where organic mixtures contain higher proportions of BTEX compounds. It is noted that some organics compounds can affect the cement hydration process, reducing the overall chemical fixation. Bentonites are therefore useful in reducing the adverse interference that BTEX may have with cement hydration processes.

Post treatment results

Evidence of treatability / properties following treatment including (refer Section 6.5 and Appendix A): - to be recorded against [Question 9](#)

The following shall be used to validate the immobilisation performance:

- The TCLP results of the final mix. The target leachability of the stabilised materials will form the priority performance indicators for immobilisation to be demonstrated, with qualification required at the receiving landfill facility being the primary post immobilisation target.
- Final curing of the immobilised mixes will be undertaken for 24-48 hours.
- Unconfined compressive strength (UCS) will be used to determine whether any strength loss has occurred.

Evidence of treatability / properties following treatment including (refer Section 6.5 and Appendix A): - to be recorded against [Question 9](#):

- Total concentration (SCC) of the contaminants and the leaching performance (based on TCLP or other relevant leaching tests) of the immobilised contaminants in the treated waste
- Physical/chemical properties of the waste after treatment: for example, pH and physical characteristics (solid/moisture content, and whether it is rigid, powdery or paste)
- Evidence of the formation, during the treatment, of the chemical compounds which are claimed to result in the immobilisation of some or all of the contaminant
- Evidence that the treated waste is likely to be stable in the long term including, if relevant, the results of a multiple extraction procedure (MEP) test
- Demonstrate that other substances present in the waste will not interfere with the micro-encapsulation. For example, it is known that some organic compounds present in high concentrations (e.g. soils with free phase hydrocarbons present) can interfere with pozzolanic reactions and will need additional considerations in terms of meeting durability of the final immobilised mix effectiveness.
- Method of mixing, including types of mixer used



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- Reagents used, including their rate of addition to the waste during treatment.

Ability to reproduce the processes, and quality assurance

[Drafting note: Appendix A validation protocol to include the following validation testing for SIA]

The following validation testing and reporting will be conducted:

- Laboratory testing to meet immobilisation criteria set
- Documentation of binder and additive dosage rates and mixing times
- Physical indicators of immobilisation
- Chemical indicators of immobilisation
- Validation testing results and reporting.

Description of repeatability and reliability of the process will be provided and recorded in [Question 10](#).

- The WTF is managed via a comprehensive [DPHI approved] OEMP and this OWMP and is subject to [Environment Protection License XXX] whereby treatment practices are routinely carried out and are regulated. Environmental and quality controls are outlined in both plans, including Inspections and Monitoring protocols (Section 5.4 of the OEMP), training and competence requirements (Section 5.6 of the OEMP), auditing protocols (Section 5.7 of the OEMP) and Incident Management (Section 5.10 and 5.11 of the OEMP).
- Immobilisation is currently carried out at HiQ's Yatala facility. Results from Yatala can be drawn upon to demonstrate treatability outcomes where like for like waste batches are encountered.
- Results from immobilisation batches will be recorded and kept. Adjustments will be made to the immobilisation process should results differ over a long term between batches
- The controlled nature of the Facility allows for easily repeated processes.

Proposed disposal location

The nominated disposal landfill is to be identified (refer Section 7.3) – to be recorded in [Question 11](#)

SIA conditions

The SIA will include the following conditions, which will be adhered to during the immobilisation process:

- The period for which the approval is valid
- The treatment required to immobilise the waste
- Testing and record keeping requirements
- How waste subject to the approval may be classified for disposal – the contaminants of concern can be classified on toxicity characteristics leaching procedure (TCLP) alone
- Disposal requirements
- Any other conditions, such as waste tracking, which are required



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6.2.1.4.2.1 Metals and metalloids

Table 6-10 includes the contamination concentrations for the untreated waste for metals that are likely to be received at the Site, the treated waste and the immobilisation reagents and indicative dosing rate for the contaminants for which SIAs may be sought for the immobilisation of metals. The dosing rate for immobilisation will be confirmed as part of bench scale testing (refer Section 5.6).

Table 6-10 Specific immobilisation approvals – indicative contaminant levels, dosing rates and treated waste levels (subject to SIA application)

Chemical contaminants of concern	Untreated waste contaminant concentration	Primary Immobilising reagent/indicative dosing rate	Secondary immobilising reagent / indicative dosing rate	Treated waste contaminant concentration (TCLP)
Arsenic	5% w/w	Portland/MaO Cement 2-5% w/w	Ferric iron/lime 2-5% w/w	5
Cadmium	5% w/w			1
Chromium	5% w/w			5
Lead	5% w/w		Phosphate 2-5% w/w	5
Mercury	5% w/w			0.2
Silver	5% w/w			5

A procedure for immobilisation of metals and metalloid contaminated soils is provided in Section 6.2.1.4.2. Approval must be in place as referred to in Section 6.2.1.4.2 prior to treatment. As noted above, the specific processes used to immobilise these materials will be outlined as part of the application for the SIA, once the specific contaminant concentrations and types are known.

Table 6-11 Metal and metalloids treatment procedure

Personal Protective Equipment
Prior to immobilisation, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the metal and metalloid contaminated soils requiring immobilisation will include: - Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material - Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment - Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area - Leachate collection system and grading of bays to capture leachate



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- Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area

Acceptance Onsite

- Trucks will enter the facility and unload the soil for immobilisation into one of the designated bays as per the soils unloading procedure (Section 5.7.1).
- Each batch is to be assigned its own bay, there is to be no mixing of batches.
- The bay area is bunded to avoid any spread of contaminated soils.

Metals and metalloid immobilisation

Immobilisation will be undertaken in accordance with approved SIA (refer to 6.2.1.4.2). General process is below:

- Reagent dosing rates to be identified and confirmed as part of bench scale testing and/or pilot testing
- Batches of the soil will be loaded into mobile high shear mixer for treatment using a front-end loader or excavator
- The moisture content of the material would be tested prior to mixing. Reagent will either be delivered dry if total water to cement (w/c) ratio of the combined soil/cement exceeds 0.5 to ensure cement hydration. If the estimated w/c ratio is expected to be less than 0.5, additional water will be gently added to the waste materials until the w/c ratio is greater than 0.5
- Water may be added during mixing as well to effectively homogenize the materials to a maximum w/c ratio of 1.0
- Cementitious or pozzolanic binders (such as cement, ground granulated blast furnace slag or cement kiln dust) to be automatically dosed based on requirement for each waste batch
- Soils to be sampled after each addition of binding material to determine if suitable pH level has been achieved. For metals a range of optimum pH for solubility will be determined.
- Once immobilisation has occurred, treated soils to be transferred from the high shear mixer to a designated storage bay using an excavator or front-end loader and left to cure
- After curing, batches to be validated and classified for offsite disposal.

Monitoring

Following treatment, the treated soil is to be tested by laboratory in accordance with the SAQP to confirm the TCLP concentrations meet the SIA requirements.

In the unlikely event the SIA requirements are not met following treatment, further bench scale testing will be undertaken to identify further treatment requirements. Treatment will then be conducted in accordance with the treatment procedure identified.

If the material fails to meet the SIA requirements after further treatment the material will need to be disposed of to an appropriately licensed waste disposal facility. The Site Manager will liaise with a licensed waste facility and coordinate the process.

Testing and Validation

- Wastes accepted at the Facility that are deemed to be Hazardous would be treated to the point where they are reclassified as Restricted Solid waste
- Waste accepted at the Facility that is deemed to be Restricted Solid waste would be treated down to General solid waste criteria prior to disposal.

Testing and validation will be carried out in accordance with Section 6.2.1.4.2 and the relevant SAQP that will be developed for the waste and included in Appendix A.

Treated material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014).

Offtake Procedure and Bay Decontamination



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Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once an EPA approved landfill facility has been identified to accept the material, the material will be redirected to the approved facility. The trucks will be loaded via the loading procedure detailed in Section 7.4.

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, A 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.2.1.4.2.2 PAHs

A procedure for immobilisation of PAHs is provided below (Table 6-12). As noted above, the specific processes used to immobilise these materials will be outlined as part of the application for the SIA, once the specific contaminant concentrations and types are known.

Table 6-12 PAH treatment procedure

Personal Protective Equipment
Prior to immobilisation, appropriate personal protective equipment is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the PAH contaminated soils requiring immobilisation will include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material • Application of water for dust suppression during loading and unloading of the material and during treatment, if required • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area. • Leachate collection system and grading of bays to capture leachate • Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area.
Acceptance Onsite
• Trucks will enter the facility and unload the soil for immobilisation into one of the designated bays as per the soils unloading procedure (Section 5.7.1). • Each load is to be assigned its own bay, there is to be no mixing of loads. • The bay area is bunded to avoid any spread of contaminated soils.
PAH immobilisation
Immobilisation will be undertaken in accordance with approved SIA (refer to 6.2.1.4.2). General process is below: • Batches of the soil will be loaded into mobile high shear mixer for treatment using a front-end loader or excavator



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- The moisture content of the material would be tested prior to mixing. Reagent will either be delivered dry if total water to cement (w/c) ratio of the combined soil/cement exceeds 0.5 to ensure cement hydration. If the estimated w/c ratio is expected to be less than 0.5, additional water will be gently added to the waste materials until the w/c ratio is greater than 0.5.
- Water may be added during mixing as well to effectively homogenize the materials to a maximum w/c ratio of 1.0.
- Cementitious or pozzolanic binders (such as cement, ground granulated blast furnace slag or cement kiln dust) to be automatically dosed based on requirement for each load.
- If LNAPL observed additional cement and filler soil may be added in accordance with the Primary Treatment Technology Procedure
- Soils to be sampled after each addition of binding material to determine if suitable pH level has been achieved.
- Treated soils to be transferred to storage bays using a front-end loader or excavator and left to cure
- After curing, batches to be validated and classified for offsite disposal.

Monitoring

During treatment of the soils, the material will be sampled to confirm the pH of the material.

Following treatment, the treated soil is to be tested by laboratory in accordance with the SAQP to confirm the TCLP concentrations meet the SIA requirements.

In the unlikely event the SIA requirements are not met following treatment, further bench scale testing will be undertaken to identify further treatment requirements. Treatment will then be conducted in accordance with the treatment procedure identified. Alternative treatments may include the addition of sorption (such as organoclays or activated carbon) in small amounts.

If the material fails to meet the SIA requirements after further treatment the material will need to be disposed of to an appropriately licensed waste disposal facility. The Environmental Manager will liaise with a licensed waste facility and coordinate the process.

Testing and Validation

- Wastes accepted at the Facility that are deemed to be Hazardous would be treated to the point where they are reclassified as Restricted Solid waste
- Waste accepted at the Facility that is deemed to be Restricted Solid waste would be treated down to General solid waste criteria prior to disposal

Testing and validation will be carried out in accordance with Section 6.2.1.4.2 and the relevant SAQP that will be developed for the waste and included in Appendix A.

Offtake Procedure and Bay Decontamination

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once an EPA approved landfill facility has been identified to accept the material, the material will be redirected to the approved facility.

The trucks will be loaded via the loading procedure detailed in Section 7.4.

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again.



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6.2.2 Acid Sulfate Soils (ASS)

ASS will be transferred and stored separate to other bulk soils and sludges in the dedicated bays (Figure 2-1). ASS will be subject to the screening and operational requirements prior to entry including verification testing to classify any contaminants and the presence of ASS. The procedure for treatment of ASS is summarised in Table 6-13, a detailed process description of the procedure is provided in the Acid Sulfate Soils Management Plan (Appendix F).

The neutralised ASS will be loaded onto trucks via a front-end loader prior to being transferred to a suitably licenced landfill for disposal (Table 7-3).

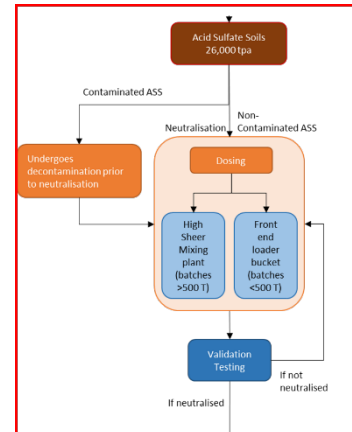


Table 6-13 Acid Sulfate Soils Procedure

Personal Protective Equipment
Prior to treatment of ASS, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the treatment of ASS contaminated soils will include: - Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material - Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment - Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the treatment bay. Use of brooms or shovels to move the soil within the treatment bay if observed outside of the bunded area - Leachate collection system and grading of bays to capture leachate - Fully impervious surfaces provided within the Facility with rollover bunding (250mm) of the entirety of area.
Acceptance Onsite
- Trucks will enter the facility and unload the PASS/ASS onto a concrete pad at Bay G for inspection and confirmation of waste type and characteristics received, as per the soils unloading procedure (Section 5.7.1). - Each batch is to be assigned its own bay, there is to be no mixing of loads.
ASS/PASS Treatment
The treatment of PASS/ASS onsite is the responsibility of the Environmental Manager and Chemist. ASS treatment will be neutralised using agricultural lime ('aglime'). Aglime is non-corrosive, and requires no special handling, contains at least 98% calcium carbonate by weight, and should have a particle size <1mm. Aglime will be applied using a mobile high shear mixer and will be automatically dosed, based on characterisation and verification test results. Where aglime is used as a neutralising agent, the type and quantity of lime must be calculated so that a neutralising value (NV) of 100 is achieved. Neutralising values are the result of the purity of the lime – a NV of 100 is required to ensure the lime effectively neutralises the acid and that calculations of liming rates remain consistent. Agricultural lime (CaCO₃) generally has a NV of 90-100%.



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- The factor of safety can be modified to account for a reduced NV.

Aglime shall be added in an appropriate ratio and/or based on results of Chromium Suite testing and/or suspension peroxide oxidation combined acidity and sulfate.

Once treated the soil will undergo validation testing as described in Section 5.5.

Any contaminated ASS (i.e. elevated levels of heavy metals) will be treated using the bulk soils methodology (Section 6.2.1) to reduce contaminant load via the high shear mixer. Cross-contamination will be minimised by the wash down of the mixer following each load and the area will be bunded to contain material. Run-off from the washdown will be captured by the leachate diversion platforms and treated as liquid waste. This is described in Section 6.4.

Treated ASS/PASS Monitoring

Following mixing and additional drying if required, the treated soil is to be tested by laboratory analysis using the Chromium Suite method to determine if the criteria for sulphur and acid trails have been met.

In the unlikely event the conditions cannot be satisfied following subsequent treatment, the material will need to be disposed of to an appropriately licensed waste disposal facility. The Site Manager will liaise with a licensed waste facility and coordinate the process.

Testing and Validation

Testing and validation will be carried out in accordance with the relevant SAQP (Appendix A).

Offtake Procedure and Bay Decontamination

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once an approved facility / site or EPA approved landfill facility has been identified to accept the neutralised ASS (Table 7-3), the material will be redirected to the approved facility.

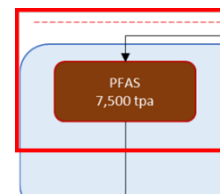
The trucks will be loaded via the loading procedure detailed in Section 7.4.

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.2.3 Storage of PFAS Contaminated Soils

PFAS contaminated soils below the restricted solid waste criteria (Table 6-14) will be received onsite for the purpose of storage while appropriate offsite disposal options are identified. PFAS contaminated materials may be classified as Dangerous Goods Class 9 Packing Group III due to it's potential to be an "environmentally hazardous substance". Procedures are in Table 6-15. There will be no mixing of PFAS contaminated soils with other soils received at the Facility. PFAS contaminated soils will be stored in designated bays to avoid cross-contamination (Figure 2-1).





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Table 6-14 TCLP and SCC values for classifying waste by chemical assessment (EPA, 2016)

Contaminant ¹	Maximum values for leachable concentration and specific contaminant concentration when used together			
	General Solid Waste ²		Restricted Solid Waste	
	Leachable concentration	Specific contaminant concentration	Leachable concentration	Specific contaminant concentration
	TCLP1 (mg/L)	SCC1 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
PFOS + PFHxS	0.05	1.8	0.2	7.2
PFOA	0.50	18.0	2.0	72.0

1. PFOS and PFHxS are to be summed for comparison against the TCLP and SCC values.

2. Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible)

Table 6-15 PFAS Contaminated Soils Procedure

Personal Protective Equipment
Prior to handling of PFAS contaminated soils, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental controls
Environmental controls for the storage of PFAS contaminated soils will include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material • Application of water via a hose system for dust suppression during loading and unloading of the material • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the bunded PFAS storage area. Use of brooms or shovels to move the soil within the bunded area if observed outside of the bunded area • Separate leachate collection system • PFAS will be stored within designated bays bunded with urethane floor bunding (150MM W x 25MM H)
Storage of PFAS Contaminated Soils
PFAS will be stored within designated bays (Figure 2-1) which are bunded to avoid cross contamination. Trucks will deliver the PFAS contaminated soils to the bay as per the unloading procedure (Section 5.7).
Offtake Procedure and Bay Decontamination
Prior to offtake, the waste material will be classified in accordance with the <i>Waste Classification Guidelines</i> (EPA, 2014) to determine an appropriate receival facility. Once acceptance at a treatment facility has been confirmed to accept the PFAS contaminated soils, the material will be redirected to the facility. The trucks will be loaded via the loading procedure detailed in Section 7.4. Once the PFAS contaminated soils have been removed from the Facility, the used bay must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area must be saturated with the solution and left to soak for 2 to 24 hours. The bay must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.



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6.3 Sediments and Sludges

6.3.1 Sludges

Sludges will be delivered to the Facility by tankers ranging in capacity from 2,000 L to 20,000 L. Tankers will unload sludge directly into designated containment bays or pits. Each batch of sludge will be unloaded in a pre-allocated pit, with no mixing of loads permitted. The sludge treatment procedure is included in Table 6-16.

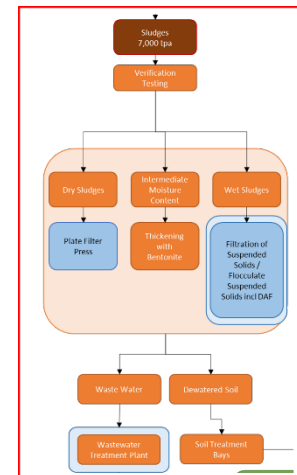


Table 6-16 Sludge treatment procedure

Personal Protective Equipment
Prior to handling of sludges, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental controls
Environmental controls for the storage of sludges will include: - Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material - Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment, if visibly dry - Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the pit or LWTP. Use of brooms or shovels to move the material within the treatment bay if observed outside of the pit or LWTP.
Pre-treatment process
Pre-treatment of sludges will be based on moisture content: - Drier sludges will be deposited directly into the LWTP to undergo dewatering via a plate filter press to reduce the moisture content to less than 20% - Sludges with intermediate moisture content will be pressed to remove excess moisture prior to being deposited directly into the sludge pit where they will undergo thickening using bentonite. An excavator would be used to mix and incorporate the bentonite with the sludge within the pit - Wet sludges will be deposited directly into the LWTP where they will undergo filtration or flocculation to separate suspended solids, prior to being transferred to the sludge pits (Figure 2-1). The products of the pre-treatment processes are: - Liquid waste – this will undergo further treatment in the LWTP, and - Dewatered soils – these will be transferred to the soil treatment bays to undergo decontamination (as described in Section 6.2).
Testing and Validation
Testing and validation will be carried out in accordance with the relevant SAQP (Appendix A).



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Transfer Procedure and Decontamination

The pre-treated sludge material will then be transferred to a treatment bay using a front end loader.

Once the material has been removed from the sludge pits, the sludge pits must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The LWTP must be saturated with the solution and left to soak for 2 to 24 hours. The sludge pits must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the pit and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

6.3.2 Drill Mud

Drill muds are generated as a by-product of hydro excavation activities, such as non-destructive digging for the purposes of asset location. Only non-contaminated drill muds will be accepted at the Facility. The procedure for treating drill muds is illustrated in a process flow diagram in Figure 6-3 and described in Table 6-17.



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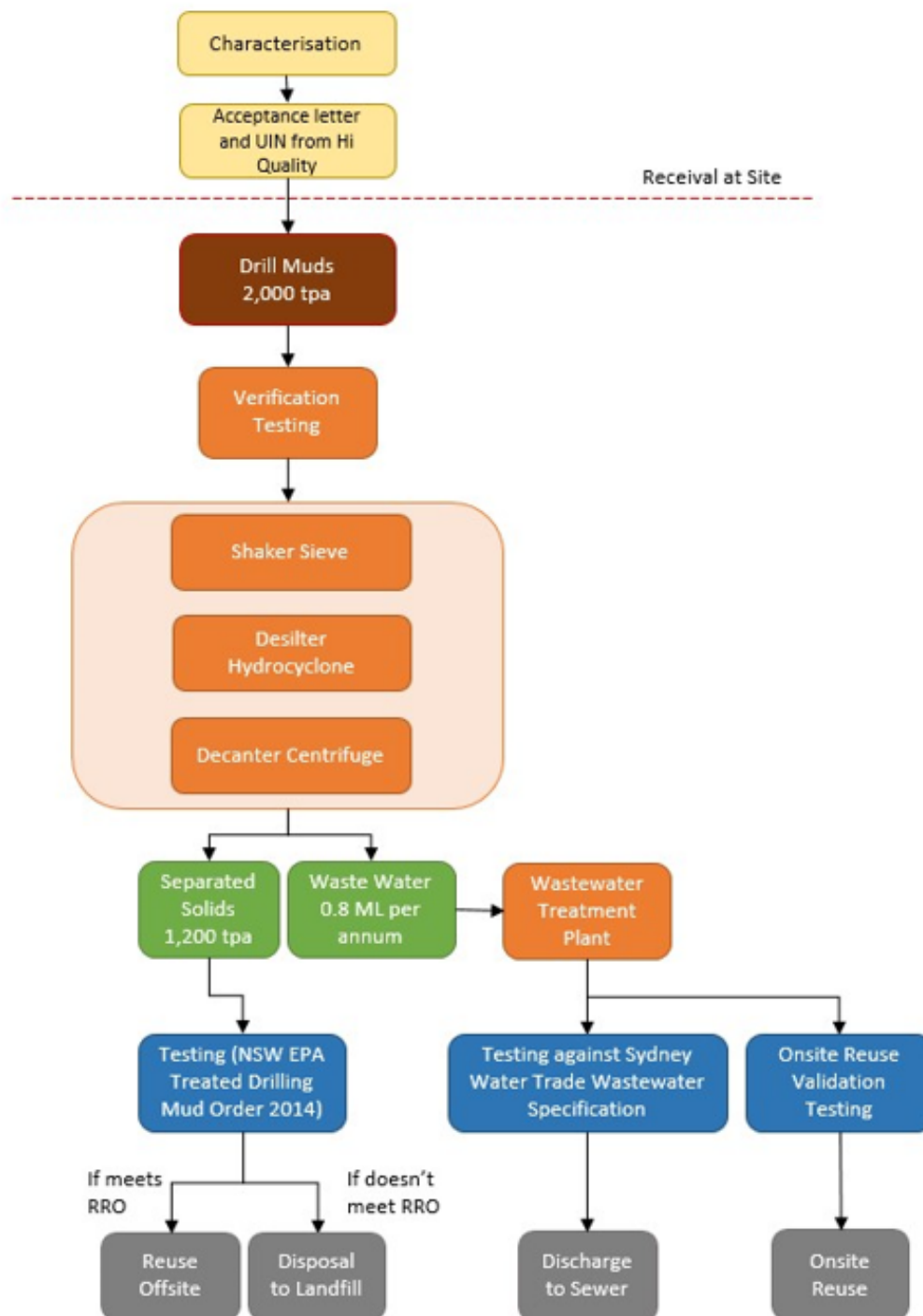


Figure 6-3: Drill mud process flow

Table 6-17 Drill Mud Treatment Procedure

Personal Protective Equipment
Prior to handling of drill muds, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the handling of drill mud will include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material • Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment • Visual inspection of the storage area on completion of unloading and loading to confirm all material is within the drill mud plant
Treatment process
Drill muds will be delivered to the Facility in vacuum tanker trucks and unloaded directly into the drill mud plant for treatment. Drill muds are treated through the drill mud plant which includes a shaker sieve, desilter hydrocyclone and decanter centrifuge. By-products of this process are separated solids (rock and aggregate, coarse sands, and finer silt pressed into a filter cake) and liquid waste. The separated solids output will undergo testing to determine compliance with the RRO and RRE for Treated Drilling Muds (2014). Compliant material will be transferred offsite for use in civil applications such as fill material. Material that doesn't meet the RRO/RRE specification will be transferred to a licenced landfill for disposal (Table 7-3). Liquid waste from the process will be treated using the LWTP system (Section 6.4) and will be tested to ensure compliance with Sydney Water trade wastewater specifications. Liquid waste will either be reused at the Facility for dust suppression or will be discharged to sewer.
RRO and RRE Requirements
The requirements in order to meet the RRO for application of treated drilling mud to land as engineering fill or for use in earthworks includes the following: <u>Sampling requirements:</u> • A written sampling plan is to be prepared including a description of sample preparation and storage procedures for the treated drill mud • Sampling is to be carried out in accordance with the sampling plan and Australian Standard 1141.3.1-2012 Methods for sampling and testing aggregates – sampling – aggregates (or equivalent) ○ Where the treated drilling mud is generated as part of a continuous process HiQ must undertake routine sampling of the treated drill mud by collecting 10 composite samples per 100 tonnes (dry weight) (or part thereof) processed, and testing each sample for the chemicals and other attributes listed in Column 1 of Table 6-18 below; or ○ Where the treated drilling mud is not generated as part of a continuous process, HiQ must undertake one-off sampling of a batch, truckload or stockpile of the treated drilling mud by collecting five composite samples from every 10 tonnes (dry weight) (or part thereof) processed and tested each sample for the chemicals and other attributes listed in Column 1 of Table 6-18 below. • The test results for each composite sample must be validated as compliant with the maximum average concentration or other value listed in Column 2 of Table 1 and the absolute maximum concentration or other value listed in Column 3 of Table 6-18 prior to the supply of the treated drilling mud below. • Testing of samples will be undertaken by the NATA laboratory, via the testing methods provided in the RRO.



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Chemical and other material requirements:

- HiQ must not supply treated drilling mud to any person if, in relation to any of the chemical and other attributes of the treated drilling mud waste:
 - The concentration or other value of that attribute of any sample collected and tested as part of the routine or one-off sampling, of the treated drilling mud exceeds the absolute maximum concentration or other value listed in Column 3 of *Table 6-18*, or
 - The average concentration or other value of that attribute from the routine or one-off sampling of the treated drilling mud (based on the arithmetic mean) exceeds the maximum average concentration or other value listed in Column 2 of *Table 6-18*.
- The absolute maximum concentration or other value of that attribute in any treated drilling mud supplied under this order must not exceed the absolute maximum concentration or other value listed in Column 3 of *Table 6-18*.

Table 6-18 - Table 1 within RRO drill mud order

Column 1	Column 2	Column 3
Chemicals and other attributes	Maximum average concentration (mg/kg 'dry weight' unless otherwise specified)	Absolute maximum concentration (mg/kg 'dry weight' unless otherwise specified)
Mercury	0.5	1
Cadmium	0.5	1
Lead	50	100
Arsenic	20	40
Chromium (total)	50	100
Copper	50	100
Nickel	30	60
Zinc	100	200
Electrical Conductivity	1.5 dS/m	3 dS/m
pH (ranges given are for the minimum and maximum acceptable pH values in the treated drilling mud)	6 to 9	5.5 to 10
Total PAHs	20	40
Benzo(a)pyrene	0.5	1
TPHs	250	500
Total Chlorinated Hydrocarbons	0.5	1

Notification:

- On or before each transaction, HiQ must provide the following to each person to whom the processor supplies the treated drilling mud:
 - a written statement of compliance certifying that all the requirements set out in this order have been met;



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- a copy of the treated drilling mud exemption, or a link to the EPA website where the treated drilling mud exemption can be found; and
- a copy of the treated drilling mud order, or a link to the EPA website where the treated drilling mud order can be found.

Record keeping and reporting:

- HiQ must keep a written record of the following for a period of six years:
 - the sampling plan required to be prepared (refer to above within this Table);
 - all routine or one-off sampling results in relation to the treated drilling mud supplied;
 - the quantity of the treated drilling mud supplied; and
 - the name and address of each person to whom the processor supplied the treated drilling mud.
- HiQ must provide, on request, the most recent sampling (whether routine or one-off or both) results for treated drilling mud supplied to any consumer of the treated drilling mud.
- HiQ must notify the EPA within seven days of becoming aware that it has not complied with any requirement in the RRO (as listed within this Table).
- Refer to the RRO for Treated Drilling Mud for further information (EPA, 2014).

The requirements in order to meet the RRE for application of treated drilling mud to land as engineering fill or for use in earthworks includes the following:

- At the time the treated drilling mud is received at the premises, the material must meet all chemical and other material requirements for treated drilling mud which are required on or before the supply of treated drilling mud under 'the treated drilling mud order 2014'.
- The treated drilling mud can only be applied to land as engineering fill or for use in earthworks.
- The consumer must keep a written record of the following for a period of six years:
 - the quantity of any treated drilling mud received; and
 - the name and address of the supplier of the treated drilling mud received.
- The consumer must make any records required to be kept under this exemption available to authorised officers of the EPA on request.
- The consumer must ensure that any application of treated drilling mud to land must occur within a reasonable period of time after its receipt.
- Refer to the RRE for Treated Drilling Mud for further information (EPA, 2014).

Offtake Procedure

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility.

Once the drill mud has undergone testing and validation the by-products may be used or disposed of in the following ways:

- Separated solids that meet the RRO and RRE criteria may be reused offsite or disposed to landfill (Table 7-3). Liquid waste that has been treated by the LWTP may be discharged via the sewer or reused onsite.

Where the byproducts are to be transferred offsite, the trucks will be loaded via the loading procedure detailed in Section 7.4

6.4 Liquid Waste

Liquid waste will be received at the Facility from industrial uses or internal Facility uses (i.e. as a by-product of other material processing methods, truck wheel wash and dewatering) and will largely involve liquids contaminated by organics, acidity and alkalinity (pH), heavy metals, nutrients, PFAS and suspended solids. Liquid wastes to be brought to the Facility are subject to the Preliminary Waste Screening and Batch Control Procedures outlined in Section 5.3.

Liquid wastes will be delivered to the Facility in tanker trucks and directly unloaded into the LWTP, as identified in Figure 2-1 and described in Section 5.7.4.

The LWTP will be used to treat contaminated liquids. A custom designed and built liquid waste treatment plant is proposed for the treatment of liquid waste, with a separate storage tank and LWTP for PFAS contaminated water.

The Facility will have its own laboratory and a designated Chemist to oversee the entire treatment process. The Facility Chemist will conduct all pre-treatment testing in the laboratory before approving batches to be treated on a commercial scale. The Chemist is responsible for the overall performance of the liquid waste treatment process and the compliance with trade waste discharge. The Facility will also employ a Chemical Engineer to oversee the process and compliance.

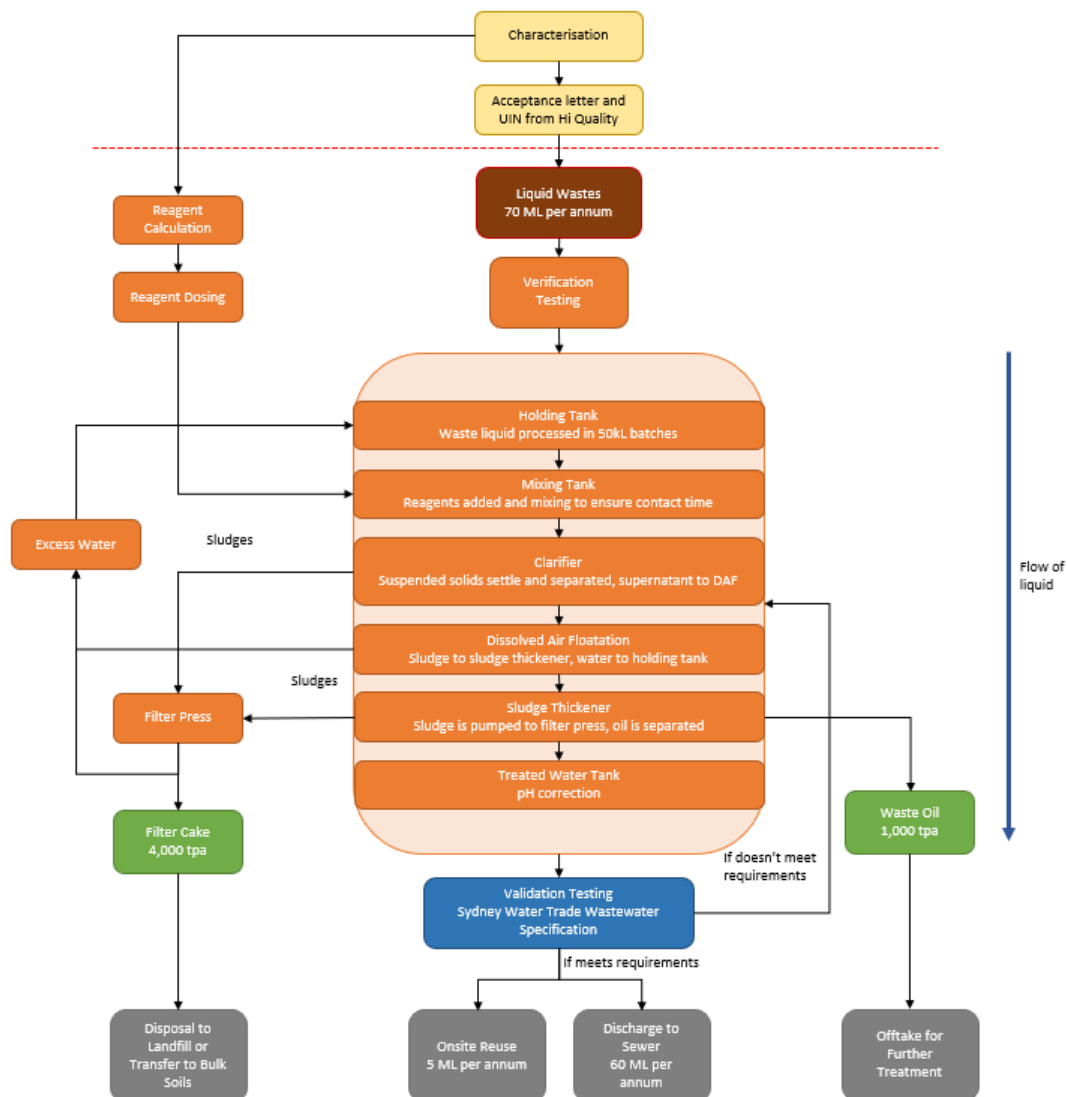


Figure 6-4: Non-PFAS liquid waste process flow



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6.4.1 Non-PFAS Contaminated Liquid Waste

The treatment procedure of liquid wastes that do not contain PFAS is outlined in Table 6-19. A proportion of liquid waste treated by this procedure may also include Dangerous Goods Class 8, Packing Group II and III.

Table 6-19 Non-PFAS Contaminated Liquid Waste Treatment Procedure

Personal Protective Equipment
Prior to handling of liquid waste, appropriate PPE is to be worn at all times in accordance with the Health and Safety Plan for the Facility.
Environmental Controls
Environmental controls for the treatment of non-PFAS liquid waste will include: • Ventilation system to be managed in accordance with the OAQMP during loading and unloading of material and treatment of material • Appropriately equipped spill kits are located throughout the WTF • An emergency / spill response procedure is provided within the OEMP • Fully impervious surfaces provided within Compartment 2 with rollover bunding (250mm) of the entirety of area to contain 110% of the largest tank capacity and in compliance with AS 3780 for the storage and handling of Class 8 liquid. Tanks fitted with overflow protection and alarms to alert operators in the event of a spill • Processing lines include isolation valves, alarms, and manual emergency stop mechanism, which can be operated to isolate water within specific tanks or processing lines • An emergency wash shower is located within the Compartment 2 area (adjacent to the entry door) • Compartment 2 to be bunded for liquid containment with pertinent Australian Standards and to be lined with epoxy sealer • Replacement parts (for pumps and isolation valves) kept on site.
Step 1 – Holding tank
Liquid waste is received into the holding / equalisation tanks from either: • Bulk Tanker Deliveries (10 KL or 20 KL) – External • Decanting water from settling pits, wheel wash, soil washing – Internal The holding tanks for each treatment train have a combined capacity of 540 KL and consist of 4 x135 KL (or similar sized) tanks. The holding tanks also act as equalisation tanks and provides a buffer for any potentially highly contaminated loads that are received, providing a somewhat stable / uniform contaminant feed for the downstream treatment.
Step 2 – Coalescing plate oil separator
The coalescing plate oil separator is specially designed to treat oily water and trap oil and grease. Other treatment components are designed to treat dissolved organics such as TPH and PAHs. The size of the coalescing plate filter is approximately 6 KL, and this equipment will be used where oily water separation is required, depending on the composition of the incoming liquid waste.
Step 3 – Chemical dosing system for oil separator



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The coalescing plate separator by itself is adequate to treat the oily water and maintain regulatory compliance of treated water discharged to trade waste. However, if emulsions or oily waters with high amounts of dissolved oil are to be treated, then chemical dosing will be necessary to split or coagulate the emulsion prior to further separation.

The chemical dosing system will consist of both acids and coagulants, with both of these dosing systems used as required to treat the varying incoming liquid waste. The chemical reagents will be pumped from 1000L IBC's using small chemical dosing pumps. The plant operator will determine when to use the coagulants, which would typically be a result of bench scale testing to determine the need for a coagulant to be used.

Step 4 – Mixing tank (neutralisation tanks/precipitation tank)

Treatment reagents (refer to Step 5) are pumped into a 50 KL mixing tank where they are mechanically mixed with the liquid waste using a mechanical mixer. The primary purpose of the mixing tank is to keep solids and precipitates in suspension and to ensure that treatment reagents have enough contact or reaction time with the contaminants in the liquid waste to either:

- Neutralise Acidity or Alkalinity
- Precipitate Heavy Metals
- Adsorb Organics.

The principal technology to remove heavy metal pollutants from liquid waste is by chemical precipitation. Chemical precipitation includes two secondary removal mechanisms: coprecipitation and adsorption. Precipitation processes are characterised by the solubility of the metal to be removed. They are generally designed to precipitate trace metals to their solubility limits and obtain additional removal by coprecipitation and adsorption during the precipitation reaction.

There are many different treatment variables that affect these processes. They include the optimum pH, the type of chemical treatments used, and the number of treatment stages, as well as the temperature and volume of wastewater, and the chemical properties of the pollutants to be removed. Each of these variables directly influences treatment objectives and costs. Treatability studies will be performed by an onsite Chemist to optimise the relevant variables, so that trade waste discharge goals are met.

The mixing tank is 50 KL and will be operated as a batch process. The mixing tank is fed by supply pumps from the storage and equalisation tanks, via the oil water separator, and the output of the mixing is pumped to the primary clarifier.

Step 5 –Chemical dosing system for mixing/neutralisation/precipitation tank

Various chemicals will be used to treat liquid waste. Due to the variability of the incoming liquid waste, a variety of chemical reagents will likely need to be used to provide effective treatment and maintain compliance to trade waste discharge. All reagents proposed to be used are considered industry standard liquid waste treatment reagents. All reagents used in the chemical dosing system will be pumped to the mixing tank.

The following is a summary of reagents to be used in the LWTP, also detailed the purpose of each reagent:

- Hydrochloric Acid (37% w/w) – precipitation of heavy metals and neutralising alkalinity
- Caustic soda (30% w/w) – precipitation of Heavy metals and Neutralising acidity
- Aluminium Sulphate Solution (28% w/w, or powdered) – coagulating agent, precipitation of phosphate
- Polymer (liquid or powdered) – coagulating agent
- Activated Carbon (powdered) – adsorption of organics, PFAS, elimination of odour
- Magnesium Oxide (powdered) – precipitation of heavy metals, neutralising acidity
- Ferrous Sulphate (powdered) – reducing agent for metals.

All reagents used in powdered form will be mixed with water in the dosing system prior to pumping to the mixing tank.



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Step 6 – Clarifier

The clarifier is used to separate solids from liquids using gravity separation. After the mixing tank process, heavy metal precipitates and absorbed organics are suspended and require separation prior to discharge to trade waste. The primary clarify will be a 50 KL lamella coalescing plate type with a conical base vessel to allow solids to be collected. Solids will then be tested and classified, depending on the waste classification solids will be treated onsite or removed for offsite disposal (Refer to Step 8, below).

Step 7 – Sand & carbon (MMF) filtration

After the primary clarifier, a series of sand and carbon filters (also known as Multi Media Filters (MMF)) will be used to “polish” the treated water prior to disposal to trade waste. Sand filtration effectively removes particles down to 20 microns that have not been separated in the primary clarification stage. Activated carbon adsorption effectively removes colour and organics that have not been separated in the primary clarification.

Although sand and carbon filtration is not likely to be essential to meet trade waste discharge criteria, it is seen as an added layer of protection and additional treatment.

The sand and carbon filtration system will need backwashing periodically. The backwashed solids will be fed back into the storage and equalisation tanks. When the activated carbon and/or sand material is spent the material will be containerised, transferred to the ‘packaged waste storage area’ and transferred offsite to an appropriately licensed disposal facility.

Step 8 – Dewatering

The solids produced from the primary clarifier will be high in moisture content and require dewatering. This will be accomplished through a plate filter press. The filter press will take high moisture solids and dewater to less than 20% moisture and produce a filter cake.

The filter cake produced from the filter press will be variable in composition due to the variability of the liquid waste to be treated. The filter cake will be classified as a restricted solid waste due to being a by-product from a treatment process. Each batch of filter cake will be analysed to determine if it can be accepted at a restricted solid waste landfill. Typically, filter cake will meet landfill acceptance criteria as General Solid Waste or Restricted Solid Waste allowing landfill disposal. However, if the filter cake is hazardous, the filter cake will be treated and immobilised/stabilised according to the contaminants present before offsite landfill disposal.

Step 9 – Trade Waste Discharge

The trade waste discharge will have provisions for flow monitoring and sampling, both of which will be required by Sydney Water. It is planned to install an in-line flow monitoring, as this allows real time monitoring and recording of flows as well as cumulative flow measurements. The trade waste discharge will also have a suitable sampling point for periodic sampling by the regulator.

Sampling and Disposal of Treated Wastewater

Liquid waste will be sampled at several points through the treatment train to confirm the effectiveness of treatment, and prior to disposal. Treated liquid waste will be tested for compliance with Sydney Water’s trade wastewater specification prior to discharge to sewer. Some treated liquid waste that meets re-use criteria may be reused onsite for dust suppression.

By-products of these processes include sludge which will undergo further dewatering via a screw press, with the dewatered material tested and either disposed to landfill or treated further using bulk soil methodologies described in Section 6.2.1.

Spent filtration media will be stored in labelled containers, sampled and analysed. Disposal will be determined based on this analysis with disposal options being directed to landfill disposal, treatment prior to disposal to landfill (onsite or offsite) or disposal via thermal destruction (e.g. in Victoria). Waste transport protocols will be followed (e.g. waste tracking and interstate consignment authorisations).



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Waste oil may also be generated as a by-product and will be stored in 1 kL IBCs and will be taken to a suitably licenced oil recycling facility for further treatment.

Offtake Procedure and Decontamination

Once the liquid waste has been removed from the Facility, the LWTP untreated wastewater holding tanks must be decontaminated using Liquinox. The holding tanks must be saturated with the solution and left to soak for 2 to 24 hours. The holding tanks must then be rinsed with water and left to dry prior to being used again. Alternatively, excess water should be pumped out and treated through the LWTP.

When not in use, the Liquinox is to be stored within the reagent storage area.

6.4.2 PFAS Contaminated Liquid Waste Water

The LWTP for treatment of liquid wastes containing PFAS is similar to that described above, with additional steps, highlighted in bold:

1. A holding tank
2. A chemical dosing and mixing tank
3. A clarifier to remove sludges and other solids. Primary chemical treatment with anionic and cationic coagulation, flocculation, chlorination, pH adjustment, settlement, and clarification with addition of powdered activated carbon and zeolite
4. **Secondary treatment through Volcanic Clinoptilolite Zeolite (VCZ) mechanical and ion exchange media filtration**
5. **Tertiary treatment through coal Granulated Activated Carbon (GAC) adsorption media filtration**
6. **Quaternary treatment through coconut-shell catalytic microporous GAC adsorption media filtration**
7. **Quinary treatment through a weak base anion exchange resin media filtration**
8. **Senary treatment through ultra-high activity enhanced kinetic mesoporous GAC adsorption media filtration**
9. A holding tank for storage and testing prior to discharge.

Liquid waste will be sampled at several points through the treatment train to confirm the effectiveness of treatment, and prior to disposal. Treated liquid waste will be tested for compliance with Sydney Water's trade wastewater specification prior to discharge to sewer. There will be no re-use of treated PFAS contaminated liquid wastewater onsite.

By-products of these processes include sludge which will undergo further dewatering via a screw press, with the dewatered material tested and either disposed to landfill (Table 7-3) or treated further using bulk soil methodologies described in 6.2.1. Handling of any by-products from PFAS treatment will be carried out by personnel in complete personnel protective equipment. PFAS by-products will be separated from all other byproducts to prevent contaminating non-PFAS materials with PFAS. All PFAS waste by- will be classified in accordance with the Waste Classification Guidelines (2014) and will be disposed of to an appropriately licensed facility, or sent to Hi-Q's Yatala Facility for further treatment or disposal.

Figure 6-5 shows the process flow chart for PFAS Contaminated Liquid Waste.



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6.4.3 LWTP spent filter media

Once the filtration media within the LWTP has been used it should be removed and stored within IBC drums labelled 'spent filtration media'. Filtration media to be disposed in accordance with Section 7. Personnel responsible for exchanging the filtration media within the LWTP should ensure they are wearing appropriate PPE at all times.

The IBCs containing spent filter media will be stored within the reagent storage area in Compartment 2 until offtake is arranged to an appropriately licensed landfill or interstate licenced thermal treatment facility.

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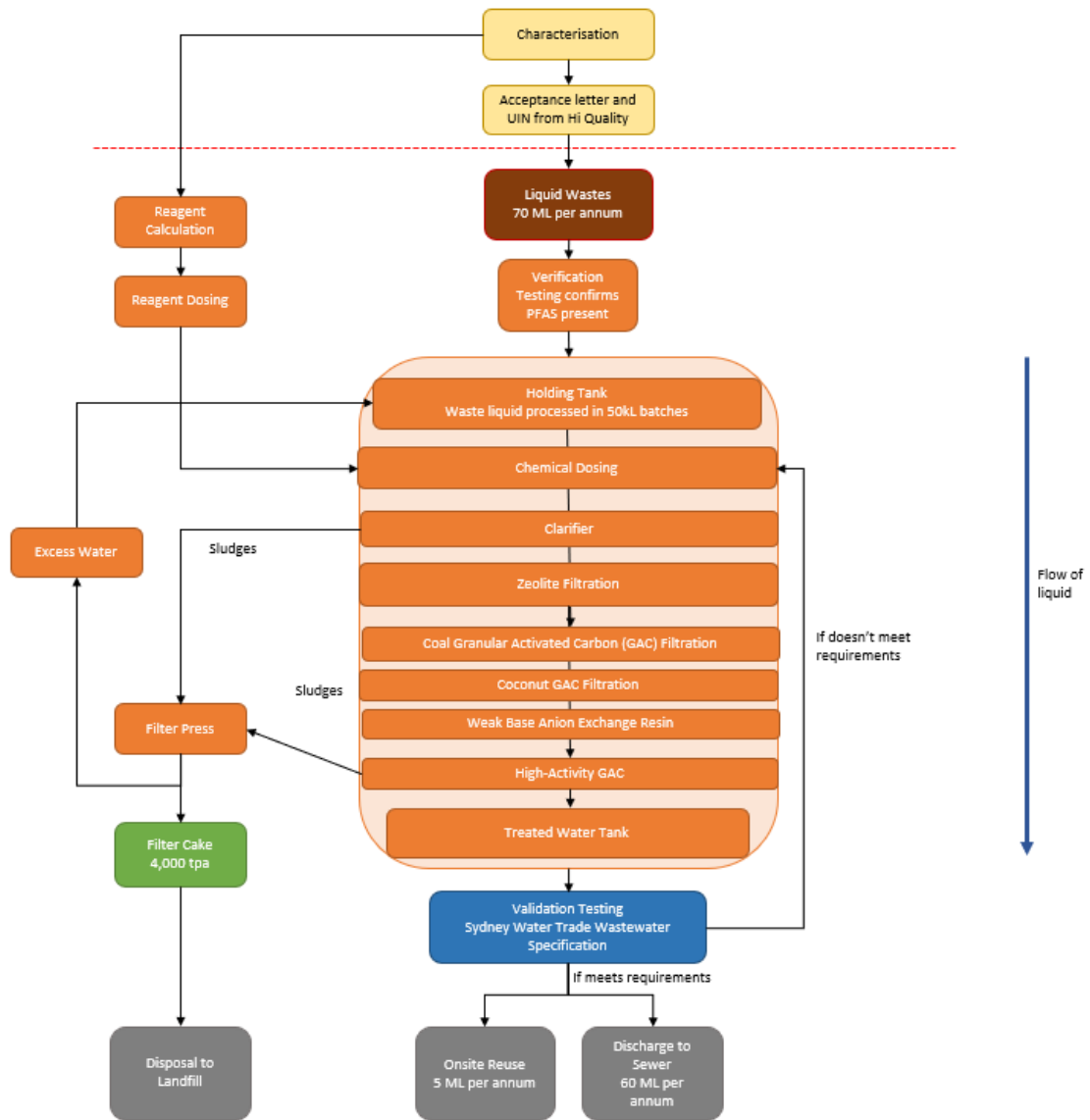


Figure 6-5: PFAS containing liquid waste process flow

6.5 Testing and Validation

Following treatment, all outputs will be tested to determine post-treatment contaminant loads and confirm success of the treatment methodology. Only wastes that meet landfill acceptance criteria will be disposed of at an appropriately licenced landfill (Table 7-3). Any waste intended for landfill that does not meet landfill acceptance criteria will undergo further treatment or be disposed of at an alternative appropriately licenced facility. Assessment and characterisation of the material for offsite disposal will be undertaken in accordance with the requirements outlined in the NSW EPA Waste Classification Guidelines.

Samples for testing will be sent to a NATA accredited laboratory.

If the results indicate the material has not responded to treatment it will undergo bench scale testing again to identify an appropriate treatment methodology. The material will undergo testing and validation after the alternative treatment train has been completed.

Further detail of testing and validation protocols will be developed in accordance with EPA requirements and industry best practice and documented in the SAQP for the relevant waste treatment process (Appendix A).

[Drafting note: Appendix A validation protocol to include the following for SIA (as per 6.2.1.4.2):

- Laboratory testing to meet immobilisation criteria set
- Documentation of binder and additive dosage rates and mixing times
- Physical indicators of immobilisation
- Chemical indicators of immobilisation
- Validation testing results and reporting.

For waste that has been tested via immobilisation, the following information will be recorded during the validation process:

- Total concentration (SCC) of the contaminants and the leaching performance (based on TCLP or other relevant leaching tests) of the immobilised contaminants in the treated waste
- Physical/chemical properties of the waste after treatment: including pH and physical characteristics (solid/moisture content, and whether it is rigid, powdery or paste)
- Evidence of the formation, during the treatment, of the chemical compounds which are claimed to result in the immobilisation of some or all of the contaminant
- Evidence that the treated waste is likely to be stable in the long term including, if relevant, the results of a multiple extraction procedure (MEP) test.
- Method of mixing, including types of mixer used
- Reagents used, including their rate of addition to the waste during treatment.

6.6 Facility Waste Generation

Waste is also generated onsite through offices, lunchrooms and other site activities. Appropriate waste receptacles are provided throughout the Facility to enable the segregation of recyclables and general waste onsite. Waste storage areas will be located within the building and as per the Liverpool City Council DCP Requirements. General waste and recyclable material are transported offsite to an appropriately licenced facility for recycling or disposal (Table 7-3).

6.7 Reagent use and storage

Reagents would be used to treat soil and liquid waste. The reagents to be used at the Facility, and their onsite storage limit, is provided in Table 6. Reagents would be stored in either Compartment 1 or within the LWTP (Compartment 2).



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Table 6-20 Reagent types, use and storage limits

Reagent	Activity	Onsite Storage limit
Ferrous sulphate (powdered)	LWTP	5 tonne
	Reducing agent for metals	2 tonne LWTP
Bacteria (liquid form)	Bioremediation	1 tonne
Urea	Bioremediation	5 tonnes
Super phosphate	For lead immobilisation	5 tonnes
Biodegradable surfactant	Chemical Separation (soils)	2 tonne
Polymer (Liquid or powdered)	LWTP Coagulating agent	2 tonne
		2 tonne LWTP
Bentonite	Sludge thickening	-
Aglime	ASS Neutralisation	20 tonne
Primary Cementitious stabilising agents, OPC, GGBFS, Pulverised Fuel Ash, Cement Kiln Dust	Primary Binding (immobilisation)	50 tonne
Secondary Stabilising Agents Lime, Sodium Silicate, Carbons, Organophilic clays, natural pozzolans, bentonites	Secondary binding (immobilisation)	50 tonne
	Bentonite used for thickening of sludges	
	Lime used for arsenic	
Aluminium Sulphate (28 wt.%)	LWTP coagulating agent, precipitation of phosphate	5 tonne
		2 tonne LWTP
HCl (37 wt.%)	LWTP Precipitation of heavy metals	5 tonne*(stored in Compartment 1)
	Reduce alkalinity	
Caustic Soda (30 wt.%)	LWTP Precipitation of heavy metals	5 tonne* (stored in Compartment 2)
	Reduce acidity	
Magnesium Oxide (powdered)	Immobilisation (cement, also CaO used) Also LWTP precipitation of heavy metals, neutralising acidity	5 tonne
		2 tonne LWTP



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Reagent	Activity	Onsite Storage limit
Activated Carbon	GAC Filtration Coconut GAC Filtration Also LWTP Adsorption of organics, PFAS, elimination of odour	2 tonne LWTP
Decon 90 (mixed to 2 -5% sol)	Decontamination of Bays	1 tonne
Liquinox	Decontamination of Bays	1 tonne

* A combined total of no more than 10 t of Hydrochloric Acid and Caustic Soda will be stored onsite at any given time

Caustic Soda and Hydrochloric Acid reagents are classified as Dangerous Goods Class 8, PG II. SDS for Caustic Soda and Hydrochloric Acid are provided in Appendix C. As per the SDS and Section 3.2.4 of the Liquid and Hazardous Waste Risk Mitigation Identification and Minimisation report, the following storage measures will be put in place for each of the reagents (Table 6-21). No more than a combined total of 10 t of Caustic Soda and Hydrochloric Acid will be stored onsite at any given time.

Table 6-21 Caustic Soda and Hydrochloric Acid Storage Requirements

Reagent	Storage Requirements
Caustic Soda	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep containers securely sealed. Check regularly for spills and leaks. Keep away from heat and sources of ignition – no smoking. Keep away from foodstuffs and incompatible materials. <u>Must be stored separate from acids.</u> Keep only in original container or corrosive resistant container/container with a resistant inner liner. Do NOT use aluminium, galvanised or tin-plated containers.
Hydrochloric Acid	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Containers should be labelled and protected from damage. Keep away from heat and sources of ignition – no smoking. Keep away from foodstuffs and incompatible materials. Must be stored separate from caustic soda. Store locked up. If stored indoors, building floors should be acid resistant with drains to a treatment system. Electrical equipment should be flameproof and protected against corrosive action. Keep only in original container or suitable material, i.e. rubber lined steel, PVC/FRP, FRP. Containers should have a safety relief valve – care should be taken to release any internal pressure slowly.

Hydrochloric acid will be stored on its own within a locked safety cabinet in the reagent storage area of Compartment 1. Appropriate signage will be used on the cabinet to denote it contains Hydrochloric Acid; only suitably authorised personnel will be provided access to the cabinet.



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7 OFFTAKE OF WASTE

Following treatment, wastes processed at the WTF will undergo validation testing and final waste classification and reporting to determine if wastes destined for landfill are compliant with chemical composition acceptance criteria.

The final test of materials prior to offtake will be summarised in a Waste Classification and Validation report that includes:

- Analytical Results
- A summary of NATA accredited lab reports against batch records
- A validation report for waste supplier and landfill
- Compilation of waste disposal facility documentation, including field testing (where applicable).

Offtake will occur between 7am and 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays. Treated or stored materials at the Facility will be reprocessed, reused or disposed of, as described below.

7.1 Offtake of Waste for Reprocessing Procedure

Recovered recyclable materials from physical screening such as timber, brick, plastics and metals are suitable for further reprocessing and recycling. Following testing, these materials will be delivered to a third party resource recovery facility for recycling. The offtake of waste for reprocessing procedure is outlined in Table 7-1.

Table 7-1 Offtake of Waste for Reprocessing Procedure

Personal Protective Equipment
Prior to any waste management, appropriate PPE is to worn at all times. At a minimum, this will include: • Eye goggles and/or face masks • Rubber boots, gloves; and • Appropriate clothing (e.g. long sleeved shirts)
Sampling
Samples for testing will be sent to a NATA accredited laboratory. Sampling and analysis of the treated waste will be in accordance with the SAQP for the relevant waste treatment process that will be prepared in accordance with EPA requirements and industry best practice (Appendix A).
Confirm Suitability for Reprocessing
The results from the NATA laboratory testing and validation protocols will be interpreted by the Facility Chemist. The results will be confirmed whether there are any remaining contaminant loads in the waste. If the waste is deemed to be within the limits outlined in the NSW EPA 2014 Waste Classification Guidelines the waste will be transferred to a third party for resource recovery and recycling.
Confirm Disposal Location
Potential offtake locations are provided in Table 7-3.



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Bay Washdown/Decontamination

Once the waste materials have been removed from the Facility, the used bay must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area must be saturated with the solution and left to soak for 2 to 24 hours. The bay must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

7.2 Offtake of Waste for Reuse Procedure

Treated water and some soils, following treatment and validation, are suitable for on and offsite reuse. Onsite reuse of water will include dust suppression and irrigation. Offsite soil reuse will include fill and other civil uses.

7.3 Disposal to Landfill Procedure

Where re-using, recycling or recovering waste is not possible, waste will be disposed of at a waste management facility or premises lawfully permitted to accept the materials. Disposal of waste (and spoil) will be in accordance with the POEO Act.

The selection of waste disposal and recovery facilities will be dependent on the nature and volume of waste streams generated and the capacity of the receiving facilities at the time of the waste generation. Waste that is unable to be reused or recycled will be disposed of offsite to an appropriately licenced waste management facility following classification.

Materials (aside from packaged waste) must be treated to meet landfill acceptance criteria for solid waste or trade wastewater criteria (as defined by Sydney Water) for liquid waste.

Materials used in the LWTP, including GAC and VCZ, will be containerised and disposed of offsite at an appropriately licensed landfill. The self-bunded containers will be filled in Compartment 2 where the LWTP will be located. This compartment is bunded at all entrances to contain any potential spillage. These containers would be transferred to the packaged waste storage area (Compartment 3) before being disposed of at an appropriately licensed landfill or interstate licenced thermal treatment facility. Specific waste locations will be identified by the Proponent, however, are anticipated to be within NSW.

Liquid waste is planned to be discharged to sewer under the Trade Waste Agreement for the Facility. However, in the event that a Trade Waste Agreement cannot be obtained (either for part or all of the proposed discharge volumes) treated liquid waste would be collected in tankers and removed offsite for disposal at a Sewage Treatment Plant (STP). The liquid waste loading procedure is outlined in Section 7.4.2 and nearby STPs are identified in Table 7-3.

Where waste cannot be classified i.e. the level of contamination is too high to be treated and needs to be disposed of appropriately, the classification of waste will be undertaken in accordance with the *Waste Classification Guidelines Part 1: Classifying Waste* (EPA, 2014b) with appropriate records and disposal dockets retained for audit purposes in accordance with Condition XX.

The EPA guidelines describe a six-step process to classifying waste (Table 7-2).



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Table 7-2: Six-step process to classifying waste

Step	Procedure
Step 1: Is it 'special waste'?	Establish if the waste should be classified as special waste. Special wastes include asbestos waste and waste tyres. <i>Note: Asbestos wastes must be managed in accordance with the requirements of Clauses 42 and 43 of the Waste Regulation.</i>
Step 2: If not special, is it 'liquid waste'?	If it is established that the waste is not special waste it must be decided if it is 'liquid waste'. Liquid waste means any waste that: has an angle of repose of less than 5° above the horizontal, becomes free-flowing at or below 60°C or when it is transported, and is generally not capable of being picked up by a spade or shovel. Liquid wastes are sub-classified into: • Sewer and stormwater effluent • Trackable liquid waste according to Protection of the Environment Operations (Waste) Regulation 2005 Schedule 1 Waste to which waste tracking requirements apply • Non-trackable liquid waste.
Step 3: If not special or liquid, has the waste already been pre-classified by the NSW EPA?	The EPA has pre-classified several commonly generated wastes in the categories of hazardous, general solid waste (putrescibles) and general solid waste (non-putrescibles). If a waste is listed as 'pre-classified', no further assessment is required.
Step 4: If not pre-classified, is the waste hazardous?	If the waste is not special waste (other than asbestos waste), liquid waste or pre-classified, establish if it has certain hazardous characteristics and can therefore be classified as hazardous waste. Hazardous waste includes items such as explosives, flammable solids, substances liable to spontaneous combustion, oxidizing agents, toxic substances and corrosive substances.
Step 5: If the waste does not have hazardous characteristics, undertake chemical assessment to determine classification	If the waste does not possess hazardous characteristics, it must be chemically assessed to determine whether it is hazardous, restricted solid or general solid waste (putrescible or non-putrescible). If the waste is not chemically assessed, it must be treated as hazardous. Waste is assessed by comparing Specific Contaminant Concentrations of each chemical contaminant, and where required, the leachable concentration using the Toxicity Characteristics Leaching Procedure, against Contaminant Thresholds.
Step 6: Is the general solid waste putrescible or non-putrescible?	If the waste is chemically assessed as general solid waste, a further assessment is available to determine whether the waste is putrescible or non-putrescible. The assessment determines whether the waste is capable of significant biological transformation. If this assessment is not undertaken, the waste must be managed as general solid waste (putrescible).

7.3.1 Potential Landfill Facilities and Sewage Treatment Plants

The following facilities are licensed to accept the treated waste and liquid waste from the WTF (Table 7-3).

Table 7-3 Indicative licensed landfill facilities and sewage treatment plants

Unique ID #	Facility Name	Owner	Management Type	Facility Street Address	Facility Suburb/Locality	State	Post-code	Authority	Licence Number	Throughput	Type of waste processed
Landfill Facilities											
NSW00133	Castlereagh Waste Management Centre	Waste Assets Management Corporation	Disposal	The Northern Road	Berkshire Park	NSW	2765	EPA NSW	4601	Unknown	Unknown
NSW00507	Glenfield Waste Services Resource Recovery Facility	Glenfield Waste Services	Disposal	Cambridge Ave	Glenfield	NSW	2167	EPA NSW	4614	450,000 tpa	Non-putrescible
NSW00699	Breen Recycling Facility	Breen Holdings Pty Ltd	Disposal	260B Captain Cook Drive	Kurnell	NSW	2231	-	-	TBC	TBC
NSW00700	Breen Resources	Breen Resources Pty Ltd	Disposal	330 Captain Cook Drive	Kurnell	NSW	2231	EPA NSW	20697	750,000 tpa	Non-putrescible
NSW00878	Penrith Waste Services Pty Ltd	Penrith Waste Services Pty Ltd	Disposal	842 Mulgoa Road	Mulgoa	NSW	2745	EPA NSW	3438	Proposed 180,000 tpa	Non-putrescible
NSW00976	Patons Lane RRC and Landfill	SRC Operations Pty Ltd	Disposal	123-129 Patons Lane	Orchard Hills	NSW	2748	EPA NSW	20814	750,000 tpa	Non-putrescible
-	Brandown Quarries	Brandown	Hazardous	90 Range Road	Cecil Park	NSW	2178	EPA NSW POEO Licence	5186 12618	Proposed 250,000 tpa	Non-putrescible
-	Cleanaway St Marys Liquid Waste Services	Cleanaway	Hazardous	40 Christie Street	St Marys	NSW	2760	EPA NSW	12628	Unknown	Unknown



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Unique ID #	Facility Name	Owner	Management Type	Facility Street Address	Facility Suburb/Locality	State	Post-code	Authority	Licence Number	Throughput	Type of waste processed
Sewage Treatment Plants											
-	St Marys Sewage Treatment System	Sydney Water	Sewage treatment	Off Links Road	St Marys	NSW	2760	EPA NSW POEO Licence	1729	> 10,000 – 20,000 ML (annual discharge)	Sewage
-	Quakers Hill Sewage Treatment System	Sydney Water	Sewage treatment	Quakers Road near Melrose Avenue	Quakers Hill	NSW	2763	EPA NSW POEO Licence	1724	> 10,000 – 20,000 ML (annual discharge)	Sewage
-	Malabar	Sydney Water	Sewage treatment	Fishermans Road	Malabar	NSW	2036	EPA NSW POEO Licence	372	> 30,000 ML (annual discharge)	Sewage

7.4 Waste Loading

Once a waste load has undergone treatment at the Facility it will either be transferred to another waste Facility for further processing or disposed of at a landfill site.

7.4.1 Soils Loading Procedure

The soil loading procedure is outlined in Table 7-4.

Table 7-4 Soil loading procedure

Preparation
• The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator • The Weighbridge Operator notifies Operations via UHF on the designated frequency • The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck loading • The spotter notifies Facility personnel of the incoming truck • The spotter confirms that the ventilation system is switched on • Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery • The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle • The spotter directs the truck to the loading position, ensuring that there are no obstructions for the tray when raised
Loading
• Communication between the truck driver and spotter will be via UHF radio • The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the loading process • The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility. • The spotter will load the truck with the soil material using an excavator and/or front end loader
Cleaning and exit
• Once the truck has been loaded the spotter will guide the truck driver through the wheel wash and hose out bay • The spotter will open the door for the truck to exit the facility and close it once the truck is clear • The spotter will notify the weighbridge operator via UHF that the truck has left the building.
Bay Washdown/Decontamination
Once the waste materials have been removed from the Facility, the used bay must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area must be saturated with the solution and left to soak for 2 to 24 hours. The bay must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

7.4.2 Liquid Waste Loading Procedure

The liquid waste loading procedure is outlined in Table 7-5.

Table 7-5 Liquid waste loading procedure

Preparation
• The truck is weighed and cleared for entry into the Facility by the Weighbridge Operator • The Weighbridge Operator notifies Operations via UHF on the designated frequency. • The Production Manager assigns a spotter (wearing appropriate PPE including: long sleeved hi-vis shirt, trousers, boots, eye protection, gloves and a respirator) to witness the truck loading



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- The spotter notifies Facility personnel of the incoming truck
- The spotter confirms that the ventilation system is switched on
- Non-essential personnel to the task will need to vacate the area along with any non-essential tools/machinery
- The spotter opens the facility door, allowing the truck to enter and closes the door behind the vehicle
- The spotter directs the truck to reverse in front of the designated liquid waste treatment plant

Loading

- Communication between the truck driver and spotter will be via UHF radio
- The spotter checks communication with the incoming truck is active by receiving a response from the driver. This should be repeated during the critical periods of the loading process
- The truck driver will remain in their cabin to eliminate risk of exposure to airborne contaminants and/or fumes present within the Facility.
- The spotter will load the truck with the liquid waste using a pump.

Cleaning and exit

- The spotter will guide the truck driver through the wheel wash and hose out bay
- The spotter will open the door for the truck to exit the facility and close it once the truck is clear
- The spotter will notify the weighbridge operator via UHF that the truck has left the building

Decontamination

Once the liquid waste has been removed from the Facility, the LWTP holding tanks must be decontaminated using Decon 90 or Liquinox. If using Decon90, a 2% to 5% solution of Decon 90 with water is to be prepared. The holding tanks must be saturated with the solution and left to soak for 2 to 24 hours. The holding tanks must then be rinsed with water and left to dry prior to being used again. Alternatively, excess water should be pumped out and treated through the LWTP. When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.

7.5 Maintenance Procedure

Maintenance of equipment and machinery will be carried out regularly to ensure that the equipment, including weighbridges and the ventilation systems, are maintained in proper working order.

[Drafting note: once the equipment has been finalised a full maintenance procedure will be drafted for final submission during the post approval phase]

7.5.1 LWTP Diaphragm pump maintenance

The LWTP diaphragm pumps will be replaced periodically in accordance with the manufacturers specifications to avoid malfunction of the LWTP. If the LWTP is in use during replacement of the diaphragm pumps the isolation valves will be activated to avoid spilling liquid waste and/or reagents. However, in the case of a spill Compartment 2 is fully bunded and any spilt material would be captured by the leachate system and repumped through the LWTP, spill kits are also available.



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8 MANAGEMENT MEASURES

Management actions prescribed by this OWMP aim to avoid and minimise waste impacts and are summarised in Table 8-1.

DRAFT

Table 8-1: Waste management measures [DRAFTING NOTE: to be updated upon receipt of Conditions of Consent]

Number	Management Measures	Timing	Responsibility	Evidence	Reference
WM1	All onsite personnel will undergo training in waste management as part of the Site induction.	Operation	Site Manager Environmental Manager	Training records	REMM WM2
WM2	Signage will be installed to display the location of waste treatment and storage areas.	Prior to operation	Site Manager	Signage	REMM WM3
WM3	Information sheets on the waste management hierarchy will be displayed on notice boards in the site office.	Operation	Site Manager	Notice boards	REMM WM3
WM4	A Sampling, Analysis Quality Plan (SAQP) will be prepared for the treatment of soils and liquid waste at the Facility. The SAQPs will be implemented to maintain the integrity of soils and liquid waste accepted onsite. The SAQPs will be subject to annual review, change in risk, legislative requirement or non-compliance which would prompt an additional review.	Operation	Site Manager Environmental Manager	SAQPs	REMM WM1 REMM WM10
WM5	The following measures will be implemented to prevent waste spreading from the Facility: - All loads will be covered until inside the building and prior to leaving the building - A truck and wheel wash will be installed for trucks prior to exiting the building - Entry and exit signage to advise transport operators of covering and loading and unloading procedures - Unloading and loading of waste material will occur within the building only.	Prior to operation Operation	Site Manager Environmental Manager Operational Staff	Inspection Checklist Waste records Signage	REMM WM9
WM6	All waste storage areas will be located within the Facility as per the Liverpool City Council DCP requirements. Waste storage areas will be appropriately bunded to minimise the potential for cross contamination between stockpiles.	Operation	Site Manager Environmental Manager	Inspection Checklist Site plan	REMM WM4
WM7	Agreements with suppliers for 'take back' to be arranged where possible.	Operation	Site Manager	Waste records	REMM WM6

Number	Management Measures	Timing	Responsibility	Evidence	Reference
			Environmental Manager		
WM8	General waste and recyclable material from the site office will be disposed of in skip bins, these will be emptied regularly so as to not overflow.	Operation	Site Manager	Inspection Checklist Waste records	REMM WM7
WM9	All wastes will be managed and properly disposed of in accordance with the relevant guidelines by an appropriately licensed contractor and/or facility.	Operation	Site Manager Operational Staff	Inspection Checklist Waste records	REMM WM8
WM10	To ensure efficiency at the Facility, and reduce traffic arrivals and weighbridge queuing, all waste accepted at the site is scheduled through a booking system. Unique treatment methods are used for each waste stream to reduce spoilage.	Operation	Site Manager	Inspection Checklist Waste records	REMM WM5
WM11	All reagents classed as dangerous goods will be stored on shelving above the PMF level within the designated chemicals storage area.	Operation	Site Manager	Inspection Checklist	Best practice
WM12	The LWTP will be bunded in accordance with relevant Australian Standards.	Operation	Site Manager	LWTP bunding	Relevant Australian Standard
WM13	Bulk soils undergoing immobilisation will be treated in accordance with the requirements set out in the relevant GIA or SIA.	Operation	Site Manager Operational Staff	Waste records	EPA GIA and SIA guidelines
WM14	The 'transfer and storage' bay (see Figure 2-1) is allocated to provide additional storage capacity in the unlikely event that it is required.	Operation	Site Manager	Transfer and Storage Bay	Figure 2-1
WM15	In the event of machinery downtime, HiQ will cease to accept any new waste loads until operational capacity has been restored.	Operation	Site Manager	Waste records	Section 10.2



9 COMPLIANCE MANAGEMENT

9.1 Roles and Responsibilities

The General Manager for HiQ carries ultimate responsibility for the implementation of this OWMP and providing the necessary resources as required. The Site Manager is responsible for coordinating the monitoring, reporting and responsibility requirements of this management plan.

Operational employees and/or contractors are responsible for responding to adverse Facility conditions and adjusting Facility operations to minimise environmental impacts. All Facility employees and/or contractors are responsible for reporting adverse Facility conditions to the Site Manager, who is responsible for review and formulation of appropriate action planning and response. Further details related to roles and responsibilities are detailed in the OEMP.

9.2 Environmental Inspections

Inspection, testing and monitoring will be undertaken at the Facility, in accordance with Table 9-1. The Site Manager is responsible for undertaking inspections and monitoring the effectiveness of all waste management measures onsite. Any non-compliances will be managed in accordance with Section 9.9.

Regular environmental inspections will be undertaken by operational staff to ensure that environmental controls have been implemented, meet specification, and are being maintained.

Table 9-1: Operational inspection regime

Monitoring Program Item	Type of Inspection/Testing	Frequency	Responsibility
Weighbridges	Certification/calibration	Annual	Site Manager
Site Inspection Housekeeping Checks	Inspection	Daily	Site Manager or nominated person

9.3 Risk Management

A detailed Risk Register has been completed as part of Sherpa's Hazard Identification Report (2024) to outline the key operational and environmental hazards associated with the proposal. The Site Manager will undertake updates to the risk register on a quarterly basis.

9.4 Environmental Monitoring

The Conditions of Consent and the EPL identify monitoring regimes which must be complied with. This Section will be updated following the Approval of the Project. The Environmental Manager will undertake the relevant monitoring requirements.

Table 9-2 outlines the monitoring activities to be implemented throughout operations to ensure that inbound waste management and outbound product management requirements are achieved. The outcomes of monitoring will be recorded in appropriate forms/checklists as detailed in Section 5.5 of the OEMP.



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Drafting note: The table will be updated once the conditions of consent/EPL are issued and requirements identified]

Table 9-2 Summary of monitoring requirements

Monitoring Requirement	Frequency
Waste received annually	Monthly (daily if nearing limit)
Total waste accepted/removed	Monthly
Authorised amount (stock on site)	Weekly (daily if nearing limit)
Reject loads	Per load
Vehicle movements	Daily
Implementation of plans, systems and procedures	Monthly
Unexpected finds	Daily
Waste classification	As required
Waste sampling	As required
Verify the Preston WTF weighbridges (within the meaning of the National Measurement Act 1960 of the Commonwealth)	Annually

9.5 Reporting

Reporting requirements and responsibilities are documented in the OEMP. Specific reporting requirements in relation to Waste Management are summarised in Table 9-3.

[Drafting note: The table will be updated once the conditions of consent are issued and reporting requirements identified]

Table 9-3: Reporting Requirements

Item	Reporting Requirements	Frequency	Responsibility
Waste Management Measures	Inspection Checklist	Daily	Site Manager Environmental Manager
Monthly Environmental Inspections	Monthly Inspection Checklist	Monthly	Site Manager Environmental Manager



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Item	Reporting Requirements	Frequency	Responsibility
Waste records	Electronic data capture system – in accordance with the requirements of the POEO (Waste) Regulation	Per Waste Load	Site Manager
Waste Classification and Validation Report – soils and non-liquid waste	Electronic data capture system – in accordance with the POEO (Waste) Regulation and HiQ SAQP requirements.	Per Waste Load	Weighbridge Operator
Trackable liquid waste	Electronic data capture system EPA's online waste tracking system	Per trackable liquid waste load	Weighbridge operator
Annual verification of weighbridge	Record of verification of weighbridges within the meaning of the National Measurement Act 1960 of the Commonwealth	Annually	Weighbridge operator
Review IChEMS register including the CAS RN list of chemicals	Electronic data capture system	Bi-annually	Environmental manager

9.5.1 Internal Reporting and Record Keeping

In accordance with the Protection of Environment Operations (Waste) Regulation 2014, the following records for each waste load accepted at the Facility will be maintained:

- The date and time of vehicle entry and exit from the Facility
- The EPL number of the Facility to which the transaction relates
- Waste type and waste stream
- Waste form and waste code (including CA Number)
- Dangerous Goods Class (if applicable – Class 8 PG II and III, and PFAS classified as Class 9 PG III only to be accepted on Site)
- Vehicle transport details
- Purpose of entry (waste delivery, service vehicle, visitor)
- Customer name, address and ABN
- Weighbridge details (waste in codes and consignment reference number and total tonnage)
- Contaminants of concern or contaminants of potential concern
- Waste destination and transporter details
- Documented limits for any wastes that are subject to Chemical Control Orders, noting that the NSW EPA Waste Classification Guidelines provide criteria for the following:



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- Limits for Aluminium Smelter Wastes (Fluoride / Cyanide)
- Limits for solids contaminated with PCBs
- Organotins
- Schedule Wastes.

Additional reporting requirements are included in Table 9-4.

Table 9-4: Internal reporting requirements

Subject	Reporting metric / documentation	Responsibility	Frequency
OWMP Review	Meeting minutes Record of review OWMP updates	Environmental Manager	Annually
Acceptance Letter	Waste delivery loads that are accepted to the Facility in accordance with the NSW EPA Guidelines	Weighbridge Operator	Daily
Reject Loads	Rejected loads by the Facility Rejected Loads Register	Weighbridge Operator	Daily
SAQP Review	Meeting minutes SAQP updates	Environmental Manager	Annually
Maintenance	Preventative maintenance plan for plant and equipment, including weighbridges.	Site Manager	Annually

Accurate records substantiating all activities associated with the Facility or relevant to the Conditions of Consent, including measures taken to implement this OWMP will be maintained, including:

- This Plan (current and superseded versions)
- Employee training and induction records
- Site inspection reports
- Maintenance and repair records performed on pollution control equipment (for a period of 2 years as per the conditions of approval)
- Waste disposal certificates for any regulated or controlled wastes disposed off-site (for a period of 1 year as per the conditions of approval)
- Records of VENM accepted at the site (for a period of 2 years as per the conditions of approval), including, material source, type, quantity, who delivered the material, certification of material and EPA approval number where applicable
- Weighbridge dockets (incoming and outgoing materials)
- Environmental monitoring records
- Monitoring equipment calibration reports
- Environmental incidents/emergencies reports
- Non-compliance reports
- Complaints register



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- Audit reports
- OWMP review minutes
- Regulatory authority inspection reports and correspondence with regulatory authorities.

9.5.2 External Reporting and Record Keeping

The WTF will maintain an electronic data management system that will be operated by the weighbridge operator. The electronic data management system will capture all the information required under Part 4 of the POEO (Waste) Regulation and the Waste Levy Guidelines (EPA, 2018). The electronic data management system will:

- Be designed so that details of any adjustments to records are recorded against the adjusted record, including that the record has been amended and the extent of the change
- Back up the electronic records weekly and store back-up records in a secure location
- Record the quantity of waste to two decimal places (e.g. 14.22 tonnes)
- Be designed so that all electronic records are able to be downloaded by the EPA in an .xls, .xlsx, .csv or .dbf format at any time.

The EPA's online waste tracking system (or an alternative system approved by the EPA in writing) will be used to record and provide the information required under Part 4 of the POEO (Waste) Regulations for:

- Trackable liquid waste and other material received at the WTF
- Trackable liquid waste and other material stored at WTF
- Trackable liquid waste transported from WTF
- Waste and material other than trackable liquid waste transported from the WTF.

All records will be kept for a minimum of 6 years after the record is made.

9.6 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of waste management measures, compliance with this OWMP, Conditions of Consents, REMMs and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in the Section 5.7 of the OEMP.

9.7 Communications

Waste management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in the OEMP.

Further detail is provided in the 5.8 of the OEMP.

9.7.1 Complaints Management

A telephone complaints line is available during operating hours to receive complaints from members of the public.

Telephone: 1800 261 666

Email address: community@hiquality.com.au

Complaints relating to waste management will be handled in accordance with Section 5.9 of the OEMP.



9.8 Incident Management

Incident Management Procedures are discussed in the OEMP. All waste management incidents will be reported and managed in accordance with HiQ's Incident Reporting and Management Procedure detailed in Appendix C of the OEMP.

9.9 Non-Compliances and Actions

A non-compliance occurs when a procedure or environmental safeguard is not followed or does not perform as required by this OWMP. The Environmental Manager (or delegate) will monitor non-compliance with the OWMP and initiate a corrective and preventative action where required. Non-compliance is reported using the Non-Conformance Report in HiQ's Management System (RAPID).

Non-compliances will be reported to the Site Manager within 24 hours of the non-compliance being detected. Details of the remedial action will be reported within one working day of completion of the remedial action. The Safety, Health and Environment electronic online Incident Report in the Hi Quality Management System (ref: RAPID) will be used to document the investigation and implementation of preventative actions.

Minor non-compliances, which can be remedied immediately, will be recorded together with the appropriate remedial action in the weekly environmental checklist. A copy of the checklist will be issued monthly to the General Manager.

In the event of a non-compliance presenting potential or actual harm to the environment, this will trigger the need for the incident management procedure. See OEMP for further information.

9.10 Training and Competence

All personnel undertaking work at the WTF will undergo general environmental awareness training and training relevant to their responsibilities under this OWMP.

Records of environmental inductions and other environmental training will be maintained and readily accessible within the HiQ Safety, Health, Environment and Quality System. See Section 5.6 of the OEMP for further information.

9.10.1 Inductions

All employees and contractors are required to complete a HiQ general site induction and will be made aware of their environmental responsibilities. The site induction includes:

- An overview of the Site Rules, Environment Policy and general environmental requirements
- Legal and other obligations
- Environmental incident and community compliant reporting requirements
- Emergency response procedures on site
- Correct use of spill kit
- The waste management hierarchy
- Waste classification and tracking
- Waste treatment procedures
- Site walk through including focus on signage denoting the location of waste treatment and storage areas
- Appropriate stockpiling and reduction in cross-contamination
- Environmental awareness of environmental protection responsibilities and measures to minimise environmental impacts.



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9.10.2 Toolbox Talks

Toolbox talks will be used to raise awareness and educate employees and contractor on specific waste related issues. All site personnel are required to complete refresher training on an annual basis via a toolbox meeting.

Toolbox talks tailored to specific environmental issues include:

- Non-conforming waste procedure
- Preliminary waste screening procedure
- Batch control procedure
- Waste storage and stock pile management
- Unloading and handling procedures.

Attendance at daily site Toolbox talks is mandatory and attendees of Toolbox talks are required to sign an attendance form. Records of Toolbox attendance is maintained within the HiQ Safety, Health, Environment and Quality system.



10 REVIEW AND IMPROVEMENT

10.1 OWMP Annual Review

The management strategies and control measures detailed within the OWMP will be reviewed annually and updated, where necessary, to reflect changes introduced by the HiQ Group operational team, site specific outcomes, non-compliances and recommendations arising out of inspections, meetings and audits. Updates to this Plan may arise from:

- Communications and complaints from interested parties
- Corrective and preventative actions
- Action items from previous management reviews
- Changing circumstances including developments in legislative and other requirements related to operations at the Facility
- Recommendations for improvements.

Outputs from management reviews will include decisions and actions related to possible changes to the OWMP which can result in (and is consistent with) continual improvement.

10.2 Contingency Planning

The Facility operates based on a maximum volume of waste material on site at any one time. The Facility does not rely on frequent or ongoing deliveries and accepts waste materials on a case-by-case basis.

As a result, additional space provision for contingency is not be required. In the event of machinery downtime, HiQ will cease to accept any new waste loads until operational capacity has been restored.

A bay has been identified on the Facility plan as a 'transfer and storage' bay (see Figure 2-1) and will be used to provide additional storage capacity in the unlikely event that it is required.

Specific waste type related contingencies are detailed in the following sections.

10.2.1 Packaged Wastes

Packaged chemical waste and packaged waste for destruction is limited to a maximum of 400 tonnes or material onsite at any one time. This volume of material can be appropriately stored in the designated holding area until the backlog of material is removed.

A bay would be designated for the storage of packaged waste that is liquid waste classified as Class 8 PG II and III Dangerous Goods. Packaged waste found to have a low (acidic) pH and those with a high (basic) pH would be stored in separate bays in Bay F.

10.2.2 Bulk Soils and Sludges

The onsite storage of bulk soils consist of a combined onsite storage total of all soils received for treatment (across all treatment categories), dried drillers mud and dried slurries awaiting treatment and/or assessment. All bulk soils and sludges will not exceed 800 m³ at any one time, excluding dried drill muds.

If testing and validation results indicate the material has not responded to treatment it will undergo bench scale testing again to identify an appropriate treatment methodology. The material will undergo testing and validation after the alternative treatment train has been completed.



10.2.3 Acid Sulfate Soils

ASS will not be stored onsite for extended periods and is to be delivered to the Facility for prompt treatment only. If treatment by the primary method, i.e. high shear mixing is not possible, no additional soils will be accepted at the Facility and exportation from the source site for transport for treatment at the WTF is to cease. Material onsite will be treated by neutralisation using alternate means (e.g. physical mixing with excavator and neutralising agent) and validated against the verification criteria for the soil treatment procedure.

Treated material will be removed from the Facility, and no additional material will be imported until the primary treatment method is re-established.

10.2.4 Drills Muds

Untreated drill mud will be limited to 250 m³ storage capacity of dedicated onsite uncontaminated detention tanks. No additional portable storage vessels will be permitted to be used onsite for the purpose of storing untreated drill muds.

Liquid waste generated as a result of onsite treatment will be handled in accordance with liquid waste storage and treatment requirements.

Slurries that are free of excess water content will be considered classified as “bulk soil” and storage capacity will be combined with that of bulk soil. The total storage volume of dry drill mud and bulk soils will not exceed 1,080 m³ onsite at any one time.

10.2.5 Liquid Waste

Onsite storage of liquid waste will be limited by the available storage capacity of approved permanent onsite detention tanks with a maximum storage capacity of 2 megalitres. Liquid waste above this volume will not be accepted onsite.

Liquid waste is planned to be discharged to sewer under a Trade Waste Agreement. However, in the event that a Trade Waste Agreement cannot be obtained (either for part or all of the proposed discharge volumes) treated liquid waste would be collected in tankers and removed offsite for disposal at a Sewage Treatment Plant (STP) or Waste Water Treatment Plant.

10.2.6 Malfunction of the weighbridge or the electronic data capture system

In the event that the weighbridge is out of operation, or the electronic data capture system malfunctions whilst the weighbridge continues to operate, HiQ will record the information required under Clause 27 of the POEO (Waste) Regulations manually. The information will be entered into the electronic data capture system as soon as the system resumes operation (with details confirming that the original recording was manual).



11 REFERENCES

Dermatas & Meng, (2001) *Leaching of metals from soil contaminated by mining activities Journal of Hazardous Materials*

EPA (2014a). *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*

EPA (2014b). *Waste Classification Guidelines – Part 1: Classification of Waste*

EPA (2014c) *Waste Classification Guidelines Part 2: Immobilisation of Waste*

EPA (2018). *Waste Levy Guidelines*

Golder (2021). *Prestons Waste Treatment Facility Environmental Impact Statement.*

NTC (2022). *Australian Dangerous Goods Code, Edition 7.8*

DRAFT



APPENDIX A SAMPLING AND ANALYSIS QUALITY PLANS

[Drafting note: to be prepared upon project approval]

To be prepared for each applicable waste type and treatment methodology]

DRAFT



PRESTONS WASTE TREATMENT FACILITY
OPERATIONAL WASTE MANAGEMENT PLAN
Integrated Management System

ENV-M-36

APPENDIX B **HOT WORKS PERMIT**

DRAFT



PERMIT TO WORK HOT WORKS

Integrated Management System

SAF-WD-58

Site Name		Date of PTW issue	
Location on Site		Timeframe of PTW	
Activity		Supervisor/Contractor Name	
PTW Issuer (HiQ Employee Only)		PTW Issuer (HiQ Employee Only) (Signature)	

Names of all workers authorised to work under the PTW authority

General PTW requirements – Check prior to issuing PTW	Yes	No
Do other persons working in the area or persons who may enter the area need to be notified?		
Does the area need to be signposted and barricaded to restrict potential access		
Does any plant or equipment need to be locked out?		
Are provisions required for access and egress to the area?		
Is there a total fire ban in place? (Note that if total fire ban in place, no general-purpose welding, grinding, soldering or gas cutting can be done in the open)		
Do I need a RFS Permit?		

Hot Work specific PTW requirements - Check prior to issuing PTW	Yes	No	Required Action/Response
Has all hot work equipment been inspected prior to use and in good working order?			
Is there specific fire-fighting equipment that must be available where work is to be undertaken?			
Are there specific flammable/combustible items that must be removed from the area prior to the work commencing?			
Are there specific flammable/combustible items that are not able to be moved that require protection? (IF YES, List the items and how they should be protected)			
Is hot work being conducted in a space which could be deemed a confined space when hot work is introduced? If yes, STOP and use Confined Space Permit			
Are there tanks, containers, piping, or pumps which may have or do store flammable or combustible substances/ material within 10 metres of the hot work task?			



PERMIT TO WORK HOT WORKS

Integrated Management System

SAF-WD-58

Hot Work specific PTW requirements - Check prior to issuing PTW	Yes	No	Required Action/Response
(IF YES, this task is a “prohibited hot work” task and is to be performed by a specialist contactor after the completion of a risk assessment that detailed controls inclusive of how tanks, containers, piping or pumps shall be cleaned out)			
Are gauges and flashback arrestors appropriately fitted and in good condition?			
Does the area need to be hosed down prior to work commencing?			
Are welding screens required to protect others from Arc Flash?			
Is there specific equipment required to ensure adequate ventilation in the work area?			
Is a fire watch required while the work is being done?			
Does the area need to be hosed down after the work is completed?			
Is a fire watch required after the task is done? (IF YES, State for how long)			
Who is the nominated fire watcher?			
What PPE is used in accordance with the task being performed available? ☐ Safety Glasses ☐ Welding Helmet ☐ Welding Gloves ☐ Safety Googles / Safety Shield ☐ Welding Jacket			
Are receptacles for the disposal of off-cuts, slag, and electrode stubs available?			
Are gas detectors available to identify if flammable/explosive gases/dusts are present or potentially generated?			



PERMIT TO WORK HOT WORKS

Integrated Management System

SAF-WD-58

Time of observation and comments

Check on completion of activity and when PTW form has been returned

Yes

No

Has the work area been cleaned an all debris, materials, tools, and equipment been removed?

Has all plant and equipment been inspected, deemed safe to operate and able to return to service?

Has the work area and surrounding areas been checked for fire 60 minutes after the work was completed to ensure safety?

I declare that the work activity is complete, tools and equipment returned, the area is clean, and it is safe to return to normal operations

Supervisor/Contractor
Name

Supervisor/Contractor
Signature

I have personally checked that the above clearances and have now cancelled the PTW

PTW Issuer (Name)

PTW Issuer (Signature)

Date

Time

APPENDIX C SAFETY DATA SHEETS

DRAFT

1. IDENTIFICATION

Product Name	Caustic Soda Liquid
Other Names	Caustic soda solution; Sodium hydroxide solution
Uses	Chemical manufacture; cleaning/washing agents/additives; adhesives; flotation agents; pH regulation; solvent; water treatment; photochemical; reducing agent; hydraulic fracturing.
Chemical Family	No Data Available
Chemical Formula	NaOH.H ₂ O
Chemical Name	Sodium hydroxide, aqueous solution
Product Description	>=5% aqueous solution.

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Level 2, No. 8, Jalan Sapir 33/7 Seksyen 33, Shah Alam Premier Industrial Park 40400 Shah Alam Sengalor, Malaysia	+60-3-5614-2111

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
Poisons Information Centre	Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust) Schedule 6

Globally Harmonised System

Hazard Classification		Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)	
Hazard Categories		Corrosive to Metals - Category 1 Skin Corrosion/Irritation - Category 1A Serious Eye Damage/Irritation - Category 1	
Pictograms			
Signal Word		Danger	
Hazard Statements		H290	May be corrosive to metals.
		H314	Causes severe skin burns and eye damage.
Precautionary Statements	Prevention	P260	Do not breathe gas/mist/vapours/spray.
		P280	Wear protective gloves/protective clothing/eye protection/face protection.
	Response	P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
		P303 + P361 + P353	IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
		P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
		P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
		P310	Immediately call a POISON CENTER or doctor/physician.
		P363	Wash contaminated clothing before reuse.
		P390	Absorb spillage to prevent material damage.
	Storage	P405	Store locked up.
		P406	Store in corrosive resistant container with a resistant inner liner.
	Disposal	P501	Dispose of contents/container in accordance with local / regional / national / international regulations.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
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Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications	Health Hazards	6.1D	Substances that are acutely toxic - Harmful
		6.1E	Substances that are acutely toxic –May be harmful, Aspiration hazard
		8.1A	Substances that are corrosive to metals
		8.2B	Substances that are corrosive to dermal tissue UN PGII
		8.3A	Substances that are corrosive to ocular tissue
	Environmental Hazards	9.1D	Substances that are slightly harmful to the aquatic environment or are otherwise designed for biocidal action

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Chemical Entity	Formula	CAS Number	Proportion
Sodium hydroxide	NaOH	1310-73-2	>=5 - <=50 %
Water	H2O	7732-18-5	Balance %

4. FIRST AID MEASURES**Description of necessary measures according to routes of exposure**

Swallowed	IF SWALLOWED: Rinse mouth, then drink (slowly) 1 - 2 glasses of water. Do NOT induce vomiting. Immediately call a Poison Centre or doctor/physician for advice. Urgent hospital treatment is likely to be needed. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. Never give anything by mouth to an unconscious person. Transport to hospital or doctor without delay.
Eye	IF IN EYES: Immediately flush eyes with running water for several minutes, holding eyelids open and occasionally lifting the upper and lower lids. Immediately call a Poison Centre or doctor/physician for advice. Remove contact lenses if present and easy to do. Continue flushing until advised to stop by a Poisons Information Centre or a doctor, or for at least 15 minutes. Transport to hospital or doctor without delay.
Skin	IF ON SKIN (or hair): Remove contaminated clothing and shoes immediately. Flush skin and hair with running water for 20 - 30 minutes. Immediately call a Poison Centre or doctor/physician for advice. In case of gross contamination, drench contaminated clothing and skin with plenty of water before removing clothes. For minor skin contact, avoid spreading material on unaffected skin. Transport to hospital or doctor without delay.
Inhaled	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a Poison Centre or doctor/physician for advice. Apply resuscitation if victim is not breathing - Do not use direct mouth-to-mouth method if victim ingested or inhaled the substance; use alternative respiratory method or proper respiratory device; Administer oxygen if breathing is difficult. Transport to hospital or doctor without delay.
Advice to Doctor	Keep victim calm and warm - Obtain immediate medical care. Alkalis continue to cause damage after exposure. Reaction may be delayed up to 24 hours after exposure; affected individuals need complete rest and must be kept under medical observation even if no symptoms are (yet) manifested. Ensure that attending medical personnel are aware of the identity and nature of the product(s) involved, and take precautions to protect themselves.
Medical Conditions Aggravated by Exposure	No information available.

5. FIRE FIGHTING MEASURES

General Measures	Alert Fire Brigade and tell them location and nature of hazard. If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out. Avoid getting water inside containers.
Flammability Conditions	Non-combustible; Material itself does not burn.
Extinguishing Media	If material is involved in a fire, use dry chemical, Carbon dioxide (CO2), foam or water spray for extinction - Do not use water jets.
Fire and Explosion Hazard	Not considered a significant fire risk, however containers may burn. Containers may explode when heated. Contact with metals may evolve flammable hydrogen gas.
Hazardous Products of Combustion	Fire or heat will produce irritating, toxic and/or corrosive gases.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may be toxic and/or corrosive and pollute waterways.
Personal Protective Equipment	Liquid-tight chemical protective clothing (splash suit) in combination with self-contained breathing apparatus (SCBA) should be used. Fully-encapsulating, gas-tight suits should be worn for maximum protection. Structural firefighter's uniform is NOT effective for this material.
Flash Point	No Data Available
Lower Explosion Limit	No Data Available
Upper Explosion Limit	No Data Available
Auto Ignition Temperature	No Data Available
Hazchem Code	2R

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Ensure adequate ventilation - Ventilate enclosed spaces before entering. ELIMINATE all ignition sources. Do not touch or walk through spilled material. Clean up all spills immediately. Do not breathe vapours and prevent contact with eyes, skin and clothing.
Clean Up Procedures	Absorb with earth, sand or other non-combustible material and transfer to a suitable, properly labelled container for disposal (see SECTION 13).
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Cover with dry earth, sand or other non-combustible material followed by plastic sheet to minimise spreading.
Decontamination	Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
Environmental Precautionary Measures	Small spillages and decontamination run-off may be washed to drains with large quantities of water. Due care must however still be exercised to avoid unnecessary pollution of watercourses.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground. Large spill: Alert Fire Brigade and tell them location and nature of hazard; Consider downwind evacuation.
Personal Precautionary Measures	Do not touch damaged containers or spilled material unless wearing appropriate protective clothing (see SECTION 8). Large spill: Wear SCBA and chemical splash suit. Fully-encapsulating, gas-tight suits should be worn for maximum protection.

7. HANDLING AND STORAGE

Handling	Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Do not breathe mist/vapours/spray and prevent contact with eyes, skin and clothing. Do not ingest. Wear protective gloves/protective clothing/eye protection/face protection (see SECTION 8). Avoid overheating (decomposition). Keep away from sources of ignition - No smoking. Absorb spillage to prevent material damage (see SECTION 6).
Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep containers securely sealed. Check regularly for spills and leaks. Keep away from heat and sources of ignition - No smoking. Keep away from foodstuffs and incompatible materials (see SECTION 10). Store locked up.
Container	Keep only in the original container or corrosive resistant container/container with a resistant inner liner. Do NOT use aluminium, galvanised or tin-plated containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - Safe Work Australia Exposure Standard: TWA = 2 mg/m ³ Peak limitation. - New Zealand WES: TWA = 2 mg/m ³ Ceiling. - NIOSH REL/OSHA PEL: 2 mg/m ³ Ceiling. - Immediately dangerous to life or health (IDLH) concentration: 10 mg/m ³ .
Exposure Limits	No Data Available
Biological Limits	No information available.
Engineering Measures	A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.
Personal Protection Equipment	- Respiratory protection: In case of inadequate ventilation, wear respiratory protection. Recommended: Particulate/mist filter respirator (refer to AS/NZS 1715 & 1716). - Eye/face protection: Wear appropriate eye protection to prevent eye contact. Recommended: Properly fitted chemical goggles. - Hand protection: Wear protective gloves. Recommended: Elbow length PVC gloves. - Skin/body protection: Wear appropriate personal protective clothing to prevent skin contact. Recommended: Overalls, PVC apron. When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.
Special Hazards Precautions	Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material. Do not allow wash water from cleaning or process equipment to enter drains. It may be necessary to collect all wash water for treatment before disposal.

Work Hygienic Practices

Do not eat, drink or smoke when using this product. Remove contaminated clothing and shoes immediately - Do NOT allow clothing wet with material to stay in contact with skin. Wash contaminated clothing and shoes before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Clear liquid
Odour	Slight odour
Colour	Clear slightly hazy water-white
pH	>12 (as supplied)
Vapour Pressure	No Data Available
Relative Vapour Density	No Data Available
Boiling Point	~142 °C (50% soln.)
Melting Point	No Data Available
Freezing Point	~12 °C
Solubility	Miscible with water
Specific Gravity	approx. 1.52 (50% soln.)
Flash Point	No Data Available
Auto Ignition Temp	No Data Available
Evaporation Rate	No Data Available
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	No Data Available
Specific Heat	No Data Available
Molecular Weight	No Data Available
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No information available.
Potential for Dust Explosion	Not applicable.
Fast or Intensely Burning Characteristics	No information available.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No information available.
Properties That May Initiate or Contribute to Fire Intensity	Non-combustible; Material itself does not burn.
Reactions That Release Gases or Vapours	Fire or heat will produce irritating, toxic and/or corrosive gases.
Release of Invisible Flammable Vapours and Gases	Contact with metals may evolve flammable hydrogen gas.

10. STABILITY AND REACTIVITY

General Information	May be corrosive to metals. Attacks some plastics, rubber, coatings and metals (aluminium, tin, zinc, etc, and their alloys), producing flammable hydrogen gas.
Chemical Stability	Product is considered stable; Unstable in the presence of incompatible materials.
Conditions to Avoid	Avoid overheating (decomposition). Keep away from sources of ignition.
Materials to Avoid	Incompatible/reactive with strong acids, acid chlorides, acid anhydrides and chloroformates. Avoid contact with copper, aluminium and their alloys.
Hazardous Decomposition Products	Fire or heat will produce irritating, toxic and/or corrosive gases.
Hazardous Polymerisation	No information available.

11. TOXICOLOGICAL INFORMATION

General Information	- Acute toxicity: Corrosive following ingestion. Ingestion of Sodium hydroxide may result in severe burns to the mouth, throat and stomach, pain, nausea and vomiting, swelling of the larynx and subsequent suffocation, perforation of the gastro-intestinal tract. - Skin corrosion/irritation: Corrosive; Causes severe skin burns. Sodium hydroxide burns are not immediately painful; onset of pain may be delayed. It causes deep penetrating burns and necrosis. The skin is discoloured and becomes brown or black, which can make initial assessment of the injury difficult. There could be recurring skin breakdown over a long period [NICNAS]. - Eye damage/irritation: Corrosive; Causes serious eye damage. Oedema, destruction of the epithelium, corneal opacification and iritis may occur. - Respiratory/skin sensitisation: Sodium hydroxide is not considered a skin sensitiser [NICNAS]. - Germ cell mutagenicity: No evidence for a mutagenic activity [NICNAS]. - Carcinogenicity: No information available. - Reproductive toxicity: No information available. - STOT (single exposure): Inhalation of alkaline corrosives may produce irritation of the respiratory tract with coughing, choking, pain and mucous membrane damage. Pulmonary oedema may develop in more severe cases; symptoms may be delayed. - STOT (repeated exposure): Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis of the jaw; Bronchial irritation, with cough, and bronchial pneumonia may ensue. The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). - Aspiration toxicity: No information available.
Acute	
Ingestion	Acute toxicity (Oral): COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - LD50, Rabbit: 325 mg/kg
Carcinogen Category	None

12. ECOLOGICAL INFORMATION

Ecotoxicity	COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - LC50, Fish: 4.16 mg/L (96 h).
Persistence/Degradability	COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - Low persistence in water/soil. - Low persistence in air.
Mobility	COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - Low mobility in soil (KOC = 14.3).
Environmental Fate	Prevent entry into drains and waterways.
Bioaccumulation Potential	COMPONENT: Sodium hydroxide (CAS No. 1310-73-2): - Low bioaccumulative potential (Log Kow = -3.8796).
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information Recycle wherever possible, or dispose of in accordance with local/regional/national regulations.

Special Precautions for Land Fill No information available.

14. TRANSPORT INFORMATION**Land Transport (Australia)**

ADG Code

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	37 Toxic And/Or Corrosive Substances Non-Combustible
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (Fiji)

ADG Code

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	37 Toxic And/Or Corrosive Substances Non-Combustible
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (Malaysia)

ADR Code

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	37 Toxic And/Or Corrosive Substances Non-Combustible
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (New Caledonia)

ADG Code

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available

EPG	37 Toxic And/Or Corrosive Substances Non-Combustible
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (New Zealand)

NZS5433

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	37 Toxic And/Or Corrosive Substances Non-Combustible
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (United States of America)

US DOT

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
ERG	154 Substances - Toxic and/or Corrosive (Non-Combustible)
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Sea Transport

IMDG Code

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available
EMS	F-A, S-B
Marine Pollutant	No

Air Transport

IATA DGR

Proper Shipping Name	SODIUM HYDROXIDE SOLUTION
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
UN Number	1824
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification

Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

15. REGULATORY INFORMATION**General Information**

No Data Available

Poisons Schedule (Aust)

Schedule 6

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

Approval Code

HSR001576

National/Regional Inventories**Australia (AICS)**

Listed

Canada (DSL)

Not Determined

Canada (NDSL)

Not Determined

China (IECSC)

Not Determined

Europe (EINECS)

Listed

Europe (REACH)

Not Determined

Japan (ENCS/METI)

Not Determined

Korea (KECI)

Not Determined

Malaysia (EHS Register)

Not Determined

New Zealand (NZIoC)

Listed

Philippines (PICCS)

Not Determined

Switzerland (Giftliste 1)

Not Determined

Switzerland (Inventory of Notified Substances)

Not Determined

Taiwan (NCSR)

Not Determined

USA (TSCA)

Listed

16. OTHER INFORMATION**Related Product Codes**

CAUBUL1000, CAUSOB0300, CAUSOB0301, CAUSOB0400, CAUSOB0600, CAUSOB0900, CAUSOB1000, CAUSOB1001, CAUSOB1002, CAUSOB1003, CAUSOB1004, CAUSOB1005, CAUSOB1006, CAUSOB1007, CAUSOB1008, CAUSOB1009, CAUSOB1010, CAUSOB1011, CAUSOB1012, CAUSOB2000, CAUSOB2001, CAUSOB2002, CAUSOB2003, CAUSOB2004, CAUSOB2010, CAUSOB2015, CAUSOB2200, CAUSOB2500,

CAUSOB2501, CAUSOB2502, CAUSOB2503, CAUSOB2510, CAUSOB2700, CAUSOB2701, CAUSOB2702, CAUSOB2800, CAUSOB3000, CAUSOB3001, CAUSOB3200, CAUSOB3201, CAUSOB3300, CAUSOB3301, CAUSOB3500, CAUSOB3600, CAUSOB4000, CAUSOB4500, CAUSOB4600, CAUSOB4900, CAUSOB4901, CAUSOB4902, CAUSOB4903, CAUSOB4904, CAUSOB5000, CAUSOB5001, CAUSOB5100, CAUSOB5500, CAUSOB6000, CAUSOB6001, CAUSOB7000, CAUSOB7500, CAUSOB7501, CAUSOB7502, CAUSOB7700, CAUSOB8000, CAUSOB9000, CAUSOB9100, CAUSOB9400, CAUSOC1000, CAUSOC1001, CAUSOC1002, CAUSOC1100, CAUSOC2450, CAUSOC2500, CAUSOC2501, CAUSOC3000, CAUSOD0500, CAUSOD0600, CAUSOD0601, CAUSOD0700, CAUSOD0800, CAUSOD0900, CAUSOD1000, CAUSOD1001, CAUSOD1002, CAUSOD1003, CAUSOD1004, CAUSOD1005, CAUSOD1006, CAUSOD1007, CAUSOD1050, CAUSOD1100, CAUSOD1101, CAUSOD1200, CAUSOD1300, CAUSOD1400, CAUSOD1500, CAUSOD1600, CAUSOD1700, CAUSOD1701, CAUSOD1702, CAUSOD1703, CAUSOD1708, CAUSOD1720, CAUSOD1800, CAUSOD1801, CAUSOD1802, CAUSOD1803, CAUSOD1804, CAUSOD1805, CAUSOD1806, CAUSOD1807, CAUSOD1808, CAUSOD1809, CAUSOD1810, CAUSOD1811, CAUSOD1812, CAUSOD1813, CAUSOD1814, CAUSOD1815, CAUSOD1816, CAUSOD1817, CAUSOD1818, CAUSOD1819, CAUSOD1820, CAUSOD1821, CAUSOD1822, CAUSOD1823, CAUSOD1824, CAUSOD1825, CAUSOD1826, CAUSOD1827, CAUSOD1828, CAUSOD1829, CAUSOD1830, CAUSOD1831, CAUSOD1832, CAUSOD1833, CAUSOD1834, CAUSOD1835, CAUSOD1836, CAUSOD1837, CAUSOD1838, CAUSOD1839, CAUSOD1840, CAUSOD1841, CAUSOD1842, CAUSOD1843, CAUSOD1844, CAUSOD1845, CAUSOD1846, CAUSOD1847, CAUSOD1848, CAUSOD1849, CAUSOD1850, CAUSOD1851, CAUSOD1852, CAUSOD1853, CAUSOD1854, CAUSOD1855, CAUSOD1856, CAUSOD1857, CAUSOD1858, CAUSOD1859, CAUSOD1860, CAUSOD1861, CAUSOD1862, CAUSOD1863, CAUSOD1864, CAUSOD1865, CAUSOD1866, CAUSOD1867, CAUSOD1868, CAUSOD1869, CAUSOD1870, CAUSOD1871, CAUSOD1872, CAUSOD1873, CAUSOD1874, CAUSOD1875, CAUSOD1876, CAUSOD1877, CAUSOD1878, CAUSOD1879, CAUSOD1880, CAUSOD1881, CAUSOD1882, CAUSOD1883, CAUSOD1884, CAUSOD1885, CAUSOD1886, CAUSOD1887, CAUSOD1888, CAUSOD1889, CAUSOD1890, CAUSOD1891, CAUSOD1892, CAUSOD1893, CAUSOD1894, CAUSOD1895, CAUSOD1896, CAUSOD1897, CAUSOD1898, CAUSOD1899, CAUSOD1900, CAUSOD1901, CAUSOD1902, CAUSOD1903, CAUSOD1904, CAUSOD1905, CAUSOD1906, CAUSOD1907, CAUSOD1908, CAUSOD1909, CAUSOD1910, CAUSOD1911, CAUSOD1912, CAUSOD1913, CAUSOD1914, CAUSOD1915, CAUSOD1916, CAUSOD1917, CAUSOD1918, CAUSOD1919, CAUSOD1920, CAUSOD1921, CAUSOD1922, CAUSOD1923, CAUSOD1924, CAUSOD1925, CAUSOD1926, CAUSOD1927, CAUSOD1928, CAUSOD1929, CAUSOD1930, CAUSOD1931, CAUSOD1932, CAUSOD1933, CAUSOD1934, CAUSOD1935, CAUSOD1936, CAUSOD1937, CAUSOD1938, CAUSOD1939, CAUSOD1940, CAUSOD1941, CAUSOD1942, CAUSOD1943, CAUSOD2000, CAUSOD2001, CAUSOD2017, CAUSOD2020, CAUSOD2050, CAUSOD2051, CAUSOD2052, CAUSOD2055, CAUSOD2100, CAUSOD2200, CAUSOD2300, CAUSOD2500, CAUSOD2501, CAUSOD2600, CAUSOD2700, CAUSOD2800, CAUSOD2900, CAUSOD2910, CAUSOD2948, CAUSOD3000, CAUSOD3010, CAUSOD3020, CAUSOD3100, CAUSOD3200, CAUSOD3201, CAUSOD3300, CAUSOD3301, CAUSOD3302, CAUSOD3310, CAUSOD3315, CAUSOD3400, CAUSOD3401, CAUSOD3500, CAUSOD3600, CAUSOD3605, CAUSOD3610, CAUSOD3700, CAUSOD4000, CAUSOD4001, CAUSOD4100, CAUSOD4201, CAUSOD4202, CAUSOD4203, CAUSOD4500, CAUSOD4600, CAUSOD4650, CAUSOD4700, CAUSOD4800, CAUSOD4801, CAUSOD4900, CAUSOD4901, CAUSOD5000, CAUSOD5001, CAUSOD5100, CAUSOD5105, CAUSOD5500, CAUSOD6000, CAUSOD6500, CAUSOD6600, CAUSOD6700, CAUSOD7000, CAUSOD7100, CAUSOD7200, CAUSOD7400, CAUSOD7500, CAUSOD7600, CAUSOD7700, CAUSOD7800, CAUSOD7900, CAUSOD7901, CAUSOD8000, CAUSOD8001, CAUSOD8100, CAUSOD8200, CAUSOD8250, CAUSOD8260, CAUSOD8261, CAUSOD8262, CAUSOD8263, CAUSOD8264, CAUSOD8300, CAUSOD8900, CAUSOD8901, CAUSOD8982, CAUSOD9100, CAUSOD9200, CAUSOD9300, CAUSOD9301, CAUSOD9302, CAUSOD9400, CAUSOI0200, CAUSOI0201, CAUSOI0300, CAUSOI0800, CAUSOI0900, CAUSOI1000, CAUSOI1001, CAUSOI1002, CAUSOI1003, CAUSOI1004, CAUSOI1100, CAUSOI1101, CAUSOI1200, CAUSOI1201, CAUSOI1300, CAUSOI1400, CAUSOI1500, CAUSOI1600, CAUSOI1700, CAUSOI1701, CAUSOI1800, CAUSOI2000, CAUSOI2001, CAUSOI2002, CAUSOI2200, CAUSOI2300, CAUSOI2400, CAUSOI2401, CAUSOI2405, CAUSOI2500, CAUSOI2600, CAUSOI2800, CAUSOI2801, CAUSOI2900, CAUSOI2901, CAUSOI2902, CAUSOI3000, CAUSOI3001, CAUSOI3100, CAUSOI3101, CAUSOI3200, CAUSOI3201, CAUSOI3250, CAUSOI3300, CAUSOI3301, CAUSOI3302, CAUSOI3303, CAUSOI3304, CAUSOI3400, CAUSOI3500, CAUSOI3600, CAUSOI3700, CAUSOI3800, CAUSOI3900, CAUSOI4000, CAUSOI4001, CAUSOI4100, CAUSOI4200, CAUSOI4300, CAUSOI4600, CAUSOI4700, CAUSOI4701, CAUSOI4800, CAUSOI4801, CAUSOI4900, CAUSOI4901, CAUSOI4902, CAUSOI5000, CAUSOI5100, CAUSOI5500, CAUSOI6000, CAUSOI6001, CAUSOI6100, CAUSOI6500, CAUSOI6600, CAUSOI6700, CAUSOI6800, CAUSOI6900, CAUSOI7000, CAUSOI7800, CAUSOI7900, CAUSOI7901, CAUSOI7902, CAUSOI8000, CAUSOI8001, CAUSOI8100, CAUSOI8500, CAUSOI8800, CAUSOI8900, CAUSOI9000, CAUSOI9100, CAUSOI9200, CAUSOS1000

Revision

4

Revision Date

03 Nov 2016

Reason for Issue

Updated SDS

Key/Legend

< Less Than

> Greater Than

AICS Australian Inventory of Chemical Substances

atm Atmosphere

CAS Chemical Abstracts Service (Registry Number)

cm² Square Centimetres

CO₂ Carbon Dioxide

COD Chemical Oxygen Demand

deg C (°C) Degrees Celcius

EPA (New Zealand) Environmental Protection Authority of New Zealand

deg F (°F) Degrees Fahrenheit

g Grams

g/cm³ Grams per Cubic Centimetre
g/l Grams per Litre
HSNO Hazardous Substance and New Organism
IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluble in each other.
inHg Inch of Mercury
inH₂O Inch of Water
K Kelvin
kg Kilogram
kg/m³ Kilograms per Cubic Metre
lb Pound
LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.
LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
ltr or **L** Litre
m³ Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m³ Milligrams per Cubic Metre
Misc or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.
mm Millimetre
mmH₂O Millimetres of Water
mPa.s Millipascals per Second
N/A Not Applicable
NIOSH National Institute for Occupational Safety and Health
NOHSC National Occupational Health and Safety Commission
OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight

1. IDENTIFICATION

Product Name	Hydrochloric acid, >25%
Other Names	Hydrochloric acid 31 - 33%; Hydrochloric acid 32%; Hydrochloric acid 33%
Uses	Industrial use.
Chemical Family	No Data Available
Chemical Formula	HCl
Chemical Name	Aqueous hydrogen chloride
Product Description	No Data Available

Contact Details of the Supplier of this Safety Data Sheet

Organisation	Location	Telephone
Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000
Redox Pty Ltd	11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222
Redox Inc.	3960 Paramount Boulevard Suite 107 Lakewood CA 90712 USA	+1-424-675-3200
Redox Chemicals Sdn Bhd	Level 2, No. 8, Jalan Sapir 33/7 Seksyen 33, Shah Alam Premier Industrial Park 40400 Shah Alam Sengalor, Malaysia	+60-3-5614-2111

Emergency Contact Details

For emergencies only; DO NOT contact these companies for general product advice.

Organisation	Location	Telephone
Poisons Information Centre	Westmead NSW	1800-251525 131126
Chemcall	Australia	1800-127406 +64-4-9179888
Chemcall	Malaysia	+64-4-9179888
Chemcall	New Zealand	0800-243622 +64-4-9179888
National Poisons Centre	New Zealand	0800-764766
CHEMTREC	USA & Canada	1-800-424-9300 CN723420 +1-703-527-3887

2. HAZARD IDENTIFICATION

Poisons Schedule (Aust) Schedule 6

Globally Harmonised System

Hazard Classification

Hazardous according to the criteria of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS)

Hazard Categories

Corrosive to Metals - Category 1
Skin Corrosion/Irritation - Category 1B
Serious Eye Damage/Irritation - Category 1
Specific Target Organ Toxicity (Single Exposure) - Category 3

Pictograms



Signal Word

Danger

Hazard Statements

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.
H433 Harmful to terrestrial vertebrates.

Precautionary Statements

Prevention	P260	Do not breathe fume/mist/vapours/spray.
	P280	Wear protective gloves/protective clothing/eye protection/face protection.
	P271	Use only outdoors or in a well-ventilated area.
Response	P303 + P361 + P353	IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
	P310	Immediately call a POISON CENTER or doctor/physician.
	P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
	P390	Absorb spillage to prevent material damage.
	P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
	P363	Wash contaminated clothing before reuse.
	P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Storage	P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
	P406	Store in corrosive resistant container with a resistant inner liner.
	P405	Store locked up.
Disposal	P501	Dispose of contents/container in accordance with local / regional / national / international regulations.

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification

Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

HSNO Classifications

Health Hazards	6.1B	Substances that are acutely toxic - Fatal
	6.1D	Substances that are acutely toxic - Harmful
	8.1A	Substances that are corrosive to metals
	8.2B	Substances that are corrosive to dermal tissue UN PGII
	8.3A	Substances that are corrosive to ocular tissue

Environmental 9.1D

Hazards

Substances that are slightly harmful to the aquatic environment or are otherwise designed for biocidal action

9.3C

Substances that are harmful to terrestrial vertebrates

3. COMPOSITION/INFORMATION ON INGREDIENTS**Ingredients**

Chemical Entity	Formula	CAS Number	Proportion
Water	H ₂ O	7732-18-5	<75 %
Hydrochloric acid	HCl	7647-01-0	>25 %

4. FIRST AID MEASURES**Description of necessary measures according to routes of exposure****Swallowed**

IF SWALLOWED: If conscious and alert, rinse mouth then drink 200 - 300 mL water to dilute the substance. Do NOT induce vomiting. Immediately call a Poison Centre or doctor/physician for advice. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration; Rinse mouth, then drink more water. Keep victim calm and warm - Obtain immediate medical care. Never give anything by mouth to an unconscious or convulsing person.

Eye

IF IN EYES: Immediately flush eyes with running water for at least 15 minutes, holding eyelids open and occasionally lifting the upper and lower lids. Immediately call a Poison Centre or doctor/physician for advice. Remove contact lenses if present and easy to do. If irritation persists, continue rinsing. Keep victim calm and warm - Obtain immediate medical care. Do not transport victim until the recommended flushing period is completed, unless flushing can be continued during transport.

Skin

IF ON SKIN (or hair): Remove contaminated clothing and shoes immediately. Flush skin and hair with running water for at least 15 minutes. Immediately call a Poison Centre or doctor/physician for advice. In case of gross contamination, drench contaminated clothing and skin with plenty of water before removing clothes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim calm and warm - Obtain immediate medical care. Do not transport victim until the recommended flushing period is completed, unless flushing can be continued during transport. During transport or if medical treatment is delayed, immerse the affected area in iced water. If immersion is not practicable, apply compresses of iced water. Wash contaminated clothing and shoes before reuse; Discard heavily contaminated clothing and shoes in a manner which limits further exposure.

Inhaled

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a Poison Centre or doctor/physician for advice. Apply resuscitation if victim is not breathing – Do not use direct mouth-to-mouth method if victim ingested or inhaled the substance; use alternative respiratory method or proper respiratory device. Administer oxygen if breathing is difficult. Keep victim calm and warm - Obtain immediate medical care.

Advice to Doctor

Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Symptoms may appear up to 48 hrs after exposure. Strict adherence to first aid measures following any exposure is essential. SPEED IS ESSENTIAL. Treat symptomatically. Ensure that attending medical personnel are aware of the identity and nature of the product(s) involved, and take precautions to protect themselves.

Medical Conditions Aggravated by Exposure

No information available.

5. FIRE FIGHTING MEASURES**General Measures**

If safe to do so, move undamaged containers from fire area. Cool containers with water spray until well after fire is out. Water spray may be used to knock down escaping vapour. Avoid getting water inside containers. When any large containers are involved in a fire, consider evacuation of areas within 800 m in all directions.

Flammability Conditions

Non-combustible; Material does not burn, but may produce toxic and/or corrosive fumes upon heating.

Extinguishing Media

If material is involved in a fire, use dry chemical, Carbon dioxide (CO₂), foam or water spray for extinction. Use extinguishing media suitable for surrounding fires.

Fire and Explosion Hazard

Will react with many compounds (some violently) releasing flammable, toxic and/or corrosive gases and runoff. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated or contaminated with water.

Hazardous Products of Combustion	Fire will produce irritating, toxic and/or corrosive gases, including chlorine.
Special Fire Fighting Instructions	Contain runoff from fire control or dilution water - Runoff may be toxic and/or corrosive and may pollute waterways.
Personal Protective Equipment	Liquid-tight chemical protective clothing (splash suit) in combination with self-contained breathing apparatus (SCBA) should be used. Structural firefighter's uniform is NOT effective for this material.
Flash Point	No Data Available
Lower Explosion Limit	No Data Available
Upper Explosion Limit	No Data Available
Auto Ignition Temperature	No Data Available
Hazchem Code	2R

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Ensure adequate ventilation - Ventilate enclosed spaces before entering. ELIMINATE all ignition sources. Do not touch or walk through spilled material. Do not breathe mist/vapours and prevent contact with eyes, skin and clothing.
Clean Up Procedures	Absorb with earth, sand or other non-combustible material; Use clean non-sparking tools to collect material and place it into suitable containers for later disposal (see SECTION 13).
Containment	Stop leak if safe to do so – Prevent entry into waterways, drains or confined areas. Cover with dry earth and/or other non-combustible material followed by plastic sheet to minimise spreading. Vapour-suppressing foam may be used to control vapours; Water spray may be used to knock down or divert vapour clouds.
Decontamination	If possible, neutralize contaminant at the spilled area with lime, limestone, sodium carbonate (soda ash), sodium bicarbonate, and dilute sodium hydroxide. Ensure adequate decontamination of tools and equipment following clean up.
Environmental Precautionary Measures	Small spillages and decontamination run-off may be washed to drains with large quantities of water. Due care must however still be exercised to avoid unnecessary pollution of watercourses.
Evacuation Criteria	Spill or leak area should be isolated immediately. Keep unauthorised personnel away. Keep upwind and to higher ground. Large spill: Consider downwind evacuation of areas within 250 m.
Personal Precautionary Measures	Do not touch damaged containers or spilled material unless wearing appropriate protective clothing (see SECTION 8). Large spill: Wear SCBA and chemical splash suit.

7. HANDLING AND STORAGE

Handling	Safety showers and eyewash facilities should be provided within the immediate work area for emergency use. Ensure adequate ventilation - Use only outdoors or in a well-ventilated area. Handle in accordance with good industrial hygiene and safety practice. Do not breathe mist/vapours and prevent contact with eyes, skin and clothing. Do not ingest. Wear protective gloves/protective clothing/eye protection/face protection (see SECTION 8). CORROSIVE: Always add acid to water during dilution - NEVER add water to acid. Avoid contact with common metals. Use corrosion-resistant structural materials. Absorb spillage to prevent material damage (see SECTION 6).
Storage	Store in a cool, dry and well-ventilated place, out of direct sunlight. Keep container tightly closed. Containers should be labelled and protected from damage. Keep away from heat and sources of ignition - No smoking. Keep away from foodstuffs and incompatible materials (see SECTION 10). Store locked up. If stored indoors, building floors should be acid resistant with drains to a treatment system. Electrical equipment should be flameproof and protected against corrosive action.
Container	Keep only in the original container or suitable material, i.e. rubber lined steel, PVC/FRP, FRP. Containers should have a safety relief valve - Care should be taken to release any internal pressure slowly.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	For Hydrochloric acid (CAS No. 7647-01-0): - Safe Work Australia (SWA) Exposure Standard: TWA = 5 ppm (7.5 mg/m ³) Peak limitation. - New Zealand Workplace Exposure Standard (WES): TWA = 5 ppm (7.5 mg/m ³) Ceiling. - OSHA PEL/NIOSH REL: TWA = 5 ppm (7 mg/m ³) Ceiling.
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Exposure Limits	- Immediately dangerous to life or health (IDLH) concentration: 50 ppm. No Data Available
Biological Limits	No information available.
Engineering Measures	A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Atmospheric levels should be controlled in compliance with the occupational exposure limit. Electrical equipment should be flameproof and protected against corrosive action.
Personal Protection Equipment	- Respiratory protection: Wear respiratory protection in case of inadequate ventilation, if facing concentrations above the exposure limit or unknown concentrations. Recommended: Chemical cartridge respirator or air-purifying respirator, providing protection against acid gas (Filter Type E); Supplied air respirator or self-contained breathing apparatus (SCBA). - Eye/face protection: Wear appropriate eye protection to prevent eye contact. Recommended: Wear chemical goggles and full face shield. - Hand protection: Wear protective gloves. Recommended: Wear impervious gloves, e.g. Nitrile rubber (full contact); Latex gloves (splash contact). - Skin/body protection: Wear appropriate personal protective clothing to prevent skin contact. Recommended: Wear impervious protective clothing, including boots, lab coat, apron or full-body suit.
Special Hazards Precautions	Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage.
Work Hygienic Practices	Do not eat, drink or smoke when using this product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing thoroughly before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Clear liquid
Odour	Pungent
Colour	Colourless to slightly yellow
pH	<1 (Neat)
Vapour Pressure	No Data Available
Relative Vapour Density	No Data Available
Boiling Point	81.5 - 110 °C
Melting Point	-74 °C
Freezing Point	No Data Available
Solubility	Miscible with water
Specific Gravity	1.0 - 1.2
Flash Point	No Data Available
Auto Ignition Temp	No Data Available
Evaporation Rate	>1 (Butyl acetate = 1)
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	No Data Available
Specific Heat	No Data Available
Molecular Weight	No Data Available
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available

VOC Volume	No Data Available
Additional Characteristics	No information available.
Potential for Dust Explosion	Not applicable.
Fast or Intensely Burning Characteristics	No information available.
Flame Propagation or Burning Rate of Solid Materials	No information available.
Non-Flammables That Could Contribute Unusual Hazards to a Fire	Will react with many compounds (some violently) releasing flammable, toxic and/or corrosive gases and runoff.
Properties That May Initiate or Contribute to Fire Intensity	Non-combustible; Material does not burn, but may produce toxic and/or corrosive fumes upon heating.
Reactions That Release Gases or Vapours	When heated to decomposition, emits toxic hydrogen chloride fumes. Can react violently if in contact with oxidising agents, liberating chlorine.
Release of Invisible Flammable Vapours and Gases	Contact with metals will produce hydrogen gas which can form explosive mixtures with air.

10. STABILITY AND REACTIVITY

General Information	Decomposes on heating, with release of (highly) toxic gases/vapours (chlorine). Reacts exothermically with many compounds. Reacts violently with (some) bases. Reacts with (strong) oxidizers, with release of (highly) toxic gases/vapours (chlorine). Reacts with (some) metals, with release of highly flammable gases/vapours (hydrogen).
Chemical Stability	Material is stable under normal conditions.
Conditions to Avoid	Keep away from heat and sources of ignition.
Materials to Avoid	Incompatible/reactive with strong mineral acid, strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials; cyanides, sulfides, sulfites, sulfuric acid and formaldehyde; oxidising agents.
Hazardous Decomposition Products	When heated to decomposition, emits toxic hydrogen chloride fumes. Contact with metals will produce hydrogen gas which can form explosive mixtures with air. Can react violently if in contact with oxidising agents, liberating chlorine.
Hazardous Polymerisation	Hazardous polymerisation does not occur.

11. TOXICOLOGICAL INFORMATION

General Information	- Acute toxicity: Acute lethal effects are expected due to the corrosive nature of the chemical. Ingestion will immediately cause corrosion of and damage to the gastrointestinal tract. Potential sequelae following ingestion include perforation, scarring of the oesophagus or stomach and stricture formation causing dysphagia or gastric outlet obstruction. - Skin corrosion/irritation: Corrosive - Causes severe skin burns. Contact with this material will cause burns to the skin. - Eye damage/irritation: Corrosive - Causes serious eye damage. May cause permanent impairment of vision, including blindness. - Respiratory/skin sensitisation: Not expected to cause respiratory or skin sensitization reactions. - Germ cell mutagenicity: Hydrogen chloride does not have any significant mutagenic potential. - Carcinogenicity: IARC has designated Hydrochloric acid as being not classifiable as to its carcinogenicity to humans. i.e. Category 3. - Reproductive toxicity: No information available. - STOT (single exposure): May cause respiratory irritation. Higher concentrations are corrosive to the mucous membrane. Acute inhalation (mist or vapour) may cause coughing, hoarseness, inflammation and ulceration of the respiratory tract and chest pain. Fluid build up on the lung (pulmonary oedema) may occur up to 48 hours after exposure and could prove fatal. - STOT (repeated exposure): Not considered to cause serious damage to health from repeated exposure. However, local irritation effects are expected due to the corrosivity of the chemical. Chronic occupational exposure has been reported to cause gastritis, chronic bronchitis, dermatitis and photosensitisation. - Prolonged exposure to low concentration may cause dental discolouration and erosion. - Aspiration toxicity: No information available.
Acute	
Ingestion	Acute toxicity (Oral): COMPONENT: Hydrochloric acid (CAS No. 7647-01-0): - LD50, Rats (female): 238 - 277 mg/kg bw. (3.3% conc.) [NICNAS].

Carcinogen Category None

12. ECOLOGICAL INFORMATION

Ecotoxicity	Aquatic toxicity: - LC50, Fish (<i>Gambusia affinis</i>): 282 mg/L (96 h) [Hydrochloric acid]. - EC50, <i>Daphnia</i> (Water flea): 56 mg/L (72 h) [Hydrochloric acid].
Persistence/Degradability	Persistence is unlikely based on available information.
Mobility	No information available.
Environmental Fate	Large discharges may contribute to the acidification of water and be fatal to fish and other aquatic life. Can cause damage to vegetation. Can cause severe damage to aquatic plants.
Bioaccumulation Potential	No information available.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of contents/container through a licensed waste contractor and in accordance with local/regional/national regulations. Decontamination and destruction of containers should be considered.
Special Precautions for Land Fill	Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together, if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals.

14. TRANSPORT INFORMATION

Land Transport (Australia)

ADG Code

Proper Shipping Name	HYDROCHLORIC ACID
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number	1789
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Land Transport (Fiji)

Proper Shipping Name	HYDROCHLORIC ACID
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number	1789
Hazchem	2R
Pack Group	II

Special Provision No Data Available

Land Transport (Malaysia)

ADR Code

Proper Shipping Name HYDROCHLORIC ACID
Class 8 Corrosive Substances
Subsidiary Risk(s) No Data Available
EPG 40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number 1789
Hazchem 2R
Pack Group II
Special Provision No Data Available

Land Transport (New Caledonia)

Proper Shipping Name HYDROCHLORIC ACID
Class 8 Corrosive Substances
Subsidiary Risk(s) No Data Available
EPG 40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number 1789
Hazchem 2R
Pack Group II
Special Provision No Data Available

Land Transport (New Zealand)

NZS5433

Proper Shipping Name HYDROCHLORIC ACID
Class 8 Corrosive Substances
Subsidiary Risk(s) No Data Available
EPG 40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number 1789
Hazchem 2R
Pack Group II
Special Provision

Land Transport (Papua New Guinea)

Proper Shipping Name HYDROCHLORIC ACID
Class 8 Corrosive Substances
Subsidiary Risk(s) No Data Available
EPG 40 Toxic And/Or Corrosive Substances Non-Combustible - Water Reactive
UN Number 1789
Hazchem 2R
Pack Group II
Special Provision No Data Available

Land Transport (United States of America)

US DOT

Proper Shipping Name HYDROCHLORIC ACID
Class 8 Corrosive Substances

Subsidiary Risk(s)	No Data Available
ERG	157 Substances - Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)
UN Number	1789
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Sea Transport

IMDG Code

Proper Shipping Name	HYDROCHLORIC ACID
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
UN Number	1789
Hazchem	2R
Pack Group	II
Special Provision	No Data Available
EMS	F-A, S-B
Marine Pollutant	No

Air Transport

IATA DGR

Proper Shipping Name	HYDROCHLORIC ACID
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
UN Number	1789
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

National Transport Commission (Australia)

Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)

Dangerous Goods Classification	Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code)
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15. REGULATORY INFORMATION

General Information	No Data Available
Poisons Schedule (Aust)	Schedule 6

Environmental Protection Authority (New Zealand)

Hazardous Substances and New Organisms Amendment Act 2015

Approval Code	HSR001557
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National/Regional Inventories

Australia (AICS)	Listed
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Canada (DSL)	Not Determined
Canada (NDSL)	Not Determined
China (IECSC)	Not Determined
Europe (EINECS)	Not Determined
Europe (REACH)	Not Determined
Japan (ENCS/METI)	Not Determined
Korea (KECI)	Not Determined
Malaysia (EHS Register)	Not Determined
New Zealand (NZIoC)	Listed
Philippines (PICCS)	Not Determined
Switzerland (Giftliste 1)	Not Determined
Switzerland (Inventory of Notified Substances)	Not Determined
Taiwan (NCSR)	Not Determined
USA (TSCA)	Not Determined

16. OTHER INFORMATION

Related Product Codes

HYACIB1000, HYACIB1500, HYACIB1600, HYACIB1893, HYACIB1895, HYACIB1897, HYACIB1900, HYACIB1901, HYACIB1902, HYACIB1903, HYACIB1904, HYACIB1940, HYACIB1941, HYACIB1959, HYACIB2000, HYACIB2100, HYACIB2200, HYACIB2300, HYACIB2500, HYACIB2510, HYACIB3000, HYACIB3001, HYACIB3002, HYACIB3003, HYACIB3004, HYACIB3005, HYACIB3006, HYACIB3007, HYACIB3016, HYACIB3050, HYACIB3060, HYACIB3200, HYACIB3500, HYACIB3600, HYACIB3700, HYACIB3701, HYACIB3702, HYACIB3703, HYACIB3705, HYACIB4000, HYACIB4005, HYACIB5000, HYACIB6000, HYACIB6700, HYACIB6900, HYACIB7500, HYACIB7900, HYACIB8000, HYACIB8001, HYACIB8100, HYACIB8500, HYACIB8501, HYACIB8502, HYACIB9000, HYACIB9500, HYACIB9600, HYACIB9601, HYACIB9602, HYACIB9603, HYACIB9604, HYACIC1000, HYACIC1001, HYACIC1300, HYACIC1500, HYACIC1861, HYACIC2000, HYACIC2001, HYACIC3000, HYACIC3001, HYACIC3002, HYACIC3003, HYACIC3004, HYACIC3005, HYACIC3006, HYACIC3007, HYACIC3008, HYACIC3050, HYACIC3070, HYACIC3300, HYACIC3400, HYACIC3700, HYACIC4003, HYACIC4004, HYACIC4400, HYACIC5000, HYACIC6000, HYACIC6300, HYACIC6301, HYACIC6500, HYACIC7300, HYACIC7500, HYACIC7501, HYACIC7502, HYACIC7505, HYACIC8000, HYACID0800, HYACID1000, HYACID1001, HYACID1002, HYACID1003, HYACID1004, HYACID1005, HYACID1006, HYACID1007, HYACID1008, HYACID1009, HYACID1010, HYACID1011, HYACID1012, HYACID1013, HYACID1014, HYACID1015, HYACID1016, HYACID1017, HYACID1018, HYACID1019, HYACID1020, HYACID1021, HYACID1022, HYACID1023, HYACID1024, HYACID1025, HYACID1026, HYACID1027, HYACID1028, HYACID1030, HYACID1200, HYACID1300, HYACID1301, HYACID1400, HYACID1500, HYACID1501, HYACID1600, HYACID1700, HYACID1701, HYACID1730, HYACID1733, HYACID1801, HYACID1802, HYACID1803, HYACID1804, HYACID1805, HYACID1806, HYACID1807, HYACID1808, HYACID1812, HYACID1813, HYACID1814, HYACID1815, HYACID1816, HYACID1817, HYACID1818, HYACID1821, HYACID1822, HYACID1823, HYACID1824, HYACID1825, HYACID1826, HYACID1827, HYACID1828, HYACID1829, HYACID1830, HYACID1831, HYACID1832, HYACID1833, HYACID1834, HYACID1835, HYACID1836, HYACID1837, HYACID1838, HYACID1839, HYACID1840, HYACID1841, HYACID1842, HYACID1857, HYACID1858, HYACID1859, HYACID1860, HYACID1861, HYACID1862, HYACID1863, HYACID1864, HYACID1865, HYACID1866, HYACID1867, HYACID1868, HYACID1869, HYACID1870, HYACID1871, HYACID1872, HYACID1873, HYACID1874, HYACID1875, HYACID1876, HYACID1877, HYACID1878, HYACID1879, HYACID1880, HYACID1881, HYACID1882, HYACID1883, HYACID1884, HYACID1885, HYACID1886, HYACID1887, HYACID1888, HYACID1889, HYACID1890, HYACID1891, HYACID1892, HYACID1893, HYACID1894, HYACID1895, HYACID1896, HYACID1897, HYACID1898, HYACID1899, HYACID1900, HYACID1901, HYACID1902, HYACID1903, HYACID1904, HYACID1905, HYACID1906, HYACID1907, HYACID1908, HYACID1909, HYACID1910, HYACID1911, HYACID1912, HYACID1913, HYACID1914, HYACID1915, HYACID1917, HYACID1919, HYACID1924, HYACID1927, HYACID1930, HYACID1932, HYACID1934, HYACID1935, HYACID1936, HYACID1937, HYACID1940, HYACID1941, HYACID1942, HYACID1943, HYACID1948, HYACID1957, HYACID1958, HYACID2000, HYACID2001, HYACID2002, HYACID2003, HYACID2034, HYACID2040, HYACID2100, HYACID2200, HYACID2300, HYACID2400, HYACID2500, HYACID2501, HYACID2505, HYACID2506, HYACID2507, HYACID2508, HYACID2509, HYACID2510, HYACID2600, HYACID2900, HYACID3000, HYACID3001, HYACID3002, HYACID3006, HYACID3050, HYACID3100, HYACID3500, HYACID3600, HYACID3700, HYACID3701,

HYACID4000, HYACID4200, HYACID5000, HYACID5100, HYACID5500, HYACID6000, HYACID6010, HYACID6050, HYACID6500, HYACID6501, HYACID7000, HYACID7100, HYACID7200, HYACID7300, HYACID7500, HYACID8000, HYACID8100, HYACID9500, HYACID9501, HYACID9502, HYACID9503, HYACID9505, HYACID9506, HYACID9507, HYACID9508, HYACIL1000

Revision

6

Revision Date

25 Apr 2019

Reason for Issue

SDS updated

Key/Legend

< Less Than
> Greater Than
AICS Australian Inventory of Chemical Substances
atm Atmosphere
CAS Chemical Abstracts Service (Registry Number)
cm² Square Centimetres
CO₂ Carbon Dioxide
COD Chemical Oxygen Demand
deg C (°C) Degrees Celcius
EPA (New Zealand) Environmental Protection Authority of New Zealand
deg F (°F) Degrees Farenheit
g Grams
g/cm³ Grams per Cubic Centimetre
g/l Grams per Litre
HSNO Hazardous Substance and New Organism
IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluable in each other.
inHg Inch of Mercury
inH₂O Inch of Water
K Kelvin
kg Kilogram
kg/m³ Kilograms per Cubic Metre
lb Pound
LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.
LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
ltr or **L** Litre
m³ Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m³ Milligrams per Cubic Metre
Misc or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.
mm Millimetre
mmH₂O Millimetres of Water
mPa.s Millipascals per Second
N/A Not Applicable
NIOSH National Institute for Occupational Safety and Health
NOHSC National Occupational Heath and Safety Commission
OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight

APPENDIX D Specific Immobilisation Approval Application Guidance Template

Specific Immobilisation Application via EPA eConnect

Application Guidance notes:

[Green Highlighted Text: Standard/confirmed information]

[Grey text: Placeholder awaiting confirmed standard/confirmed information]

[Blue Highlighted Text: Guidance notes for sections that are to be prepared for each individual application]

Introduction note: Prior to commencing application the following information must be confirmed (as per Waste Classification Guidelines Part 2: Immobilisation fo Waste (EPA, 2014):

1. Ensure that the waste has no free liquids and you have characterised the waste through assessment and testing as required under the Waste Guidelines, identifying contaminants of concern and their variability. Immobilisation is only necessary where waste is classified under the Waste Guidelines as 'hazardous' or 'restricted solid waste' (refer Section 5 of the OWMP)
2. Investigate alternatives to immobilisation. Specific immobilisation approvals will only be issued where it is not practical to reuse, recycle or reprocess the waste. Where feasible, treatment to remove or destroy the contaminants is preferable to immobilisation.
3. Check the EPA website to see whether there is a general immobilisation approval for your waste already granted

Applicant Details

Applicant Type

Have you contacted the NSW EPA regarding this application? *Yes No

Are you an authorised agent completing this application on behalf of the applicant? *Yes No

Applicant Details

Do you hold a current Environment Protection Licence number? *Yes No

Environment Protection Licence number * [Drafting note: EPL number to be inserted once EPL has been issued]

Are you an organisation? * Yes No

Type	ACN	ABN*	Company Name
ABN/ACN	660 023 049	18 660 023 049	Hi Quality Group Pty Ltd

Postal Address*

9 – 13 Whyalla Place Prestons NSW 2170

Primary Contact Details

First Name*	Middle name	Last / Family Name*
[Site Manager's Details to be populated]		

Email Address*	Mobile Number*	Phone Number
[Site Manager's Details to be populated]		

Add Additional Contact

No Additional Contacts

[Site Chemist's Details to be populated]

Waste Generator Details

Waste Related Information

Are you the waste generator? *

Yes

No

Waste Generator Contact Details

First Name

Middle name

Last / Family Name

[Insert Customer/Generator Contact Details]

Email Address

Mobile Number

Phone Number

[Insert Customer/Generator Contact Details]

Where the waste is stored / nominated or proposed to be disposed

Waste storage address*

Prestons Waste Transfer Facility 9 – 13 Whyalla Place Prestons NSW 2170

Name of the facility

Hi Quality Group Pty Ltd

Waste disposal address

[Insert Proposed Landfill Disposal Location.

Refer Section 7 of the OWMP for the process of identifying appropriate disposal locations (Section 7.3.1 identifies suitable landfill disposal locations)

SIA – New Application

Waste and Proposed Treatment/Immobilisation Mechanism

Address each of the issues listed below. You may also need to attach other documents relevant to your application. Where appropriate, please include the relevant (upper or lower) 95% confidence limit for data obtained from representative samples.*

1

Avoidance, reuse, recycling or reprocessing
(Provide evidence that avoidance, reuse, recycling or reprocessing is not feasible.)*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB. [Attach](#)

Description

[Provide a brief description of the waste type, its waste code (N120) and the nature of contamination present. Note that the soil is not suitable for reuse as it would be considered Restricted Waste and would not meet the requirements of a Recovered Soil Order or Exemption due to the level of contamination present.]

[Attach the NATA lab results verifying the nature and type of contamination present.]

Remaining Char Count

2035

2

Quantity of waste requiring treatment and/or disposal *

[Select one off supply if customer has identified this as one off, or ongoing if there are likely to be future waste batches from the customer. This information will be requested from the customer as per Section 5.4 of the OWMP]

[Provide the total of volume for the applicable waste batch, in either tonnes or cubic metres]

One off Supply / Ongoing Supply **Enter Volume**

Unit Tonnes / m3

Estimated time to complete treatment and/or disposal *

[Provide the identified number of days needed for immobilisation – note will typically be between 1-3 weeks]

Enter Period

Days / Weeks / Months

3 Form of the waste*

[Unless required otherwise (e.g. for sludges), likely selection will be soils]

Soil / Slag / Sludge / Dust / Powder / Grit / Tar / Spent Catalyst / Building (B&D) / Other

4 Background information about the waste

Include information about its origin (such as the process and conditions (temperature, oxygen availability, etc) of its formation), the history of the site and the source of the contamination. Indicate whether the waste is continuing to be generated or is a result of past activities. If the applicant is not the owner of the waste, provide evidence that the applicant is authorised by the owner to treat and/or dispose of the waste. *

Please use **Attach** option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

Description

[Upload the following supporting documentation:

- Refer to the upload NATA lab results
- Copy of formal authorisation from the customer to treat the waste (if required)
- The results of the Unconfined Compression Strength (UCS) testing (refer Table 5-5 of the OWMP)]

[Provide a description of the following –ascertained as per Section 5.4 of the OWMP

- Source and history of the waste
- Whether the waste is likely to continue to be generated or is a result of past activities
- Waste conditions and physical properties]

Remaining Char Count

2386

Specific Immobilisation Application via EPA eConnect

Application Guidance notes:

[Green Highlighted Text: Standard/confirmed information]

[Grey text: Placeholder awaiting confirmed standard/confirmed information]

[Blue Highlighted Text: Guidance notes for sections that are to be prepared for each individual application]

Introduction note: Prior to commencing application the following information must be confirmed (as per Waste Classification Guidelines Part 2: Immobilisation fo Waste (EPA, 2014):

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3. Check the EPA website to see whether there is a general immobilisation approval for your waste already granted

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Applicant Type

Have you contacted the NSW EPA regarding this application? *Yes No

Are you an authorised agent completing this application on behalf of the applicant? *Yes No

Applicant Details

Do you hold a current Environment Protection Licence number? *Yes No

Environment Protection Licence number * [Drafting note: EPL number to be inserted once EPL has been issued]

Are you an organisation? * Yes No

Type	ACN	ABN*	Company Name
ABN/ACN	660 023 049	18 660 023 049	Hi Quality Group Pty Ltd

Postal Address*

9 – 13 Whyalla Place Prestons NSW 2170

Primary Contact Details

First Name*

[Site Manager's Details to be populated]

Middle name

Last / Family Name*

Email Address*

[Site Manager's Details to be populated]

Mobile Number*

Phone Number

Add Additional Contact

No Additional Contacts

[Site Chemist's Details to be populated]

Waste Generator Details

Waste Related Information

Are you the waste generator? *

Yes

No

Waste Generator Contact Details

First Name

Middle name

Last / Family Name

[Insert Customer/Generator Contact Details]

Email Address

Mobile Number

Phone Number

[Insert Customer/Generator Contact Details]

Where the waste is stored / nominated or proposed to be disposed

Waste storage address*

Prestons Waste Transfer Facility 9 – 13 Whyalla Place Prestons NSW 2170

Name of the facility

Hi Quality Group Pty Ltd

Waste disposal address

[Insert Proposed Landfill Disposal Location.

Refer Section 7 of the OWMP for the process of identifying appropriate disposal locations (Section 7.3.1 identifies suitable landfill disposal locations)

SIA – New Application

Waste and Proposed Treatment/Immobilisation Mechanism

Address each of the issues listed below. You may also need to attach other documents relevant to your application. Where appropriate, please include the relevant (upper or lower) 95% confidence limit for data obtained from representative samples.*

1

Avoidance, reuse, recycling or reprocessing
(Provide evidence that avoidance, reuse, recycling or reprocessing is not feasible.)*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB. [Attach](#)

Description

[Provide a brief description of the waste type, its waste code (N120) and the nature of contamination present. Note that the soil is not suitable for reuse as it would be considered Restricted Waste and would not meet the requirements of a Recovered Soil Order or Exemption due to the level of contamination present.]

[Attach the NATA lab results verifying the nature and type of contamination present.]

Remaining Char Count

2035

2

Quantity of waste requiring treatment and/or disposal *

[Select one off supply if customer has identified this as one off, or ongoing if there are likely to be future waste batches from the customer. This information will be requested from the customer as per Section 5.4 of the OWMP]

[Provide the total of volume for the applicable waste batch, in either tonnes or cubic metres]

One off Supply / Ongoing Supply **Enter Volume**

Unit Tonnes / m3

Estimated time to complete treatment and/or disposal *

[Provide the identified number of days needed for immobilisation – note will typically be between 1-3 weeks]

Enter Period

Days / Weeks / Months

3 Form of the waste*

[Unless required otherwise (e.g. for sludges), likely selection will be soils]

Soil / Slag / Sludge / Dust / Powder / Grit / Tar / Spent Catalyst / Building (B&D) / Other

4 Background information about the waste

Include information about its origin (such as the process and conditions (temperature, oxygen availability, etc) of its formation), the history of the site and the source of the contamination. Indicate whether the waste is continuing to be generated or is a result of past activities. If the applicant is not the owner of the waste, provide evidence that the applicant is authorised by the owner to treat and/or dispose of the waste. *

Please use **Attach** option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

Description

[Upload the following supporting documentation:

- Refer to the upload NATA lab results
- Copy of formal authorisation from the customer to treat the waste (if required)
- The results of the Unconfined Compression Strength (UCS) testing (refer Table 5-5 of the OWMP)]

[Provide a description of the following –ascertained as per Section 5.4 of the OWMP

- Source and history of the waste
- Whether the waste is likely to continue to be generated or is a result of past activities
- Waste conditions and physical properties]

Remaining Char Count

2386

5 Chemical composition and physical/chemical nature of the untreated waste

Include relevant test results, including pH, solid/moisture content, concentrations of chemical contaminants and TCLP (or other relevant leaching test) test values. All laboratory test reports must be compiled by a suitable NATA registered laboratory.*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

Description

[Upload the following supporting documentation:

- Refer to the upload NATA lab results
- Bench control, batch testing and/or verification testing results
- The results of the UCS testing (refer Table 5-5 of the OWMP)]

Provide a description of the following – ascertained as per Section 5.4 of the OWMP

- pH levels
- Moisture content
- Unconfined Compression Strength
- Contaminants of Potential Concern (summary, noting more detail to be provided under Question 6)
- TCLP results]

Remaining Char Count

2468

6 Chemical contaminants of concern

List contaminants for which the specific immobilisation approval is sought.*

[Upload the following supporting documentation:

- Refer to the upload NATA lab results

5 Chemical composition and physical/chemical nature of the untreated waste

Include relevant test results, including pH, solid/moisture content, concentrations of chemical contaminants and TCLP (or other relevant leaching test) test values. All laboratory test reports must be compiled by a suitable NATA registered laboratory.*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

Description

[Upload the following supporting documentation:

- Refer to the upload NATA lab results
- Bench control, batch testing and/or verification testing results
- The results of the UCS testing (refer Table 5-5 of the OWMP)]

Provide a description of the following – ascertained as per Section 5.4 of the OWMP

- pH levels
- Moisture content
- Unconfined Compression Strength
- Contaminants of Potential Concern (summary, noting more detail to be provided under Question 6)
- TCLP results]

Remaining Char Count

2468

6 Chemical contaminants of concern

List contaminants for which the specific immobilisation approval is sought.*

[Upload the following supporting documentation:

- Refer to the upload NATA lab results

- Bench control, batch testing and/or verification testing results]

[Provide a description of the following – ascertained as per Section 5.4 of the OWMP

- Contaminants of Potential Concern (summary, noting more detail to be provided under Question 6)
- TCLP results
- Unconfined Compression Strength]

7 Proposed treatment method or process

Describe the treatment method or process, if any, you propose to use to achieve the immobilisation of the contaminants, with a detailed account of the materials, methods and equipment to be used in the process. Please indicate the ratio of reagents to be used, final pH of the treated waste and moisture content before and after treatment, if available)*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

[Provide a description of the immobilisation technique and process noting:

- Immobilisation will be via micro-encapsulation via the mixing of soil, generally with cement, lime or other pozzolonic reagents. Section 6.7 of the OWMP lists the reagents available for use in the immobilisation. Provide details of the reagent proposed in this application (from the below list), and specify the proposed ratio of reagents and design rates proposed:

Reagent	Activity
Super phosphate	For lead immobilisation
Primary Cementitious stabilising agents, OPC, GGBFS, Pulverised Fuel Ash, Cement Kiln Dust	Primary Binding (immobilisation)
Secondary Stabilising Agents Lime, Sodium Silicate, Carbons, Organophilic clays, natural pozzolans, bentonites	Secondary binding (immobilisation) Bentonite used for thickening of sludges Lime used for arsenic
Magnesium Oxide (powdered)	Immobilisation (cement, also CaO used)

- General equipment / process to be followed [to be tailored and detailed based on the specific immobilisation process]:
 - Batches of the soil will be loaded into mobile high shear mixer for treatment using a front-end loader or excavator
 - The moisture content of the material would be tested prior to mixing. Reagent will either be delivered dry if total water to cement (w/c) ratio of the combined soil/cement exceeds 0.5 to ensure cement hydration. If the estimated w/c ratio is expected to be less than 0.5, additional water will be gently added to the waste materials until the w/c ratio is greater than 0.5
 - Water may be added during mixing as well to effectively homogenize the materials to a maximum w/c ratio of 1.0
 - Cementitious or pozzolanic binders (such as cement, ground granulated blast furnace slag or cement kiln dust) to be automatically dosed based on requirement for each waste batch
 - Soils to be sampled after each addition of binding material to determine if a pH of >12 has been achieved. Additional binders will be added until the pH >12 is achieved
 - Once immobilisation has occurred, treated soils to be transferred from the high shear mixer to a designated storage bay using an excavator or front-end loader and left to cure
 - After curing, batches to be validated and classified for offsite disposal
- Outline target final pH and moisture content:
 - For metalloids refer to Section 6.2.1.4.2.1 of the OWMP
 - For PAH immobilisation refer to Section 6.2.1.4.2.2 of the OWMP

Remaining Char Count

1468

8 Scientific evidence/justification

Give details of the scientific evidence/justification supporting the proposed immobilisation method or process. Include a summary of the following, as applicable:

- the physical mechanism and/or chemistry of immobilisation, including the formation of chemical compounds during treatment which are claimed to result in the immobilisation of some or all of the contaminants.
- reliable documentary evidence of the successful application, in Australia or overseas, of the treatment process proposed to be used for the immobilisation of the contaminants in a similar waste type.
- copies of articles from reputable scientific or engineering journals supporting the successful immobilisation of the contaminants (either natural or as a result of using the proposed process).*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

[Provide a description of why immobilisation is suitable/effective to treat the identified contaminants of concern, and why immobilisation is the only appropriate treatment path.]

As per the 'EPA Immobilization Technical Note 2' cement based Solidification/Stabilisation treatment is a viable waste immobilisation treatment process for certain contaminants. This technique essentially involves the use of cement as a binding reagent to micro encapsulation the contaminants.

Note, the ITRC – Development of Performance Specifications for Solidification/Stabilization (Interstate Technology & Regulatory Council (ITRC), July 2011 provides further detail on solidification/stabilisation techniques.

If secondary immobilisation is required, describe the secondary agents used, and why.

Lime and organophilic clays can be used as secondary stabilising agents to the primary cementitious binders to enhance the cement stabilisation process of immobilising hydrocarbons in soil (UK Environment Agency, Science Report SC980003/SR2m Review of Scientific Literature on the use of stabilisation / solidification for the treatment of contaminated soil, solid waste and sludges). Organophilic clays are clays that are dosed with quaternary ammonium salt to align and widen the interspatial distance between clay platelets in a parallel orientation to permit absorption of larger organic hydrocarbons (e.g. PAH>4 benzene rings). It is generally acknowledged that organophilic clays are best used as preconditioning agents prior to cement stabilisation binder addition. The combinations of such treatment processes would be dependent on the contaminants of concern being treated.

Lime, particularly quicklime mixed with clayey soils as a pre-treatment can be used to stabilised cationic metals effectively (Dermatas & Meng, (2001) "Leaching of metals from soil contaminated by mining activities Journal of Hazardous Materials" 87((1-3):289-300).

Bentonites have also had application as secondary stabilising agents for use as strong absorbents where organic mixtures contain higher proportions of BTEX compounds. It is noted that some organics compounds can affect the cement hydration process, reducing the overall chemical fixation. Bentonites are therefore useful in reducing the adverse interference that BTEX may have with cement hydration processes.

Provide other sources as relevant that relate to the specific contaminant of concern]

Remaining Char Count

2481

9 Treatability

Based on a trial/pilot program or bench scale study, provide the following details about treatability:

- total concentration (SCC) of the contaminants and the leaching performance (based on TCLP or other relevant leaching tests) of the immobilised contaminants in the treated waste
- physical/chemical properties of the waste after treatment: for example, pH and physical characteristics (solid/moisture content, and whether it is rigid, powdery or paste)
- evidence of the formation, during the treatment, of the chemical compounds which are claimed to result in the immobilisation of some or all of the contaminants

- evidence that the treated waste is likely to be stable in the long term including, if relevant, the results of a multiple extraction procedure (MEP) test.
- method of mixing, including types of mixer used
- reagents used, including their rate of addition to the waste during treatment.*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

[Upload results from post treatment testing and verification (refer Section 6.5 and Appendix A of the OWMP).]

[The following shall be used to valid the immobilisation performance:

- The TCLP results of the final mix. The target leachability of the stabilised materials will form the priority performance indicators for immobilisation to be demonstrated, with qualification required at the receiving landfill facility being the primary post immobilisation target.
- Final curing of the immobilised mixed will be undertaken for 24-48 hours.
- Unconfined compressive strength (UCS) will be used to determine whether any strength loss has occurred.

Description of treatability / properties following treatment including

- Total concentration (SCC) of the contaminants and the leaching performance (based on TCLP or other relevant leaching tests) of the immobilised contaminants in the treated waste
- Physical/chemical properties of the waste after treatment: for example, pH and physical characteristics (solid/moisture content, and whether it is rigid, powdery or paste)
- Evidence of the formation, during the treatment, of the chemical compounds which are claimed to result in the immobilisation of some or all of the contaminant
- Evidence that the treated waste is likely to be stable in the long term including, if relevant, the results of a multiple extraction procedure (MEP) test
- Demonstrate that other substances present in the waste will not interfere with the micro-encapsulation. For example, it is known that some organic compounds present in high concentrations (e.g. soils with free phase hydrocarbons present) can interfere with pozzolanic reactions and will need additional considerations in terms of meeting durability of the final immobilised mix effectiveness.
- Method of mixing, including types of mixer used
- Reagents used, including their rate of addition to the waste during treatment.]

Remaining Char Count

2481

10 Ability to reproduce the processes, and quality assurance

Give evidence demonstrating that the applicant or their agents can reliably reproduce any treatment process involved, and that they can consistently achieve test results similar to those of the treatment study upon which an approval is based. (Include a description of the proposed quality assurance/quality control scheme for the process.)*

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB.

[Attach](#)

[The following validation testing and reporting will be conducted:

- Laboratory testing to meet immobilisation criteria set
- Documentation of binder and additive dosage rates and mixing times
- Physical indicators of immobilisation
- Chemical indicators of immobilisation
- Validation testing results and reporting.

The Prestons Waste Transfer Station is managed via a comprehensive [DPHI approved] Operational Environmental Management Plan and Operational Waste Management Plan and is subject to [Environment Protection License XXX] whereby treatment practices are routinely carried out and are regulated. Environmental and quality controls are outlined in both plans, including Inspections and Monitoring protocols (Section 5.4 of the OEMP), training and competence requirements (Section 5.6 of the OEMP), auditing protocols (Section 5.7 of the OEMP) and Incident Management (Section 5.10 and 5.11 of the OEMP).

Protocols to manage the immobilisation process and results are provided in Section 6.2.1.4 and Appendix A of the OWMP.

If similar immobilisation has occurred previously provide post treatment results for prior/similar immobilisation results]

If similar immobilisation has occurred to date at the Yatala Facility results provide results from Yatala (in lieu on results from the Prestons Facility if not available]

Remaining Char Count

2481

11 Proposed disposal location

Please ensure that the proposed disposal facility is lawfully able to take the waste. Note that, if granted, the specific immobilisation approval may require that the landfill receiving the waste monitors leachate and groundwater for the contaminants being immobilised.*

[Insert Proposed Landfill Disposal Location.

Refer Section 7 of the OWMP for the process of identifying appropriate disposal locations (Section 7.3.1 identifies suitable landfill disposal locations)

Include EPL number of proposed disposal location]

Please use Attach option to provide images, files etc. Maximum file size allowed is 100 MB. [Attach](#)

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2473

Attachments

Question#	Category	File Name
No attachments		

Additional Files/Documents
[Attach](#)

File Name	Category	Delete
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APPENDIX E WASTE ACCEPTANCE PROTOCOL

DRAFT



Prestons Waste Treatment Facility

9-13 Whyalla Place, Prestons, NSW 2170

Acid Sulfate Soils Management Plan

May 2025



PRESTONS WASTE TREATMENT FACILITY
ACID SULFATE SOILS MANAGEMENT PLAN
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Document Control

File Name	Acid Sulfate Soils Management Plan
Plan Title	Prestons Waste Treatment Facility Operational Waste Management Plan

Revisions

Version	Date	Description	Authorised by
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B			

Document Changes

Version	Date Reviewed	Review Team	Nature of Amendment
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Glossary

Term	Definition
AASS	Actual Acid Sulfate Soil
ALS	ALS Environmental Laboratory Group
Arcadis	Arcadis Australia Pty Ltd
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
CoC	Chain-of-Custody
CRS	Chromium Reducible Sulfur
DMP	Dewatering Management Plan
DWER	Department of Water and Environmental Regulations
H ₂ O ₂	Hydrogen peroxide
HIQ	HIQ Group Pty Ltd
HIQ	HIQ Group Pty Ltd
ID	Identification
LDPE	Low Density Polyethylene
mAHD	metres Australian Height Datum
mbgl	Meters Below Ground Level
NATA	National Association of Testing Authorities
P/ASS	Potential or Actual Acid Sulfate Soils
PASS	Potential Acid Sulfate Soils
pH _f	pH before rapid oxidation with hydrogen peroxide (pH field)
pH _{fox}	pH after rapid oxidation with hydrogen peroxide (pH fox)
QA/QC	Quality Assurance and Quality Control
QLD	Queensland
RL mAHD	Relative Level metres Australian Height Datum
WTF	Waste Treatment Facility



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1 Introduction

1.1 Overview

[Drafting note: Section to be revised following approval]

HiQ Waste Treatment Services Pty Ltd (HiQ) has submitted a State Significant Development application (SSD 9346594) for the construction and operation of a Waste Treatment Facility (WTF / Facility) at 9-13 Whyalla Place, Prestons NSW (the Site) in accordance with Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The WTF is wholly owned by HiQ (Refer to Figure 1-1).

HiQ is seeking approval to optimise the existing site for the purpose of processing and treating contaminated soils, sludges and liquid wastes to a level suitable for reuse or disposal to a landfill or sewer, with a throughput capacity of up to 210,500 tonnes per annum (tpa). The approval seeks to expand the existing warehouse to a total floor area of about 6,400 m² (an increase of 1,300 m²). This will be achieved through partial demolition of one external wall.

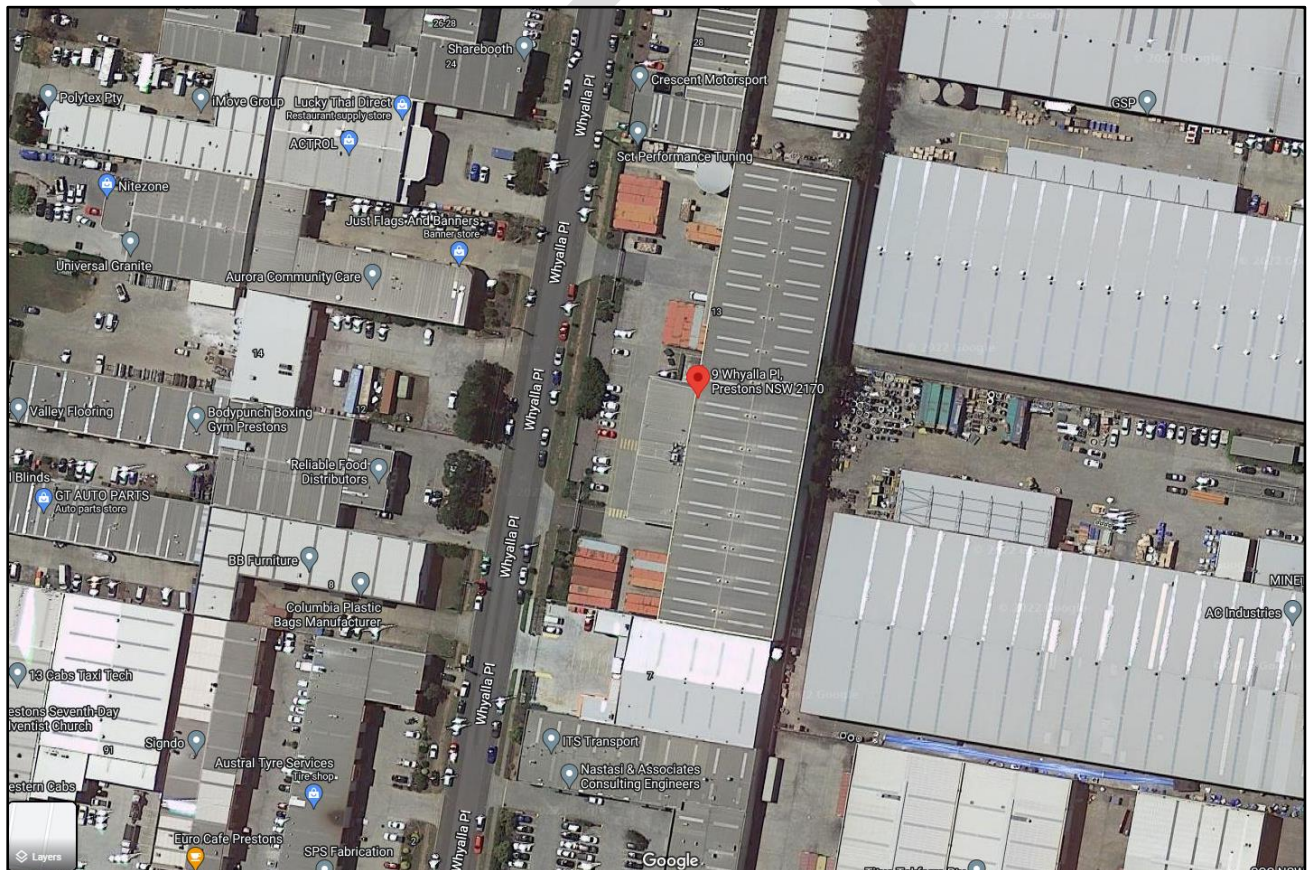


Figure 1-1 Project Site (Google Maps)



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1.2 Scope and Objectives

[Drafting note: Section to be revised following approval]

This Operational Acid Sulfate Soils Management Plan (ASSMP) is a sub-plan to the Operational Waste Management Plan (OWMP). The ASSMP will be used to guide the management of treatment for Acid Sulfate Soils at the Facility during operation.

This ASSMP provides the framework and guidance for the Facility activities to be conducted in a manner whereby appropriate control measures are implemented to minimise the potential for adverse impacts on the environment and to meet compliance requirements of the approvals and licences.

The objectives of this ASSMP are to:

- Detail procedures to effectively treat P/ASS received at the Site, in accordance with the relevant guidance and NSW statutory environmental regulations.
- Provide practicable P/ASS management measures to be implemented for materials handling phase while reducing avoidable human health and environmental impacts both on-site and within proximity to the Site.

1.3 Interactions with other Environmental Management Plans

This ASSMP has the following interrelationships with other management plans and documents:

[Drafting note: Determined by the Conditions of Consent]

- Operational Environmental Management Plan that discusses the proposed waste facility processes
- Operational Waste Management Plan that discusses the management of waste treatment and processes.



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2 FACILITY OVERVIEW AND OPERATION DETAILS

2.1 Facility Overview

The WTF is a rectangular shaped parcel of land, located in the industrial area of Prestons, south of Dampier Place and Whyalla Place intersection. The nearest commercial receiver is Starfish Learn to Swim located 150 m to the north at 26-28 Whyalla Place, Prestons, NSW.

Access to the Facility is via Hoxton Park Road, Liverpool into Whyalla Place. The surrounding arterial roads include the M7 Motorway to the west and Hume Highway to the east.

The Site is approximately 9,100 m² and currently supports a warehouse building (~4,097 m²) and 650 m² office facility. The existing warehouse includes Compartment 1.

Once upgraded the Facility will feature:

- An enclosed warehouse with a total floor area of 6,400 m² for unloading and handling of waste, with environmental controls including an air extraction system
- An office building with office space and amenities for workers
- Three weighbridges facilitating a single-direction heavy vehicle flow of traffic
- An extension to the Facility to accommodate an additional two compartments. The three distinct compartments will include:
 - Compartment 1: Waste treatment storage, transfer bays and treatment of soil, muds and sludges, as well as dewatering plant, water tanks, wheel wash, weighbridge, reagent storage and leachate collection pits
 - Compartment 2: Liquid Waste Treatment Plant (LWTP) and reagent storage
 - Compartment 3: Mobile plant and equipment, cement silo, storage of packaged waste and resource recovery materials storage area.
- Two 8-metre-wide driveways to Whyalla Place for use by heavy vehicles and a third driveway for light vehicles, allowing for direct access to the carpark, separated from heavy vehicles.

The Facility will house the HiQ Group head office within the existing office space at the Site.

A conceptual layout of the proposed Facility is provided in Figure 2-1.



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Operations would comprise the following:

- Storage, classification and transfer of contaminated soil, including ASS/PASS
- Storage, classification and transfer of packaged waste in intact containers
- Storage, classification, transfer and treatment of contaminated liquids and sludges
- Shredding of non-contaminated, inert packaged waste
- Treatment of contaminated soil by bioremediation
- Treatment of ASS
- Treatment of contaminated soil in accordance with both general and specific immobilisation approvals
- Operation of the LWTP.

Further details on WTF operations are provided in Section 2 of the OEMP.

2.2 Non-Conforming Waste to be Rejected

As stated in the *Prestons WTF Operational Waste Management Plan (OWMP)* (2024), the following materials are considered to be non-conforming waste that is to be automatically rejected:

- Scheduled PCB contaminated material as defined by the Polychlorinated biphenyl chemical control order (1997)
- PFAS contaminated soil above the restricted solid waste criteria
- Asbestos containing material
- Wastes classified as Dangerous Goods, other than liquid waste and packaged waste classified as Class 8 PG II or III and Class 9 PG III.

In the unexpected event that materials received at the Facility meet the classification of Asbestos Containing Material, the material will be subject to an unexpected finds procedure (refer to Appendix C of the OEMP) and removed from the Facility for appropriate disposal.

Detailed weighbridge procedures for screening and acceptance of waste are described in Section 5.5 of the OWMP.

A procedure for the handling of non-conforming waste is provided in Section 5.8 of the OWMP.

2.3 Operating Hours

The WTF receives waste 24 hours a day. Processing and dispatch operations will be undertaken between:

- 7:00am to 6:00pm Monday to Saturday and
- 8:00am to 6:00pm Sundays and Public Holidays



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3 LEGISLATION AND GUIDELINES

This ASSMP has been developed in consideration of the following applicable legislation and guidelines:

- ASSMAC (1998). *Acid Sulfate Soil Manual*. (the ASS Manual)
- Dear, F. E., Williams, K. M., McElnea, A. E., Ahern, C. R., Dobos, S. K., Moore, N. G., & O'Brien, L. E. (Dear et al.) (2024). *Queensland Acid Sulfate Soil Technical Manual* (the QLD ASS Manual).
- Sullivan et al. (2018a). *National Acid Sulfate Soils Guidance - National acid sulfate soils sampling and identification methods manual*.
- Sullivan et al. (2018b), *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Identification and Laboratory Methods Manual*.
- National Environment Protection Council (NEPC) (2013), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013* (the NEPM).
- NSW EPA (2014a), *Waste Classification Guidelines - Part 1: Classifying Waste*
- NSW EPA (2014b), *Waste Classification Guidelines – Part 4: Acid Sulfate Soils*
- NSW EPA (2016). *Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste*
- NSW Government (1997). *Protection of the Environment and Operations Act 1997* (the POEO Act)
- NSW Government. (2014). *Protection of the Environment Operations (Waste) Regulation 2014* (the Waste Regulation).
- NSW Government (2001). *The Waste and Resource Recovery Act 2001* (WARR Act)
- NSW Government (2011). *Work Health and Safety Act 2011*.



4 CHARACTERISING ACID SULFATE SOILS

Up to 26,000 tonnes per annum (tpa) of ASS is proposed to be received and treated at the Facility.

4.1 Acid Sulfate Soils

Acid sulfate soils (ASS) can be defined as naturally occurring soil and sediment containing iron sulfides, principally the mineral iron pyrite, or containing acidic products of the oxidation of sulfides. Acid Sulfate Soils are formed by iron reducing bacteria in saturated saline soils where iron and organic material are processed to generate Iron sulphides. Iron sulphides associated with Iron pyrite are stable and inert when in an anaerobic (oxygen free) state such as below the water table or beneath impermeable soil layers. When sulfides are exposed to air, oxidation takes place and sulfuric acid is ultimately produced when the soil's capacity to neutralise the acidity is exceeded. As long as the sulfide soils remain under the water table, oxidation cannot occur, and the soils are quite harmless and can remain so indefinitely.

4.2 Actual Acid Sulfate Soils

Actual ASS can be defined as soils containing highly acidic soil horizons or layers, resulting from the oxidation of soil materials that are rich in iron sulfides. This oxidation produces hydrogen ions in excess of the sediment's capacity to neutralise the acidity, resulting in soils of pH of 4 or less when measured in dry season conditions. These soils can usually be recognised by the presence of pale-yellow mottles and coatings of jarosite.

4.3 Potential Acid Sulfate Soils

Potential ASS can be defined as soils which contain iron sulfides or sulfidic material which has not been exposed to oxygen to oxidise. The field pH of these soils in their undisturbed state is usually 4 or more (and may be neutral or even slightly alkaline).

4.4 Potential Adverse Effects of Acid Sulfate Soils

When ASS oxidises, sulfuric acid is generated which can result in the release of heavy metals, nutrients and acidity into the surrounding environment. The release of contaminants such as acid, nutrients, iron, aluminium, arsenic and other heavy metals may adversely affect the environment (natural and built) and may cause human health impacts including the following:

- The ecology of wetlands and shallow freshwater and brackish aquifer systems by degrading water quality, habitat and dependent ecosystems. Acidified waters may result in the killing or disease of fish and other aquatic organisms
- Corrode concrete and steel infrastructure, such as culverts, pipes and bridges, reducing their functional lifespan
- Cause skin irritation and dermatitis, while dust from disturbed ASS may also cause eye irritation.

4.5 Pre-acceptance Testing, Handling and Transport

Waste generators need to assess the status of the ASS at the point of generation (source site), based primarily on the techniques specified in the ASS Manual and in consideration of methods and procedures detailed in Sullivan et al. (2018a).



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The soils should also be concurrently chemically assessed (including asbestos) and classified by a suitably experienced environmental consultant in accordance with the following guidance:

- NSW EPA (2014a) *Waste Classification Guidelines – Part 1: Classifying Waste*
- NSW EPA (2016) *Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste.*

For chemical assessment, samples should be collected in situ from the source site in general accordance with the methods and minimum density requirements specified in the NSW EPA (2022) *Sampling design part 1 – application* guidelines.

Documentation relating to the assessment of the P/ASS will be reviewed at the Facility to determine the status and likely treatment requirements of the material prior to acceptance. Acceptance procedures for all waste types are outlined in Section 5 of the OWMP.

Note: Soils assessed at the source site to be PASS, are to be kept wet and transported to the Facility within 16 hours of being excavated for treatment, to minimise the potential for oxidation and change in the classification to AASS.

4.6 Material Transport and Acceptance to Site

Prior to acceptance, receipt and unloading onsite, the following procedures must be undertaken as outlined in the OWMP:

- Characterisation of waste by the waste generator
- Batch control procedure or preliminary waste screening procedure
- Preliminary waste screening procedure
- Identification of a preliminary and primary treatment technology procedure

As specified in the OWMP, once an approval letter has been issued to the waste generator, waste can be scheduled for receipt at the Facility. The weighbridge office will be responsible for all waste acceptance at the Facility. Waste will be received from contaminated sites within the Sydney region. The weighbridge operator will ensure that all incoming wastes are weighed, recorded and that waste delivery matches the waste classification and screening records as recorded on the batch number, Acceptance Letter and CA. If inconsistencies exist and/ or the wastes are not consistent with the delivery expectations the waste load will be rejected.



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5 ACID SULFATE SOIL MANAGEMENT PROCEDURES

Identified P/ASS will be managed to limit adverse impacts on sensitive environmental receptors surrounding the WTF. The management procedures detailed in this section have been prepared in accordance with the ASSMAC *guidelines*, and where appropriate the more recently published national guidance detailed in the Sullivan et al. (2018a) *National Acid Sulfate Soils Guidance - National acid sulfate soils sampling and identification methods manual* and Sullivan et al. (2018b), *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Identification and Laboratory Methods Manual*. Any variation from the management strategy discussed herein will require review and approval by the NSW EPA.

5.1 Responsibility

The HiQ Site Manager is responsible for implementing the management procedures described in this ASSMP. The HiQ Environmental Manager will oversee the following management strategy and will monitor the effectiveness of the treatment of validation demonstrating the soils have been suitably neutralised. The following management measures must be carried out in accordance with NSW Work Health and Safety requirements and personnel will be appropriately trained in handling of chemicals.

5.2 Treatment (Neutralisation)

Trucks arriving at the WTF will unload the P/ASS material onto a concrete bunded pad at Bay G for inspection and confirmation of waste type and characteristics received. Once confirmed, the material will be relocated to a designated treatment and storage bay (Bay D) and will be loaded into a pugmill where the soils will be dosed and treated based on the nominated liming rate. Soils must be sufficiently dry prior to lime application. It is expected that application would be undertaken through mechanical mixing of Agricultural lime ('aglime') into the soil.

Note: inadequate mixing of the ASS and neutralising agent is a common cause of failure of verification testing. It is much more costly to re-treat rather than re-test, and the time to re-treat is often critical to operational timeframes. The best option is to ensure thorough mixing in the first place.

5.2.1 Treatment Agent

Aglime is the recommended treatment agent for treatment and neutralisation of PASS. Aglime is non-corrosive, and requires no special handling, contains at least 98% calcium carbonate by weight, and should have a particle size <1mm. The aglime will consist of the following characteristics:

- A high neutralising value of 85% to 95%
- pH in the range of pH 8.2 to 9.0
- Low solubility in water to provide acid buffering capacity over a sustained period.

Where possible, minimal excess aglime will be stored at the site, rather it is preferable for aglime to be transported to site 'as needed'. Up to 20 tonnes of aglime will be stored on site and will be covered with a tarpaulin or plastic, to minimise dust generation and prevent wetting, since it is then more difficult to spread (due to clumping).

Note: ensure that soil is treated with Ag Lime and not builders' lime or Dolomitic aglime (magnesium-blend aglime) as this is Hydrated Lime / slaked lime and is highly alkaline and is not suitable for ASS soil treatment and may pose an environmental risk due to overdosing, with the potential to damage estuarine ecosystems.



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5.2.2 Liming Rate

The liming rate is adopted as detailed in the ASS Manual and the Sullivan et al. (2018a) and will be calculated based on the laboratory data provided by the waste generator. Aglime shall be added in an appropriate ratio and/or based on results of Chromium Suite testing and/or suspension peroxide oxidation combined acidity and sulfate. When using neutralising agents, the rate of application must be calculated according to their neutralising value, with a target soil pH of 6.5 and 8.5 and a safety factor of 1.5 should be applied to the liming rate. The equation below is an estimated rate of lime required to treat soils. The type and quantity of lime must be calculated so that a neutralising value (NV) of 100 is achieved.

The amount of lime to be used for neutralisation will be calculated using the following equation:

$$\begin{aligned} \text{Lime required (kg CaCO}_3\text{/tonne material)} &\cong \text{kg H}_2\text{SO}_4\text{/tonne of material} \times \text{safety factor} \\ &\cong (\text{oxidisable S \%} \times 30.59) \times 1.5 \end{aligned}$$

Whereby:

- S% = percentage of oxidizable sulfur present in the material
- Safety factor = multiplier used to ensure sufficient lime (ASSMAC, 1998)

Where ASS verification testing indicates additional liming is required, liming rates will need to be recalculated based on additional testing and laboratory results received, refer to Section 6.1.

5.2.3 Effluent/Leachate

All unloading, temporary storage and loading works will be undertaken in designated works area that contain bunding and drainage to capture any generated effluent from the soils. All drainage points will be connected to the onsite wastewater collection system and will be treated as outlined in the OWMP (2024).

Refer to Section 6.2.

5.2.4 Dimensions and design

The P/ASS treatment bays have been designed with the ability to contain any generate leachate or runoff from the treated P/ASS as well as be graded to capture runoff to a drainage system.

Note: The size and capacity of the bays for the holding and drying of treated P/ASS dictates the maximum volume of soils that can be treated onsite at any one time. Once the capacity of the bays has been reached, no additional P/ASS can be accepted or treated until verification of the treatment process has been achieved.

5.2.5 Impervious Surface layer

Storage of treated P/ASS will be in dedicated concrete bays (Bay D) within the WTF with an epoxy seal applied to the base and walls of the bay. Regular monitoring and maintenance will be undertaken to ensure the epoxy coating is suitably maintained to contain any generated leachate.

Should the epoxy coating not be able to be maintained, alternate methods for leachate containment should be implemented.



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5.2.6 Containment

Each storage bay hydrologically isolated and been designed to fall to the rear to allow for collection of water runoff and leachate from the wet soils.

Note: ASS placed on a fully contained treatment pad are not limited by the stockpiling timeframes listed in Section 10.2.2 of the guidelines.

5.2.7 Stockpiling

Figure 2-1 shows the areas designated onsite to be used for the stockpiling and treatment of ASS material. Stockpiling will be subject to the following:

- Untreated ASS material cannot be stockpiled on-site for longer than 18 hours for sands to loamy sands and peat material, 42 hours for clayey sand to light clays, and 66 hours for light medium to heavy clays and silty clays material. All material will be excavated, transported, placed in a treatment bay and limed within 8-10 hours (Dear et al. 2018).
- Individual stockpiles will be easily identifiable to enable successive validation sampling (for on-site treatment) and tracking of material e.g., numbered signage system.
- Stockpiles will be clearly marked to distinguish between untreated, treated but not validated and treated. To achieve this, a mechanism for material tracking must be implemented e.g. a flag system (or suitable alternative) will need to be implemented if there are multiple stockpiles present on-site at any one time, e.g.:
 - Red flag for untreated,
 - Yellow flag for treated but validation required/pending.
 - Blue flag for treated and verified.

It is expected that material will be sorted and allocated via bay numbers for ease of tracking and identification.



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6 VERIFICATION AND VALIDATION

Following the treatment of the ASS, verification will be required to confirm that effective neutralisation has been achieved.

6.1 Verification Testing

6.1.1 Verification Sampling Density

Following treatment of the soil, the treated soil is to be tested by laboratory analysis. Verification sampling of stockpiles post-treatment may include composite samples, each sample is to be made up of a minimum of 5 sub-samples to ensure that the result is representative (Dear et al. 2014). Sampling for verification purposes should occur at the same frequency as outlined in Table 6-1.

Table 6-1 Minimum Stockpile Sampling Requirements

Volume (m ³)	Number of Samples
< 250	2
251-500	3
500-1000	4
> 1000	4 + 1 per additional 500 m ³

Treated soils must have a pH_F of >6.5 prior to being sent for S_{CR} analysis at a NATA accredited laboratory.

6.1.2 Soil Sampling Procedure

An appropriate sampling design for verification testing must be selected and developed by a suitably qualified ASS scientist. Sampling design procedures described in NSW EPA (2022) *Sampling design part 1 – application guidelines* are considered suitable for collecting representative samples of the treated stockpiled material. This includes probability-based designs over a systematic grid, which has the advantages of being unbiased, and provides the ability to make quantitative statements about level of confidence of the results. Judgement sampling designs based on expert knowledge or professional judgement may be appropriate for non-homogeneous material (e.g. containing sands and clays).

Note: Laboratory analysis has a standard turnaround time of five to seven working days. Additional treatment and validation testing will be required if the adopted validation criteria is not achieved. Stockpiling may be required for an extended period and must be taken into consideration to provide sufficient area for stockpiling.

6.1.3 Sample Identification, Handling, Storage and Transport

Following collection, samples should be immediately placed in laboratory prepared containers, leak proof with minimal headspace (e.g. zip-lock bags with air extruded) to avoid oxidation and moisture loss from the sample. It is recommended that the bags are >30 µm and composed of High-Density Polyethylene (HDPE) to minimise diffusion of oxygen into the sample, which are an order of magnitude more effective in restricting oxygen diffusion than bags of equivalent thickness composed of Low-Density Polyethylene (LDPE).



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Soil samples will be labelled with unique treatment stockpile identifier, sampling point identification number and sampling depth interval (e.g. SP01/0.1-1.2), and date the sample was collected. It is most important that sample labelling and documentation remain with the samples at all times. The labels used should be persistent and hence need to be water-proof, wear-proof and oven-proof.

Soil materials will be placed immediately in insulated containers with ice and kept cold (less than 4 °C) to aid preservation. It is preferable that samples reach the selected laboratory within 24 hours of collection. For transport and short-term storage during transit, samples should be kept chilled and stored in an insulated container so that they reach the laboratory at less than 4 °C. Samples will be transported to the analytical laboratory by courier, using the analytical laboratory's chain of custody (CoC) documentation. It is important to inform the laboratory both prior to and when samples are about to be delivered for analysis to allow the laboratory to prepare for timely sample pre-treatment to minimise the potential for oxidisation of RIS in soil samples.

If samples cannot be received by the laboratory within 24 hours of collection, the samples must be managed by additional strategies aimed at sample preservation. Such methods include:

- Quick oven drying the sample at 80–85 °C in a large capacity fan-forced convection oven. These oven-dried samples must then be stored in sealed containers in a low humidity environment.
- Freezing the sample in sealed, air-tight containers.
- Vacuum sealing and storing in either a cold (less than 4 °C) or frozen state.

Note: samples stored in a refrigerator (i.e. not frozen) commonly start to oxidise within days, indicated by a lowering of the pH and formation of jarosite.

It is also important to require the laboratory to confirm the time and date of receipt of the samples and indicate the time and date and method by which the samples were pre-treated prior to analysis. This information is critical as delays in either transport or pre-treatment can lead to inconsistencies in field and laboratory data and laboratory results that do not reflect conditions at the time of sampling.

6.1.4 Performance Criteria

Performance criteria for validation testing will be consistent with the National ASS Guidance (2018b) which states that the following performance criteria must be met for soil that has been treated using neutralisation:

- Samples must have no positive calculated net acidity (using acid base accounting) in the soil following treatment.
- Record keeping that demonstrates a safety factor of at least 1.5 has been applied in calculating liming rates.
- Post-neutralisation, the soil pH (pH_{KCl}) is to be between 6.5 and 8.5.
- Excess neutralising agent should remain within the treated soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity. This generally precludes the use of materials with appreciable soluble alkalinity (e.g. burnt lime, quicklime) for permanent soil amelioration.



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If laboratory results confirm that no further lime is required, the material will be considered appropriately treated and neutralised. Note that Sullivan et al. (2018b) requires the net acidity of treated material to be ≤ 0 , when using the following equation:

Verification Net Acidity

$$\begin{aligned} &= \text{Potential Sulfidic Acidity} + \text{Actual Acidity} + \text{Retained Acidity} \\ &- \text{Post Treatment Acid Neutralising capacity} \\ &- \text{Initial Acid Neutralising Capacity} \end{aligned}$$

Soil that has been treated by neutralisation techniques and has not met these criteria must be re-treated and re-tested until the performance criteria are met.

6.2 Effluent / Leachate Management

Effluent generated from the treatment area, will be captured and treated within the onsite LWTP and will be subject to storage and management in accordance with the OWMP (2024).

6.3 Record Keeping

In consideration of the ASS Manual record keeping recommendations, at the completion of treatment the following records will be kept and provided to the EPA when required:

- Waste classification certificate applicable to the treated material.
- Chemical and ASS analytical data of the material prior to treatment, provided by the waste contractor.
- Volume of ASS material treated on site.
- Summary of any deviations from the ASSMP methodology.
- Liming rates for each stockpile should be recorded.
- Verification results for treated ASS stockpiles.
- Type of neutralisation agent, receipt of purchase, supplier details, quantity purchased.
- Reconciled quantities of neutralising agent used on-site.
- Evidence of the composition, purity (including presence of metal contaminants) and particle size of the neutralising agent used.
- Disposal documentation for treated material, including:
 - Waste classification report
 - Truck dockets and receiving facility receipts.
 - Tracking sheets including the vehicle registration, total volume of soil disposed, date, time, and receiving facility acceptance receipts.



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7 OFF-SITE DISPOSAL

7.1 Treated Soil

Post neutralisation, waste classification testing will be required for soil to be transported off-site. The source site is to provide testing in accordance with the NSW EPA *Waste Classification Guidelines – Part 1: Classifying Waste* (2014a). Following neutralisation and verification, the soils are to be transferred to a licensed facility under the appropriate waste classification. If chemical composition has changed, additional sampling may be required to confirm the classification in accordance with Step 5 of Part 1 of the *Waste Classification Guidelines*. This will determine whether there are any other contaminants that may affect how the waste is classified for disposal. Further onsite treatment may be carried out should the soil contain other contaminants. The waste classification detailing the chemical classification of the material and data verifying the material has been suitably neutralised is to be provided to the relevant receiving landfill facility.

7.1.1 Offtake Procedure and Bay Decontamination

Prior to offtake, the waste material will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) to determine an appropriate receival facility. Once an approved facility / site or EPA approved landfill facility has been identified to accept the neutralised ASS, the material will be redirected to the approved facility as per the procedures outlined in Section 7 of OWMP.

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.



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8 CONTINGENCY MEASURES

8.1.1 Failed Verification testing

In the event that verification testing identifies that compliance has not been achieved with the performance criteria, re-application of additional lime and mixing followed by additional validation testing will be required. This process should continue until the performance criteria is achieved.

8.1.2 Temporary Stockpiles

If soils require temporary stockpiling prior to treatment, the soils should be covered and remain wet until treatment. The indicative maximum period for short-term temporary stockpiling (Dear et al., 2014) is presented in Table 8-1 below. If this cannot be achieved, additional ASS testing should be undertaken to confirm the liming rate, prior to treatment.

Table 8-1 Indicative maximum periods for short term temporary stockpiling of untreated ASS

Type of material		Maximum acceptable duration of stockpiling
Texture range National Committee on Soil and Terrain (NCST, 2009)	Approximate clay content (%)	
Coarse Sands to loamy sands and peats	< 5	Overnight (18 hours)
Medium Sandy loams to light clays	5 - 40	2 nights (42 hours)
Fine Medium to heavy clays and silty clays	> 40	3 nights, e.g. a weekend (66 hours)

8.1.3 Treatment Pad Concrete Damaged

If during loading and turning the soils on the concrete pad damages the epoxy sealant. The concrete is to be immediately repaired, and another layer of epoxy sealant applied.



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9 DUTY TO NOTIFY POLLUTION INCIDENTS

The NSW EPA POEO Act describes that all persons have a duty to notify 'relevant authorities' (the EPA, local authority, Ministry of Health, SafeWork NSW (formerly WorkCover and Fire and Rescue NSW) of pollution incidents where material harm to the environment is caused or threatened.

Material harm includes actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial or that results in actual or potential loss or property damage as detailed in the POEO Act. Failure to do so is an offence.

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APPENDIX G BIOREMEDIATION MANAGEMENT PLAN

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Prestons Waste Treatment Facility

9-13 Whyalla Place, Prestons, NSW 2170

Bioremediation Management Plan

May 2025



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Document Control

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Plan Title	Prestons Waste Treatment Facility Operational Waste Management Plan

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Glossary

Term	Definition
Arcadis	Arcadis Australia Pacific Pty Ltd
BMP	Bioremediation Management Plan
BTEX	Benzene, toluene, ethylbenzene, xylene
CLM Act	Contaminated Land Management Act 1997
CoC	Chain of Custody
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
EPA	Environment Protection Authority
HIQ	HIQ Group Pty Ltd
ID	Identification
LDPE	Low Density Polyethylene
LWTP	Liquid Waste Treatment Plant
HVAC	Heating, ventilation and air conditioning
NATA	National Association of Testing Authorities
NEPM	National Environment Protection (Assessment of Site Contamination) Measure
NSW	New South Wales
OEMP	Operational Environmental Management Plan
OWMP	Operational Waste Management Plan
PAH	Polycyclic aromatic hydrocarbons
PFAS	Per- and poly-fluoroalkyl substances
PID	Photo-ionisation detector
POEO	Protection of Environment and Operations
Pty Ltd	Proprietary Limited
QA/QC	Quality Assurance and Quality Control
TPH	Total Petroleum hydrocarbons
TCLP	Toxicity characteristics leaching procedure
SCC	Specific contaminant concentration
VOC	Volatile organic compounds
WTF	Waste Treatment Facility

1 Introduction

1.1 Overview

[Drafting note: Section to be revised following approval]

HiQ Waste Treatment Services Pty Ltd (HiQ) has submitted a State Significant Development application (SSD 9346594) for the construction and operation of a Waste Treatment Facility (WTF) at 9-13 Whyalla Place, Prestons NSW (the Site) in accordance with Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979*. The Prestons is wholly owned by HiQ (Refer to Figure 1-1). HiQ is seeking approval to optimise the existing site for the purpose of processing and treating contaminated soils, sludges and liquid wastes to a level suitable for reuse or disposal to a landfill or sewer, with a throughput capacity of up to 210,500 tonnes per annum (tpa). The approval seeks to expand the existing warehouse to a total floor area of about 6,400 m² (an increase of 1,300 m²). This will be achieved through partial demolition of one external wall.

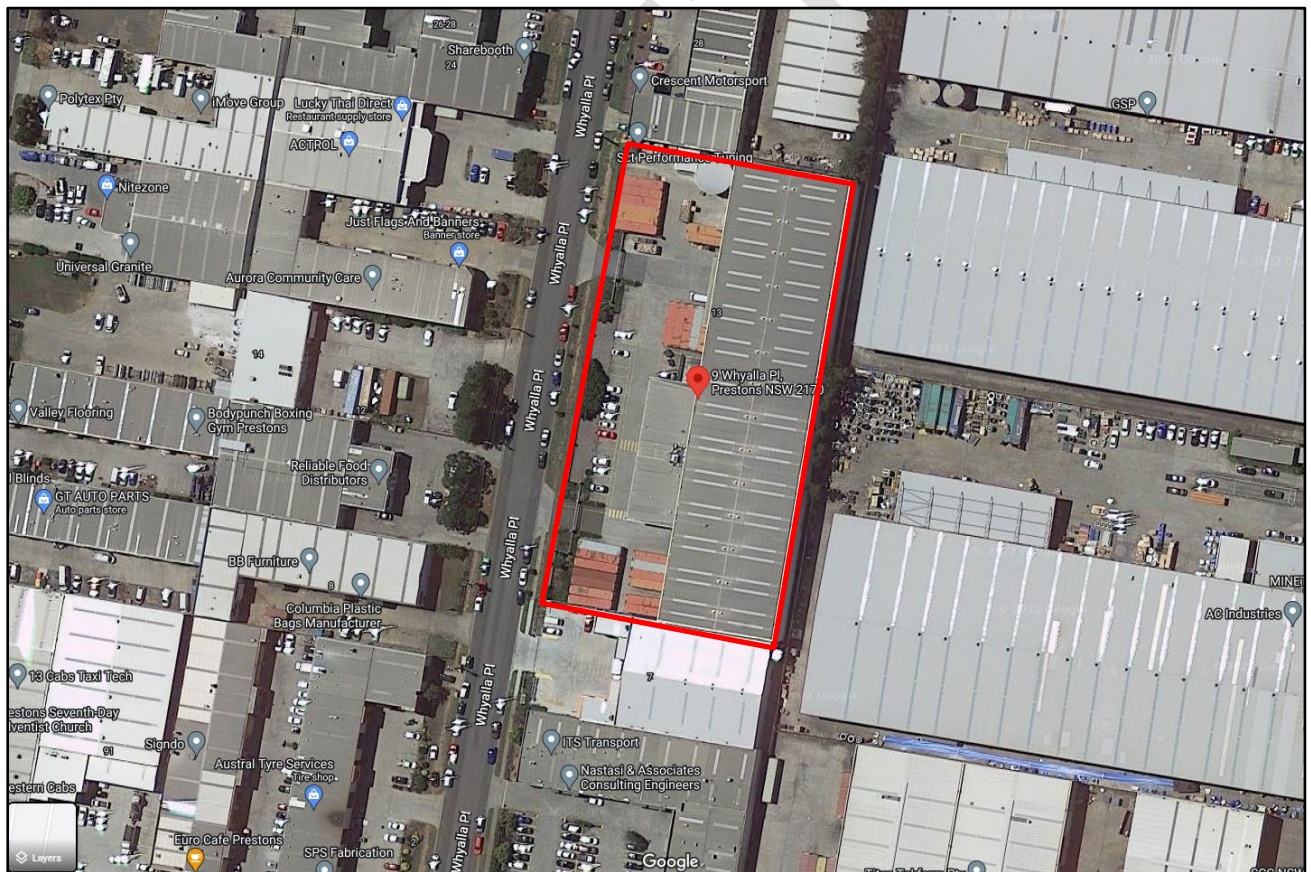


Figure 1-1 Site Location and approximate boundary in red

1.2 Scope and Objectives

To achieve the objectives, Arcadis completed the following scope of work:

- Desktop review of relevant legislation and guidance documents.
- Meetings with HiQ and discussion on the capabilities of the proposed Prestons WTF to treat Hazardous and Restricted Solid Waste soils containing relevant contaminants of concern.
- Development of this BMP detailing the treatment method and management measures to be implemented in general accordance with the NSW EPA (2014) *Best Practice Note: Landfarming*.

1.3 Interactions with other Environmental Management Plans

The BMP has the following interrelationships with other management plans and documents:

[Drafting note: Determined by the Conditions of Consent]

- Operational Environmental Management Plan that discusses the proposed waste facility processes.
- Operational Waste Management Plan that discusses the management of waste treatment and processes.

2 FACILITY OVERVIEW AND OPERATION DETAILS

2.1 Facility overview

The WTF is a rectangular shaped parcel of land, located in the industrial area of Prestons, south of Dampier Place and Whyalla Place intersection. The nearest commercial receiver is Starfish Learn to Swim located 150 m to the north at 26-28 Whyalla Place, Prestons, NSW.

Access to the Facility is via Hoxton Park Road, Liverpool into Whyalla Place. The surrounding arterial roads include the M7 Motorway to the west and Hume Highway to the east.

The Site is approximately 9,100 m² and currently supports a warehouse building (~4,097 m²) and 650 m² office facility. The existing warehouse includes Compartment 1

Once upgraded the Facility will feature:

- An enclosed warehouse with a total floor area of 6,400 m² for unloading and handling of waste, with environmental controls including an air extraction system
- An office building with office space and amenities for workers
- Three weighbridges facilitating a single-direction heavy vehicle flow of traffic
- An extension to the Facility to accommodate an additional two Compartments. The three distinct compartments will include:
 - Compartment 1: Waste treatment storage, transfer bays and treatment of soil, muds and sludges, as well as dewatering plant, water tanks, wheel wash, weighbridge, reagent storage and leachate collection pits.
 - Compartment 2: LWTP and reagent storage.
 - Compartment 3: Mobile plant and equipment, cement silo, storage of packaged waste and resource recovery materials storage area.
- Two 8-metre-wide driveways to Whyalla Place for use by heavy vehicles and a third driveway for light vehicles, allowing for direct access to the carpark, separated from heavy vehicles.

The Facility will house the HiQ Group head office within the existing office space at the Site.

A conceptual layout of the proposed Facility is provided in Figure 2-1.

Operations would comprise the following:

- Storage, classification and transfer of contaminated soil, including ASS/PASS
- Storage, classification and transfer of packaged waste in intact containers
- Storage, classification, transfer and treatment of contaminated liquids and sludges
- Shredding of non-contaminated, inert packaged waste
- Treatment of contaminated soil by bioremediation
- Treatment of contaminated soil in accordance with both general and specific immobilisation approvals.
- Treatment of ASS
- Operation of the LWTP.

Further details on WTF operations are provided in Section 2 of the OEMP.

2.2 Non-Conforming Waste to be Rejected

As stated in the *Prestons WTF Operational Waste Management Plan (OWMP)* (2025), the following materials are considered to be non-conforming waste that is to be automatically rejected:

- Scheduled PCB contaminated material as defined by the Polychlorinated biphenyl chemical control order (1997)
- PFAS contaminated soil above the restricted solid waste criteria
- Asbestos containing material
- Wastes classified as Dangerous Goods, other than liquid waste and packaged waste classified as Class 8 PG II or III and Class 9 PG III.

In the unexpected event that materials received at the Facility meet the classification of Asbestos Containing Material, the material will be subject to an unexpected finds procedure (refer to Appendix C of the OEMP) and removed from the Facility for appropriate disposal.

Detailed weighbridge procedures for screening and acceptance of waste are described in Section 5.5 of the OWMP.

A procedure for the handling of non-conforming waste is provided in Section 5.8 of the OWMP.

2.3 Operating Hours

The WTF receives waste 24 hours a day. Processing and dispatch operations will be undertaken between:

- 7:00am to 6:00pm Monday to Saturday and
- 8:00am to 6:00pm Sundays and Public Holidays.

3 LEGISLATION AND GUIDELINES

The key legislation which governs the treatment and management of contaminated soils in NSW is the NSW Government (1997). *Protection of the Environment and Operations Act 1997* (the POEO Act) and the NSW Government. (2014). *Protection of the Environment Operations (Waste) Regulation 2014* (the Waste Regulation). The classification and treatment of soils by method of landfarming is guided by the NSW EPA (2014a), *Waste Classification Guidelines: Part 1-4* and the NSW EPA (2014b). *Best Practice Note: Landfarming*, respectively.

Consideration should also be given to the following applicable legislation and guidelines:

- National Environment Protection Council (NEPC) (2013), *National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013* (the NEPM).
- NSW Government (2001). *The Waste Avoidance and Resource Recovery Act 2001* (WARR Act)
- NSW Government (2011). *Work Health and Safety Act 2011*.
- NSW Government (2017). *Work Health and Safety Regulation 2017*.

4 ASSESSING SUITABILITY OF SOILS FOR ACCEPTANCE

4.1 Suitability for Bioremediation

Bioremediation is defined as the accelerated process to degrade and detoxify organic substances through the addition of micro-organisms while manipulating their environment to achieve optimum degradation (NSW EPA, 2014). Ex-situ bioremediation treatment of contaminated soil is generally undertaken in NSW by land farming or contained biopiles. The SA EPA (2005) *Soil Bioremediation EPA 589/05* and NSW EPA (2014b) *Best Practice Note: Landfarming* states bioremediation is generally suitable for treatment of organic chemicals in soils including the following:

- Volatile organic compounds,
- Benzene, toluene, ethylbenzene, xylene (BTEX) compounds,
- Total petroleum hydrocarbons (TPH),
- Phenolics,
- Polycyclic aromatic hydrocarbons (CRC CARE (2018) *CRC for Contamination Assessment and Remediation of the Environment National Remediation Framework Technology guide: Bioremediation* states simpler aromatic compounds with lower molecular weights and higher biodegradability).
- Nitroaromatic compounds.

On the contrary, bioremediation is generally not suitable for inorganic compounds such as metals, complex PAH compounds and per- and poly- fluoroalkyl substances (PFAS).

The Facility is proposing to conduct bioremediation with mechanical turning of the soils for aeration in a shear mixer or tilling on a pad and/or air sparging or a combination of these processes. The Facility is expected to treat up to 8,000 tonnes of soil material via bioremediation annually. The Facility will predominantly bioremediate soils containing elevated contaminants including the following:

Contaminant	Maximum contaminant level in soil (mg/kg)	Anticipated annual throughput (t)
Benzene	Up to 50,000 mg/kg	340 tpa
m-Cresol	Up to 50,000 mg/kg	275 tpa
o-Cresol	Up to 50,000 mg/kg	275 tpa
p-Cresol	Up to 50,000 mg/kg	275 tpa
Cresol(total)	Up to 50,000 mg/kg	825 tpa
Ethylbenzene	Up to 50,000 mg/kg	2,750 tpa
C6–C9 petroleum hydrocarbons ¹³	Up to 50,000 mg/kg	5,500 tpa
Polycyclic aromatic hydrocarbons (total)	13,000 mg/kg	2,750 tpa



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The WTF will accept materials that are classified as either 'hazardous' or 'restricted solid waste' under the *Waste Classification Guidelines Part 1: Classifying a Waste* (EPA, 2014). Waste that is accepted under the classification of 'hazardous waste' would have a treatment goal of reaching the classification of 'restricted solid waste' to enable disposal to landfill. Whereas waste initially accepted under the 'restricted solid waste' classification would be treated until it meets the criteria of 'general solid waste'.

4.2 Material transport and acceptance onsite

Under Part 4 of the *Protection of the Environment Operations (Waste) Regulation 2014* (Waste Regulation), the transport and disposal of hazardous waste listed in Schedule 1 must be tracked when it is transported into, within or out of NSW. Waste that meets this classification would be transported to the Site in accordance with the requirements of the Waste Regulation and *Australian Code for the Transport of Dangerous Goods by Road & Rail* (Edition 7.8, 2022) (ADG Code). Waste tracking involves:

- obtaining approval from the EPA for the hazardous waste to be transported
- completing required documentation
- ensuring all parties are authorised to transport and receive the waste.

The waste generator is responsible for generating and providing a Consignment Authorisation (CA), any UN Hazard Code (if applicable for dangerous goods) and Dangerous Goods classification (class and packing group, if applicable), and waste form, in accordance with regulatory requirements. Tracking will be undertaken using the waste generators' CA, waste form and code and Unique Identification Number (UIN) allocated by HiQ. The UIN will be used to track the waste through the Facility and to its ultimate disposal.

Prior to acceptance, receipt and unloading onsite, the following procedures must be undertaken:

- Characterisation of waste by the waste generator (refer to Section 5.1 of the OWMP)
- Batch control procedure or preliminary waste screening procedure (refer to Section 5.2 and 5.3 of the OWMP)
- Identification of a preliminary and primary treatment technology procedure (refer to Section 5.4 of the OWMP)
- In some cases pilot testing will be completed to confirm the treatment procedure.

As specified in Section 5.5 of the OWMP, once an approval letter has been issued to the waste generator, waste can be scheduled for receipt at the Facility. The weighbridge office will be responsible for all waste acceptance at the Facility. Waste will be received from contaminated sites within the Sydney region. The weighbridge operator will ensure that all incoming wastes are weighed, recorded and that waste delivery matches the waste classification and screening records as recorded on the batch number, Acceptance Letter and CA. If inconsistencies exist and/or the wastes are not consistent with the delivery expectations the waste load will be rejected.



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5 IMPLEMENTATION OF THE BMP

Soils accepted for bioremediation will be managed to limit adverse impacts on sensitive environmental receptors surrounding the WTF. The management procedures detailed in this section have been developed by Arcadis in accordance with the NSW EPA (2014) *Best Practice Note: Landfarming* in consideration of the requirements of the POEO Act. Any variation from the management strategy discussed herein will require review and approval by the NSW EPA.

[Drafting note: Section to be revised following to ensure compliance with approval and EPL once received]

5.1 Responsibility

The HiQ Site Manager is responsible for implementing the management procedures described in this BMP. The HiQ Environmental Manager will oversee the following management strategy and will monitor the effectiveness of the treatment of validation demonstrating the soils have been suitably neutralised. The following management measures must be carried out in accordance with NSW Work Health and Safety detailed in NSW Government (2011). *Work Health and Safety Act 2011* and NSW Government (2017). *Work Health and Safety Regulation 2017* and personnel will be appropriately trained in handling of chemicals.

5.2 Remedial target concentrations and timeframe

5.2.1 Target concentrations

A total of up to 8,000 tpa of contaminated soil suitable for treatment via bioremediation will be accepted at the Facility. The is expected volumes by waste classification (subject to annual and market condition fluctuations) and the target classification following treatment are:

Waste classification pre-treatment	Approximate volume per annum	Target waste classification following treatment
Hazardous waste	3,200 tpa	Restricted solid waste
Restricted solid waste	4,800 tpa	General solid waste (non-putrescible)

The target concentrations guiding the BMP process is based on the General Solid Waste and Restricted Solid Waste Threshold Criteria sourced from the NSW EPA (2014a) *Waste Classification Guidelines - Part 1: Classifying Waste*; Table 1: CT1 and CT2 values for classifying waste by chemical assessment without the TCLP test and Table 2: toxicity characteristics leaching procedure (TCLP) and specific contaminant concentration (SCC1 and SCC2) values for classifying waste by chemical assessment.



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The table below includes the contaminants targeted for bioremediation and threshold values to reduce the classification of the waste soils (e.g. Hazardous to Restricted Solid Waste and Restricted Solid Waste to General Solid Waste) and facilitate disposal of the waste soils within NSW at a landfill facility licenced to accept the classification of waste (i.e. Restricted Solid Waste or lesser). Following treatment, verification / validation testing must demonstrate contaminant levels below the following threshold criteria (Table 5-1).

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Table 5-1 Maximum Threshold Values for General Solid Waste and Restricted Solid Waste

Contaminant	Maximum values of SCC for classification without TCLP		Maximum values for TCLP concentration and SCC when used together			
	General solid waste ¹ : CT1 (mg/kg)	Restricted solid waste: CT2 (mg/kg)	Restricted solid waste: TCLP2 (mg/L)	Restricted solid waste: SCC2 (mg/kg)	General solid waste ¹ : TCLP1 (mg/L)	General solid waste ¹ : SCC1 (mg/kg)
Benzene	10	40	2	72	0.5 ²	18
m-Cresol	4,000	16,000	800	28,800	200 ²	7,200
o-Cresol	4,000	16,000	800	28,800	200 ²	7,200
p-Cresol	4,000	16,000	800	28,800	200 ²	7,200
Cresol (total)	4,000	16,000	800	28,800	200 ²	7,200
Ethylbenzene	600	2,400	120	4,320	30 ¹⁰	1,080
TPH C ₆ –C ₉	650	2,600	N/A*	2,600	N/A ¹²	650
Phenol (non-halogenated) [#]	288	1,152	57.6	2,073	14.4 ⁴	518
PAH (Total)	200	800	N/A*	800	N/A ¹²	200
Toluene	288	1,152	57.6	2,073	14.4 ⁴	518
Xylenes (total)	1,000	4,000	200	7,200	50 ¹⁸	1,800
Note: * N/A = Not applicable as no TCLP analysis is required. [#] High levels of non-halogenated phenols can be toxic to microorganisms. Dilution or pre-treatment may be required to reduce concentrations before bioremediation,, with benchmark testing to confirm prior to treatment. ¹Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible) ²See Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 2012b) for TCLP levels. ⁴Calculated from Hazardous Waste: Identification and Listing (USEPA 2012a). ¹⁰Calculated from Australian Drinking Water Guidelines (NHMRC 2011).						



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¹²No TCLP analysis is required. Moderately harmful pesticides, petroleum hydrocarbons, polychlorinated biphenyls, polycyclic aromatic hydrocarbons and scheduled chemicals are assessed using SCC1 and SCC2. Polychlorinated biphenyls must be managed in accordance with the EPA's polychlorinated biphenyl (PCB) chemical control order 1997, which is available on the EPA website at Polychlorinated Biphenyl (PCB) Chemical Control Order 1997.

¹⁸Calculated from Guidelines for Drinking Water Quality (WHO 2011).

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5.2.2 Target timeframe

[Drafting note: Section to be revised with further detail during licensing phase and following first batch pilot testing trials in consultation with the EPA]

Bioremediation of contaminants to target levels may be achieved within a typical period of between 3 weeks and 3 months. There are several factors which can affect the speed and efficiency of bioremediation, which are detailed in Section 5.4. Each waste batch would have a different target timeframe depending on these factors, and treatment time would be confirmed on a batch by batch basis.

It is important to conduct the bench scale testing (and upon occasion pilot testing) (refer to Section 5.3) of the waste soils to be treated, to determine the optimum additive ratios, moisture, and soil texture to increase microbe productivity and achieve expedited bioremediation timelines.

5.3 Bench scale testing and bioremediation factors

By addressing the critical factors hereafter—homogenisation, nutrient addition, moisture optimisation, texture amendment, and surfactant addition—bench-scale testing will provide the necessary data to design and operate an effective bioremediation system.

5.3.1 Homogenisation and baseline measurement

Due to the natural heterogeneity of some soils, there is a risk of misinterpreting scientific data. Hence, the waste soils will require treatability testing which will need to consider the heterogeneity of the soils and representative samples taken from each soil batch. For instance, clay soils clump together and are difficult to aerate, resulting in low oxygen concentrations (NSW EPA, 2014b). The distribution of additives (nutrients and moisture) can also be hindered. However, the structure of dispersed massive clay soils can be amended by adding soil conditioners, such as gypsum, and bulking agents, such as sawdust. Clumpy soils may also require pre-treatment to homogenise the soil. Homogeneity will be confirmed by collecting primary and duplicate soil samples for analysis of contaminants of concern (COC), which will be conducted by National Association of Testing Authorities (NATA) accredited laboratories. If the inter-laboratory triplicate results vary by more than 15%, additional homogenisation and soil analysis will need to be performed. Once the soil is confirmed homogeneous, the laboratory will proceed to evaluate biodegradation rates, cost-effective biodegradation optimisation, and potential remediation timelines.

5.3.2 Nutrient addition

Adding inorganic chemicals (fertilisers) will ensure optimal concentrations of nitrogen and phosphorus, essential for soil bacteria to utilise the contaminant as an energy source. The nutrient mix should be aimed at a carbon to nitrogen (N) to phosphorus (P) ratio of around 100:10:1, allowing bacteria to convert the carbon in the contaminant into biomass efficiently. The carbon portion for N and P calculations will be derived from the laboratory analysis of the homogeneous soil. Commercial fertilisers (such as dynamic lifter or blood and bone), which may also contain beneficial potassium, will be used to achieve these nutrient levels.

5.3.3 Surfactant addition

Surfactants increase the water solubility of hydrophobic hydrocarbon compounds, typically accelerating bioremediation rates. Research, such as that by Brown et al., indicates that surfactants, especially when combined with texture amendments like biochar, can enhance bioremediation rates for weathered TPH in soil. Before commencing the bench-scale study, the waste generator or HiQ will review recent literature on surfactants for bioremediation to select the most promising product. They will then assess its commercial availability and cost implications. Once a suitable surfactant is identified and deemed feasible it will be used during the bench-scale study and subsequent bioremediation.



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5.3.4 Moisture optimisation

Moisture is a fundamental requirement for biological activity. Bioremediation ceases at low moisture levels and is hindered when soils are too wet. Hence, it is recommended that soil moisture to be between 50% and 80% of the soil's moisture holding capacity. Below 50%, bacterial activity is threatened; above 80%, gas exchange is impaired, leading to anaerobic conditions, which are unfavourable for bioremediation. During the bench-scale study, the specific moisture holding capacity of the homogenised soil samples will be determined. Sample containers will maintain soil moisture within this optimal range throughout the handling, transport and testing.

5.3.5 Texture amendment

Texture amendment involves adding a small percentage of organic material (e.g., sawdust, corn cob, mulch) to improve the soil's moisture holding capacity and arability, particularly required for clayey soils. Arability refers to the soil's ability to trap pockets of atmospheric air (21% oxygen) during mechanical mixing, ensuring adequate oxygen availability for bioremediation. Properly amended soil requires less mixing than less arable soil. If beneficial, cost-effective texture amendments can often be sourced locally throughout NSW.

5.4 Factors influencing efficacy of bioremediation

There are a number of parameters which impact and/or optimise the efficiency of biodegradation process of contaminants within the soils (see Table 5-2). The NSW EPA (2014b). *Best Practice Note: Landfarming* lists the following parameters and factors for optimisation of the bioremediation process:

Table 5-2 Optimal Factors for Each Parameter

Parameter	Optimal Factors
Oxygen	The process requires oxygen to enable biodegradation to occur but should consider excessive volatilisation of VOCs (typically in the range of approximately 10% - 20% oxygen in the soil's pore spaces).
Temperature	Must range between 10 - 45°C for microbial populations to remain active.
pH	Soil pH should remain neutral, generally ranging between 6 to 8 pH units. It can be adjusted by adding lime or sulfur to raise or lower the pH level, respectively.
Microbial Population Density	For optimised efficacy the minimum heterotrophic plate count should be 10 ³ colony-forming units per gram (CFU/g).
Nutrient Balance	The ratio of carbon, nitrogen, and phosphorus needed for microbial populations to thrive ranges from 100:1:0.5 to 100:10:1
Aeration Timing	Aeration of soil should be conducted weekly to monthly based on soil type a to limit fungal growth and increase biodegradation rates. Noting too frequent disturbance may disrupt microbial population growth



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Parameter	Optimal Factors
Contaminant Load	Different contaminant types and loads will be treated in different timeframes
Moisture	Typically, between 12 and 30% by weight or between 40 - 85% of the field capacity. Moisture should be added as necessary ensuring soils do not become saturated which may restrict movement of air.
Soil Texture	The distribution of nutrients and moisture can also be hampered in clayey soils because they exacerbate water retention and prevent adequate mixing. However, the structure of the soils can be ameliorated by adding soil conditioners, including bulking agents, such as sawdust, straw etc as a pre-treatment.

5.5 Bioremediation procedure

The procedure for bioremediation in order of sequence is detailed below:

- **STEP 1:** Waste classification results will be provided by the waste generator to the WTF.
- **STEP 2:** Trucks arriving at the WTF will unload the waste soils directly onto a bunded pad (Bay G) prior to being loaded into a shear mixer within the batches designated treatment Bay (Bay C/D) for mechanical turning or placed on a bunded pad for tilling via excavator or similar.
- **STEP 3:** Benchmark testing (and if required pilot testing) conducted to confirm additive ratios and optimum conditioning.
- **STEP 4:** Soil conditioning will be undertaken by improving soil texture through the addition of additives such as straw, saw dust etc (if required) and water spraying to maintain moisture levels.
- **STEP 4:** Nutrients and surfactants will be incorporated and soils aerated periodically. The additives will be based on the waste generator or HiQ benchmark testing results.
- **STEP 5:** Conduct periodic sampling and testing of the soil to monitor contaminant levels and microbial activity and adjust aeration and additive dosing accordingly.
- **STEP 6:** Verification and validation of the contaminant levels within the soils are reduced to relevant target concentrations based on the target classification to be achieved.

5.5.1 Monitoring and assessment

Periodic sampling of the soils, at the rate detailed in Table 5-3, will be required to monitor the critical parameters and ensure remedial targets are maintained including:

- Contaminant concentrations to assess if the reduction rate is on track to meet remedial timeframes, and target concentrations.
- Microbial activity to confirm they are effectively breaking down contaminants.



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- Environmental conditions including oxygen levels, moisture content, temperature, and pH to ensure optimal conditions for bioremediation.

By optimising environmental conditions and leveraging microbial activity, the proposed bioremediation strategy can effectively degrade organic contaminants, ensuring safe and sustainable soil remediation.

5.5.2 Corrective actions

Corrective actions are essential when monitoring reports indicate deviations from expected results or when operational issues arise. Below are common challenges in the bioremediation process and the corresponding corrective actions (Table 5-3).

Table 5-3 Corrective actions

Issue	Corrective actions
Insufficient Contaminant Degradation: Contaminant concentrations are not decreasing as expected.	• Reassess microbial activity and consider bioaugmentation (introducing additional microbes). • Add nutrients (carbon, nitrogen, and phosphorus) to stimulate microbial degradation. • Improve aeration by increasing the frequency or intensity of soil mixing. • Adjust moisture levels to restore optimal conditions for microbial growth.
Poor Soil Aeration: Lack of oxygen in the soil is inhibiting microbial activity.	• Increase the frequency of soil tilling or use mechanical aerators. • Reduce soil compaction by breaking up compacted layers. • Ensure proper drainage to prevent waterlogging, which can reduce oxygen availability.
Excessive Moisture or Runoff: Soil is too wet, leading to anaerobic conditions or contaminant migration.	• Improve drainage systems to prevent water accumulation. • Reduce irrigation frequency or volume. • Install berms or barriers to contain runoff and prevent contamination of surrounding areas.
Nutrient Deficiency: Lack of essential nutrients is slowing microbial activity.	• Conduct soil analysis to identify nutrient deficiencies. • Apply fertilizers containing nitrogen and phosphorus in appropriate quantities. • Ensure uniform distribution of nutrients during application.



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Issue	Corrective actions
pH Imbalance: Soil pH is outside the optimal range (6–8) for microbial activity.	• Add lime to increase soil pH if it's too acidic. • Add sulfur to lower soil pH if it's too alkaline. • Continuously monitor and adjust pH as needed.
Odour or Dust Generation: Odours or dust emissions are causing environmental or community concerns.	• Increase aeration to prevent anaerobic conditions • Adjust microbial balance by introducing aerobic microbes to reduce VOC production • Implement dust control measures, such as spraying water over the soil surface.
Volatile Generation: Volatiles are detected within the WTF or at the boundary which may pose a health and safety risk to workers or the community. Use real-time sensors to identify spikes in emissions and take immediate corrective action.	• Maintenance of HVAC system and check for leaks around bays using photo-ionisation detector (PID) or similar • Implement cooling techniques to lower soil temperature and reduce volatilisation • Ensure microbial activity is optimised to counteract temperature-induced volatiles • Add organic materials (e.g., biochar or compost) to bind volatile compounds and reduce emissions • Introduce chemical amendments (e.g., lime or activated carbon) to stabilize or degrade volatile compounds • Apply surfactants or biosurfactants to enhance microbial access to volatile contaminants.

6 VALIDATION OF TREATED SOILS

Following the treatment of contaminated soils, the following methodology will be employed to satisfy the required soil sampling program and analytical procedures outlined in NSW EPA (2022) *Sampling Design part 1 – application*. Verification and validation will be required to confirm that effective bioremediation has been achieved below the maximum values of specific contaminant concentration for the relevant waste classification, in accordance with NSW EPA (2014a) *Waste Classification Guidelines - Part 1: Classifying Waste* for the purpose of disposal to a landfill within NSW licenced to receive Restricted Solid Waste.

6.1 Verification testing

6.1.1 Verification sampling density

Appropriate sampling design procedures for verification testing described in NEPC (2013) *Schedule B2: Guidelines on site characterisation*, are considered suitable for collecting representative samples of the treated stockpiled material and the minimum recommended sample density. As described in Section 2.2 and Section 5.2 of the OWMP, Prestons WTF proposes to treat 8,000 tpa of contaminated soils using bioremediation per annum with an upper storage limit of 2,000t at any one time. Each bay will treat a maximum of 60m³ of waste soils per batch. Hence, a minimum of three samples is recommended for assessment of each batch of waste soil being treated.

6.1.2 Soil sampling procedure

Effective soil sampling procedures are critical for verification testing following bioremediation treatment. Samples should be collected in general accordance with:

- NSW EPA (2022) *Sampling Design Part 1 – Application*
- Standards Australia (1999). AS 4482.2-1999 *Guide to the Sampling and Investigation of Potentially Contaminated Soil - Volatile Substances*.
- Standards Australia (2005). AS 4482.1-2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and Semi-Volatile Compounds*.

The sampling procedure for a stockpile should consider its observable composition, size, presence of olfactory or visual contaminants, and volatile screening using a PID. Sampling design procedures described in NSW EPA (2022) includes probability-based designs for stockpile sampling over a systematic three-dimensional grid, which has the advantages of being unbiased, and provides the ability to make quantitative statements about level of confidence of the results. Judgement sampling designs based on expert knowledge or professional judgement may be appropriate for non-homogeneous material (e.g. containing a mixture of sand and clays).

Soil samples will be collected from relevant sampling points a minimum of 300mm below the surface of the stockpile. Collected soil samples will be screening for ionisable volatile organic compounds using a PID. A sub sample from each sample collected at each sampling point will be placed in a zip lock bag, sealed, and shaken. Each zip lock bag will then be pierced with the tip of a PID and the results recorded. Practical consideration for a thorough examination of a stockpile will involve sampling throughout the stockpile and may require machinery to access the stockpile's interior.



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6.1.3 Sample identification, handling, storage and transport

Following collection, samples should be immediately placed in laboratory prepared containers, typically 250ml glass containers with Teflon lined lids, with minimal headspace to avoid oxidation and moisture loss from the sample. Soil samples will be identified using the unique identifying number for each treated stockpile, sampling point identification number and sampling depth interval (e.g. TP01/0.0.8-1.0), and date the sample was collected. It is most important that sample labelling and documentation remain with the samples at all times. The labels used should be persistent and hence need to be water-proof, wear-proof and oven-proof.

Soil materials should be placed immediately in insulated containers with ice and kept cold (less than 4 °C) to aid preservation. It is preferable that samples reach the selected laboratory within 24 hr of collection. For transport and short-term storage during transit, samples should be kept chilled and stored in an insulated container so that they reach the laboratory at less than 4 °C. Samples will be transported to the analytical laboratory using the analytical laboratory's chain of custody (CoC) documentation. It is important to inform the laboratory both prior to and when samples are about to be delivered for analysis to allow the laboratory to prepare for timely sample pre-treatment.

Note: Laboratory analysis has a standard turnaround time of five to seven working days. Additional treatment and validation testing will be required if the adopted validation criteria is not achieved. Stockpiling may be required for an extended period and must be taken into consideration to provide sufficient area for stockpiling.

6.1.4 Quality assurance and quality control

6.1.4.1 Decontamination

Non-disposable sampling equipment will be decontaminated between sampling points to mitigate potential for cross contamination of samples. The summarised decontamination method included the following:

- The non-disposable sampling equipment will be washed with a solution of potable water and suitable detergent (Liquinox or Decon 90)
- The washed equipment will then be rinsed with de-ionised water
- Then the rinsed equipment will be air dried.

6.1.4.2 Duplicates and triplicates

Soil duplicates and triplicates will be collected at a rate of one set per 20 primary samples collected (an equivalent of 5%). Soil sample collection will include splitting of one bulk sample across three separate sample containers. Soil samples should not be homogenised, to prevent potential volatilisation. Analysis of the duplicate and triplicates should be based on at least one of the analytes that the parent sample is being analysed for. The relative percent difference (RPD) of the detected concentrations in the parent and duplicate, and the parent and triplicate, will be calculated.

6.1.4.3 Trip blanks and trip spikes

One trip blank and trip spike should be used for each day of sampling. A minimum of one trip blank and one trip spike should be scheduled for BTEX analysis, given sample handling, preservation and storage procedures should be consistent on each day of sampling.



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6.1.4.4 Rinsate blanks

One rinsate blank per day of sampling, Analysis of the rinsate blank will be based on at least one of the analytes that the parent sample is being analysed for.

6.1.5 Laboratory quality assurance and quality control

Analytical laboratories will be NATA accredited for the analytical methods used.

The QA/QC program of the primary analytical laboratory typically includes analysis of method blanks, matrix spikes, surrogate spikes, laboratory control samples and laboratory duplicates. The laboratory reports on whether the QA/QC analysis met the laboratory's adopted data quality objectives.

6.2 Record keeping and reporting

At the completion of treatment, the following records will be maintained and provided to the EPA when required:

- Each incoming load of restricted solid waste and it's quantity, composition, and source.
- The date and time of vehicle entry and exit from the WTF
- Benchmark testing results
- Quantities and details of the additives
- Waste classification certificate applicable to the treated material
- Verification results for bioremediated soils
- Corrective actions
- Non-conformance and non-compliances
- Incidents and complaints
- Waste type and waste stream
- Waste form and waste code (including CA Number)
- Vehicle transport details
- Purpose of entry (waste delivery, service vehicle, visitor)
- Customer name, address and ABN
- Weighbridge details (waste in codes and consignment reference number and total tonnage)
- Contaminants of concern (COCs) or contaminants of potential concern (COPC)
- Waste destination and transporter details
- Disposal documentation for treated material, including:
 - Waste classification report
 - Truck dockets and receiving facility receipts.
 - Tracking sheets including the vehicle registration, total volume of soil disposed, date, time, and receiving facility acceptance receipts.

The records kept may be required to be presented in a periodic report to be presented to the EPA, if required under the environment protection licence (EPL) for the Site.

7 OFFSITE DISPOSAL

7.1 Treated soil

Post treatment, waste classification testing will be required for soil to be transported off-site, in accordance with the NSW EPA *Waste Classification Guidelines – Part 1: Classifying Waste* (2014a). This will determine whether there are any other contaminants that may affect how the waste is classified for disposal. The waste classification detailing the chemical classification of the material and data verifying the material has meets the required performance criteria must be provided to the receiving landfill facility as restricted solid waste.

For further details of offtake of waste post treatment refer to Section 7 of OWMP.

7.2 Offtake Procedure and Bay Decontamination

Prior to offtake, the waste material will be classified in accordance with the Waste Classification Guidelines (EPA, 2014) to determine an appropriate receival facility.

Once an EPA approved landfill facility has been identified to accept the treated soils, the material will be redirected to the approved facility as per the procedures outlined in Section 7.3 of OWMP.

Once the soils have been removed from the Facility, the used bay and machinery must be decontaminated using Decon 90 or Liquinox. If using Decon 90, a 2% to 5% solution of Decon 90 with water is to be prepared. The bay area and machinery must be saturated with the solution and left to soak for 2 to 24 hours. The bay and machinery must then be rinsed with water and left to dry prior to being used again. If needed, excess water should be pumped out of the bay and processed through the LWTP.

When not in use, the Decon 90 and/or Liquinox is to be stored within the reagent storage area.



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8 ENVIRONMENTAL CONTROL MEASURES

Any bioremediation proposal must demonstrate sufficient safeguards to protect human health and the environment. Site-specific factors, such as the nature of the contamination and site conditions, must be carefully assessed to address potential uncontrolled emissions, including VOCs, leachates, odours, and other adverse effects resulting from the treatment process. In consideration of the NSW EPA (2014b) the following environmental controls and management measures should be implemented during the bioremediation process.

8.1 HVAC / air emissions control system

The control, capture, and treatment of VOCs released into the atmosphere may be necessary if soils being land farmed contain volatile constituents. Emissions must pose no health risks, and compliance with air quality standards and occupational exposure limits is required. The Facilities HVAC system features Particulate Matter (PM) filters and Activated Carbon (AC) filters to remove VOCs and odours. Additionally, exhaust hoods and removable fabric curtains would be used on each of the bioremediation bays to contain minor contaminant generation from the handling and turning process.

All air from inside the WTF building is drawn through an emissions control system and is treated prior to discharge. As detailed in the revised Air Quality Assessment (Zephyr, 2022), contaminated air is drawn from each area (Compartments 1, 2 and 3) and is routed to the common inlet plenum for the heating, ventilation and air conditioning (HVAC) emissions control system. This system includes the following components (in order of exhaust flow):

- Common inlet plenum serving Compartments 1 and 2
- Fabric hoods / exhaust hoods above the material bays as required
- Use of fabric curtains around bays to reduce escape of fugitive dust and vapours
- Particulate Matter (PM) filter box
- VOCs and odour filter box
- Common outlet plenum
- Three strobic exhaust fans operating in parallel.

The air emissions control system and strobic fans are located in, and on, the small compartment outside the “storage and transfer bays” along the western wall of Compartment 1. Fabric hoods and use of fabric curtains can be applied directly to individual treatment bays as required.

Compartment 1 is served by a series of overhead vents along the north wall. These are designed to draw contaminated air from near the emitting activities and route this air to the common inlet plenum for the air emissions control system.

The maximum air exchange through the system will be 52.6 m³/s vented from the building through the three strobic exhaust fans. Each fan is associated with an individual stack and therefore the flow rate through each ventilation outlet is 17.5 m³/s. The HVAC and Air Emissions Control System is described in further Section 2 of the OAQMP.

Particulate matter, VOC and odour emissions from the Prestons WTF will be mitigated using engineering controls (e.g. use of vents, fabric hoods, fabric curtains, sealed vessels, vapour recovery systems etc), as well as management controls including policies and procedures designed to reduce the generation of PM and VOC emissions. An OAQMP has been prepared that describes HVAC air emissions control system, air quality, odour and health management and monitoring procedures.

8.2 Dust and odour controls

Any dust and odours generated during the unloading and aeration/mixing soil process must be managed appropriately. Mitigation efforts should follow best practices and utilise the best available control technologies. These measures include the use of water spraying, odour suppressants, foggers, or biodegradable foams. It is essential to ensure that no dust or offensive odours are detectable at the property boundary.

8.3 Effluent / leachate management

As described in the Prestons WTF OEMP, leachate collection pits are provided within the building to collect potentially contaminated runoff and transferred to one of two 50KL temporary holding tanks. A connection to sewer will be installed following successful application for a trade wastewater licence from Sydney Water, should collected leachate meet the requirements of the trade wastewater licence it will be discharged to Sydney Water sewer. However, any leachate that does not meet the trade waste criteria set by Sydney Water would be tanked offsite for disposal at an appropriately licenced site.

During operations, the leachate is pumped from leachate collection pits to a holding tank within the onsite the liquid waste treatment plant (LWTP) within the WTF. Following treatment, the leachate is sampled to confirm it meets the Sydney Water Trade Wastewater standards and would then be discharged to sewer. No leachate enters the stormwater or rainwater collection systems.



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9 CONTINGENCY MEASURES

9.1 Failed verification testing and timeframe

In the event that verification testing identifies that the target concentration has not been achieved, re-application of additives, followed by additional validation testing will be required. This process should continue until the target concentrations have been achieved (refer Section 5.2.1). If bioremediation of the soils do not meet the predicted timeframe, the soils may require transport and disposal to a licensed land fill or to HiQ's Yatala Facility for further treatment.

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10 DUTY TO NOTIFY POLLUTION INCIDENTS

The POEO Act describes that all persons have a duty to notify 'relevant authorities' (the EPA, local authority, Ministry of Health, SafeWork NSW (formerly WorkCover and Fire and Rescue NSW) of pollution incidents where material harm to the environment is caused or threatened.

Material harm includes actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial or that results in actual or potential loss or property damage as detailed in the POEO Act. Failure to do so is an offence.

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11 REFERENCES

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APPENDIX H CONTAMINANT CONCENTRATIONS

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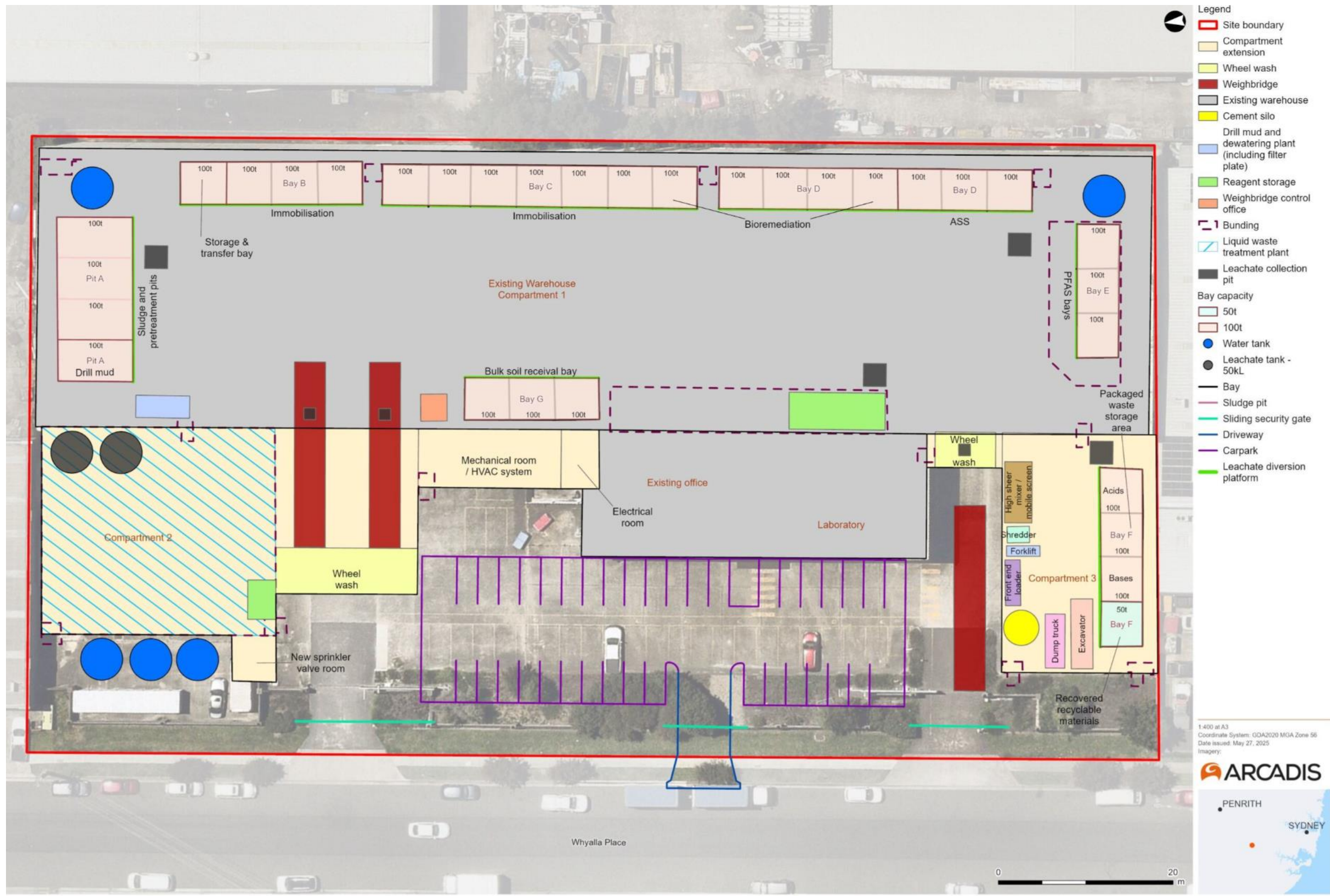
PRESTONS WTF CONTAMINANT CONCENTRATION TABLES

All waste to be received at the Prestons WTF will be classified in accordance with the *NSW EPA Waste Classification Guidelines* (2014) prior to receipt at the Facility, and again prior to dispatch for reuse or disposal from the Facility. Table 1 and Table 2 of the Guidelines outline the contaminant concentrations, leachable concentrations and specific contaminant concentrations for a range of contaminants that determine whether waste is classified as General Solid Waste, Restricted Solid Waste or, if above the prescribed thresholds, Hazardous Waste. The Facility will only accept waste that is contaminated by specific contaminants of concern, up to specific concentration limits. This document outlines the contaminant concentration levels for soil and packaged (liquid) waste. The below sections outline:

- Contaminants of concern
- Maximum concentration limits for each contaminant type
- The maximum annual throughput for each contaminant type
- The storage location for each contaminant type
- The maximum any one time limit for each contaminant

As noted above, the sections below outline the bays and location for the stroage and/or treatment of wastes based on their contaminants. These bays (and the individual bay anticipated capacity) is shown in the Figure overpage.

The annual total tonnages of each of the waste classification types, and the specific contaminants within the waste batches, will vary year on year and are determined by market demand. Accurately predicting the exact quantities is therefore not possible. Notwithstanding this, indicative tonnage throughputs for waste have been identified. These tonnages reflect the potential variability in annual and market conditions by representing the upper limit of likely received tonnages for each contaminant. Not all contaminants would be expected to be received in their likely maximum quantities every single year. Similarly, upper limits for storage have been provided accounting for periods where a high proportion of the waste stored at Site is of a similar nature (highly possible for example if many batches of soil come from a single construction site and are contaminated with a similar profile of contaminants). Further, it is noted that a single batch of soil may have more than one contaminant present. Despite annual fluctuations of the breakdown of waste type and characteristics, the Facility would not exceed its total licensed annual throughput.



- Legend**
- Site boundary
 - Compartment extension
 - Wheel wash
 - Weighbridge
 - Existing warehouse
 - Cement silo
 - Drill mud and dewatering plant (including filter plate)
 - Reagent storage
 - Weighbridge control office
 - Bunding
 - Liquid waste treatment plant
 - Leachate collection pit
 - Bay capacity
 - 50t
 - 100t
 - Water tank
 - Leachate tank - 50kL
 - Bay
 - Sludge pit
 - Sliding security gate
 - Driveway
 - Carpark
 - Leachate diversion platform

1:400 at A3
Coordinate System: GDA2020 MGA Zone 56
Date issued: May 27, 2025
Imagery:

ARCADIS

PENRITH
SYDNEY

Contaminated soils

The below table provides the maximum contaminant concentration limits for bulk soils and sludges proposed to be received at the Facility. It is noted that the below table outlines only the proportion of bulk soils waste that would be classified as ‘Hazardous Waste’. No Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) contaminated soils will be received above the Restricted solid waste thresholds.

Individual contaminant in soil (name)	Maximum contaminant level in soil (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/ bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated soil (tonnes)	Maximum quantity to be stored at any one time – treated soil (tonnes)
Bulk soils sediments and sludges								
Refer to individual contaminant below	Refer to individual contaminant below	Hazardous bulk soil ~ 23,200 tpa Hazardous sediments and sludges ~ 2,800 tpa	Hazardous waste would all be treated with the intention achieving contaminant levels below the ‘restricted solid waste’ threshold. It has been assumed all waste originally classified as hazardous, would have a final classification therefore of restricted waste. In some cases it may not be possible to treat to this level, meaning some waste may remain as ‘hazardous waste’. All waste treated down to meet ‘restricted’ contaminant levels would be disposed of to landfill. Waste that is classified as ‘hazardous’ after treatment would either be re-treated or transferred to a facility that is licensed to accept it. Any waste that cannot achieve ‘restricted’ waste contaminant thresholds would be sent interstate for	Bulk soils - Bays B, C and D Sludges - Pit A	The pre and post storage locations are the same. Once designated a treatment bay soil is moved directly to its own individual bay where it will remain until collected for offsite disposal. Treatment and storage occur within the one bay. No two batches are mixed together, and batches are not moved between locations. The Facility design and the OWMP have been prepared with best practice design features incorporated (as identified for example through the Guidance for the liquid waste industry (EPA)). Containment / management features include: - Waste batches are never mixed, and are treated within individual bays separated by concrete push walls - Compartment 1 is fully impervious with rollover bunding (250mm); bunded with >1000 kL of bunding capacity - Bays and pits have been designed to slope to the back, directing leachate to rear of bay - Fixed leachate collection pipes and tank system in place, with leachate treated within the Liquid Waste Treatment Plant (LWTP) - Additional leachate collection pits are located within Compartment 1 outside of the bays - Spill kits located throughout the WTF - Scrubber / HVAC system to be operated in accordance with the OAQMP - Emergency wash shower provided throughout the WTF - Mandatory minimum training and PPE requirements - All wastes received at the Facility are to be tracked from the waste generator through to destination facility (e.g. landfill), consistent with the Protection of the Environment Operations (Waste) Regulation 2014. - Prior to receipt at the Facility, the Facility chemist will verify the waste material to be received via bench scale testing. - When loads of non-conforming waste are identified, the customer will be asked to leave the	Bulk soils maximum any one time storage limit for both untreated and treated – 2,000 t Sediments and sludges are received in Pit A. Following dewatering the soil would be relocated to Bay B, C or D for treatment (depending on treatment type), where it would remain until removal offsite. After initial receipt in Bay G for bulk soils, individual batches would be transferred to either Bay B, C or D (depending on treatment type) where it would undergo treatment and storage prior to removal offsite.	Soil is not stored for significant periods as either ‘untreated’ or ‘treated’. The majority of time spent stored on site is while undergoing treatment. Once received, bulk soils will be moved to their designated treatment bay and treatment will commence typically within 24 hours of receipt. For waste to be treated via immobilisation this will take 1-3 weeks. For soil treated via bioremediation this will take approximately 3 weeks – 3 months. Once treated, soil will be removed offsite for disposal, again typically within 24 hours following treatment and will not be stored on site for long periods of time. Total storage volumes therefore have been provided for total soil (treated and untreated) combined: Bulk soils maximum any one time storage limit for both untreated and treated – 2,000 t Sediments and sludges upper storage limit for both untreated and treated - 400 t	

Individual contaminant in soil (name)	Maximum contaminant level in soil (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated soil (tonnes)	Maximum quantity to be stored at any one time – treated soil (tonnes)
			further treatment or disposal.		facility immediately with the load. The event is then recorded within the Facility’s “Rejected loads register”. Application of water via a hose system for dust suppression during loading and unloading of the material and during treatment, if visibly dry			
By individual contaminant								
Arsenic	Up to 50,000 mg/kg	Up to 2,750 tpa	Immobilisation		Soil - Bays B, & C		Up to 500 t	Up to 500 t
Benzene	Up to 50,000 mg/kg	Up to 340 tpa	Bioremediation		Soil - Bays C & D		Up to 150 t	Up to 150 t
Benzo(a)pyrene³	UP to 500mg/kg	Up to 2,750 tpa	Immobilisation		Soil - Bays B, & C		Up to 500 t	Up to 500 t
Beryllium	Up to 50,000 mg/kg	Up to 550 tpa	Immobilisation		Soil - Bays B, & C		Up to 100 t	Up to 100 t
Cadmium	Up to 50,000 mg/kg	Up to 550 tpa	Immobilisation		Soil - Bays B, & C		Up to 100 t	Up to 100 t
Chromium (VI)⁶	Up to 50,000 mg/kg	Up to 2,750 tpa	Immobilisation		Soil - Bays B, & C		Up to 500 t	Up to 500 t
m-Cresol	Up to 50,000 mg/kg	Up to 275 tpa	Bioremediation		Soil - Bays C & D		Up to 50 t	Up to 50 t
o-Cresol	Up to 50,000 mg/kg	Up to 275 tpa	Bioremediation		Soil - Bays C & D		Up to 50 t	Up to 50 t
p-Cresol	Up to 50,000 mg/kg	Up to 275 tpa	Bioremediation		Soil - Bays C & D		Up to 50 t	Up to 50 t
Cresol(total)	Up to 50,000 mg/kg	Up to 825 tpa	Bioremediation		Soil - Bays C & D		Up to 150 t	Up to 150 t
Cyanide (amenable)^{7,8}	Up to 4,000 mg/kg	Up to 550 tpa	Immobilisation		Soil - Bays B, & C		Up to 100 t	Up to 100 t
Cyanide (total)⁷	Up to 4,000 mg/kg	Up to 2,750 tpa	Immobilisation		Soil - Bays B, & C		Up to 500 t	Up to 500 t
Ethylbenzene	Up to 50,000 mg/kg	Up to 2,750 tpa	Bioremediation		Soil - Bays C & D		Up to 500 t	Up to 500 t
Fluoride	Up to 50,000 mg/kg	Up to 2,750 tpa	Immobilisation		Soil - Bays B, & C		Up to 500 t	Up to 500 t

Individual contaminant in soil (name)	Maximum contaminant level in soil (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/ bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated soil (tonnes)	Maximum quantity to be stored at any one time – treated soil (tonnes)
Lead	Up to 50,000 mg/kg	Up to 2,750 tpa	Immobilisation	Soil - Bays B, & C			Up to 500 t	Up to 500 t
Mercury	Up to 50,000 mg/kg	Up to 550 tpa	Immobilisation	Soil - Bays B, & C			Up to 100 t	Up to 100 t
Nickel	Up to 50,000 mg/kg	Up to 5,500 tpa	Immobilisation	Soil - Bays B, & C			Up to 1,000 t	Up to 1,000 t
C6–C9petroleum hydrocarbons ¹³	Up to 50,000 mg/kg TRH w/w for soils	Up to 5,500 tpa	Bioremediation	Soil - Bays C & D			Up to 1,000 t	Up to 1,000 t
C10–C36 petroleum hydrocarbons ¹³	Up to 50,000 mg/kg	Up to 5,500 tpa	Immobilisation	Soil - Bays B, & C			Up to 1,000 t	Up to 1,000 t
Phenol(non-halogenated)	2,000 mg/kg	Up to 550 tpa	Immobilisation	Soil - Bays B, & C			Up to 100 t	Up to 100 t
Polychlorinated biphenyls ¹²	50 mg/kg (as potential co-contaminant in soils) Storage only for soil	Up to 500 tpa	Storage only (if received as a co-contaminant in soil – no treatment)	Bays B, & C			Up to 50 t	Up to 50 t
Polycyclic aromatic hydrocarbons (total) ¹⁶	13,000mg/kg	Up to 2,750 tpa	Bioremediation Immobilisation	Soil - Bays B, & C			Up to 500 t	Up to 500 t
Toluene	Up to 50,000 mg/kg	Up to 2,750 tpa	Bioremediation	Soil - Bays C & D			Up to 500 t	Up to 500 t
Xylenes (total)	Up to 50,000 mg/kg	Up to 550 tpa	Bioremediation	Soil - Bays C & D			Up to 100 t	Up to 100 t
Other contaminants								
Aluminium	Up to 50,000 mg/kg	Up to 550 tpa	Storage only (if received as a co-contaminant in soil – no treatment)	Soils Bays B, & C			Up to 100 t	Up to 100 t
Boron	Up to 50,000 mg/kg	Up to 275 tpa	Immobilisation	Soil - Bays B, & C			Up to 100 t	Up to 100 t
Chromium (0 and III oxidation states)	Up to 50,000 mg/kg	Up to 1,650 tpa	Immobilisation	Soil - Bays B, & C			Up to 300 t	Up to 300 t
Copper	Up to 50,000 mg/kg	Up to 2,750 tpa	Immobilisation	Soil - Bays B, & C			Up to 500 t	Up to 500 t

Individual contaminant in soil (name)	Maximum contaminant level in soil (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated soil (tonnes)	Maximum quantity to be stored at any one time – treated soil (tonnes)
Vanadium	Up to 50,000 mg/kg	Up to 550 tpa	Immobilisation	Soil - Bays B, & C			Up to 100 t	Up to 100 t
Zinc	Up to 50,000 mg/kg	Up to 1,650 tpa	Immobilisation	Soil - Bays B, & C			Up to 300 t	Up to 300 t

Packaged waste

Packaged waste would primarily be classified as Liquid Waste under the waste classification guidelines. Notwithstanding this, contaminant concentration limits have been nominated for packaged waste. Packaged waste would be stored only onsite, with no treatment proposed for packaged waste. All packaged waste would be stored in Bay F within Compartment 3. Packaged waste that is identified as having a low (acidic) pH would stored in separate bay to waste identified as having a high (alkaline) pH.

Individual contaminant in packaged waste	Maximum contaminant level in packaged waste (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated (tonnes)	Maximum quantity to be stored at any one time – treated (tonnes)
Packaged waste								
Refer to individual contaminant below	Refer to individual contaminant below	Total liquid packaged waste – 35,000 tpa	Packaged waste would be received at the Facility in intact IBCs or drums. These wastes would be stored at the Facility on raised platforms/shelving until a suitable treatment or destruction facility is able to accept the material within NSW or interstate. No treatment of packaged waste is proposed. The waste classification for packaged waste would therefore remain consistent once leaving the	Packaged waste Bay F (storage only – no treatment)	The following environmental controls are in place for the management of packaged hazardous soils: - All wastes received at the Facility are to be tracked from the waste generator through to destination facility (e.g. landfill), consistent with the Protection of the Environment Operations (Waste) Regulation 2014. - Prior to acceptance at the Facility, the Facility chemist will verify the waste material to be received via bench scale testing. - When loads of non-conforming waste are identified, the customer will be asked to leave the facility immediately with the load. The event is then recorded within the - Facility’s “Rejected loads register”. - Packaged waste will be stored on shelving above the Probable Maximum Flood (PMF) - Leachate collection pit located within Compartment 3 for collection of any accidental spills or leaks. - Spill kits and emergency wash showers provided throughout the Facility. - Fully impervious surfaces provided within the		Up to 400 t of packaged waste to be stored at any one time. No treatment.	N/A (no treatment proposed)

Individual contaminant in packaged waste	Maximum contaminant level in packaged waste (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated (tonnes)	Maximum quantity to be stored at any one time – treated (tonnes)
			Facility.		Facility with rollover bunding (250mm) of the entirety of area to contain 110% of the largest tank capacity and in compliance with AS 3780 for the storage and handling of Class 8 liquids to prevent any spills exiting the Facility. Total capacity of containment within Compartment 3 is 120kL. - Individual temporary bunding provided within the acid's and bases bays each. - The emergency response procedure is detailed in the OEMP - Staff training and inductions will be provided for all staff working onsite as outlined in the OEMP - Mandatory minimum PPE requirements for all staff are prescribed in the Operational Waste Management Plan (OWMP) including eyewear, protective clothing and covered footwear			
By individual contaminant								
Arsenic	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Benzene	Up to 50,000 mg/kg	Up to 3,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Benzo(a)pyrene³	Up to 500mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Beryllium	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Cadmium	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Chlorobenzene	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Chromium (VI)⁶	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA

Individual contaminant in packaged waste	Maximum contaminant level in packaged waste (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated (tonnes)	Maximum quantity to be stored at any one time – treated (tonnes)
m-Cresol	Up to 50,000 mg/kg	Up to 500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
o-Cresol	Up to 50,000 mg/kg	Up to 500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
p-Cresol	Up to 50,000 mg/kg	Up to 500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Cresol(total)	Up to 50,000 mg/kg	Up to 1500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Cyanide (amenable)^{7,8}	Up to 4,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Cyanide (total)⁷	Up to 4,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
1,2-Dichloroethane	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
1,1-Dichloroethylene	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Ethylbenzene	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Fluoride	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Lead	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Mercury	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA
Methyl ethyl ketone	5 Up to 50,000 mg/kg (note would not be taken	Up to 2,000 tpa	Packaged waste (storage only)			Packaged waste Bay F	Up to 400 t	NA

Individual contaminant in packaged waste	Maximum contaminant level in packaged waste (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated (tonnes)	Maximum quantity to be stored at any one time – treated (tonnes)
	in flammable form)							
Molybdenum	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Nickel	Up to 50,000 mg/kg	Up to 9,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
C6–C9 petroleum hydrocarbons¹³	Up to 50,000 mg/kg (only to be accepted if non-flammable)	Up to 9,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
C10–C36 petroleum hydrocarbons¹³	Up to 50,000 mg/kg	Up to 9,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Phenol (non-halogenated)	Up to 2,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Plasticiser compounds¹⁵	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Polycyclic aromatic hydrocarbons (total)¹⁶	Up to 13,000mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Scheduled chemicals¹⁷	Vvariable limits pending on chemical	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Styrene (vinyl benzene)	Up to 50,000 mg/kg	Up to 1,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Toluene	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Vinyl chloride	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA

Individual contaminant in packaged waste	Maximum contaminant level in packaged waste (mg/kg)	Quantity to be received and processed at the facility per annum (tonnes)	Onsite treatment method (descriptive) – also describe end waste product use, destination, and waste classification	Onsite treatment location	Onsite storage location (before treatment) – also describe containment/bunding and other environmental controls	Onsite storage location (after treatment) - also describe containment/bunding and other environmental controls	Maximum quantity to be stored at any one time – untreated (tonnes)	Maximum quantity to be stored at any one time – treated (tonnes)
Xylenes (total)	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
PFOS + PFHxS	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
PFOA	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Other contaminants								
Aluminium	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Barium	Up to 50,000 mg/kg	Up to 100 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Boron	Up to 50,000 mg/kg	Up to 500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Chromium (0 and III oxidation states)	Up to 50,000 mg/kg	Up to 2,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Copper	Up to 50,000 mg/kg	Up to 4,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Iron	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Manganese	Up to 50,000 mg/kg	Up to 2,000 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Vanadium	Up to 50,000 mg/kg	Up to 900 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA
Zinc	Up to 50,000 mg/kg	Up to 2,500 tpa	Packaged waste (storage only)		Packaged waste Bay F		Up to 400 t	NA