REPORT

VOLUME 1

Environmental Impact Statement

Prestons Waste Treatment Facility

Submitted to:

NSW Department of Planning, Industry and Environment

Submitted by:

Hi-Quality Waste Treatment Services Pty Ltd

Golder Associates Pty Ltd

Level 8, 40 Mount Street, North Sydney, New South Wales 2060, Australia

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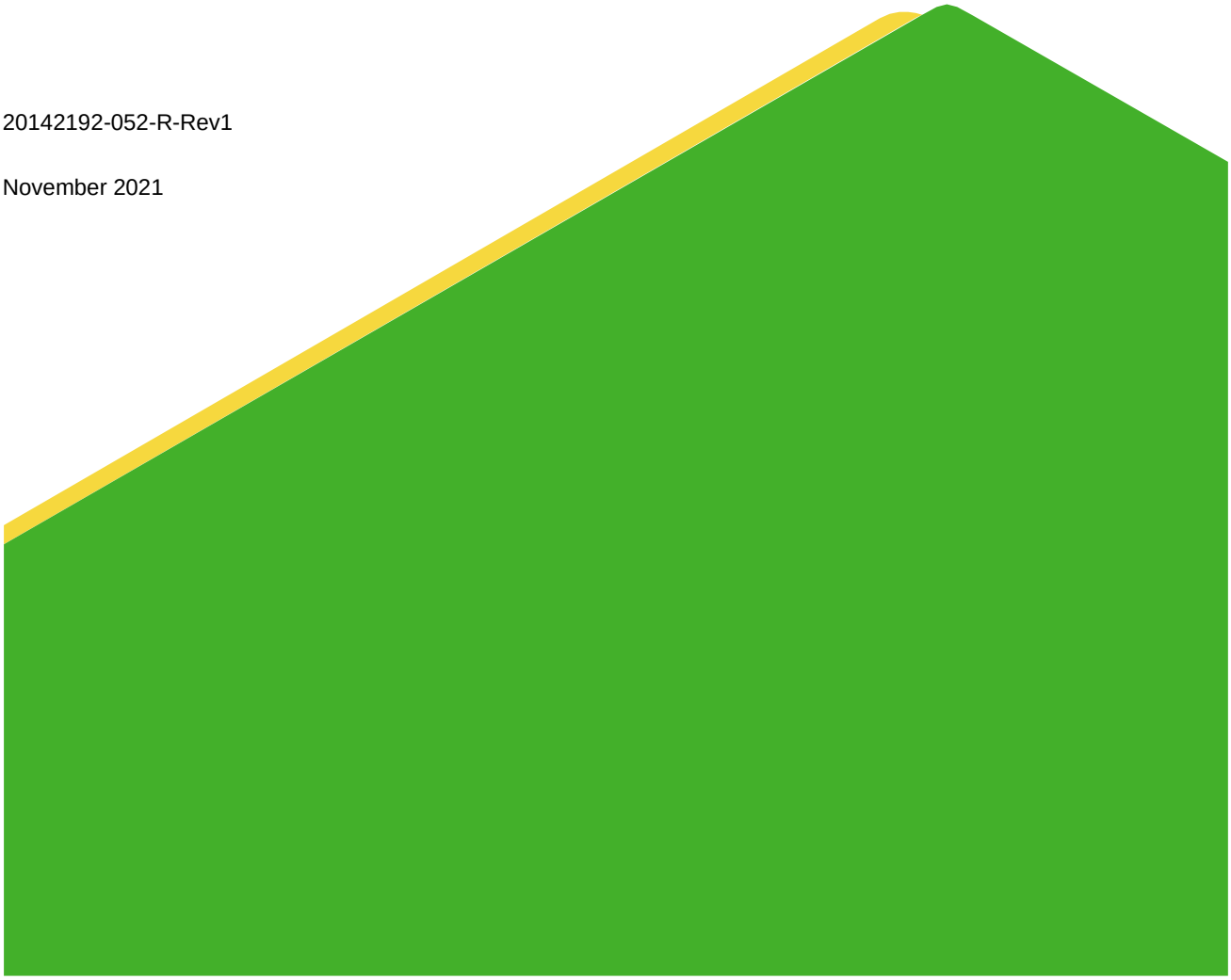

Distribution List

NSW Department of Planning, Industry and Environment

Hi-Quality Waste Treatment Services Pty Ltd

Golder Associates

Executive Summary

Introduction

Hi-Quality Waste Treatment Services Pty Ltd seek to construct and operate a Waste Treatment Facility, located at 9-13 Whyalla Place, Prestons NSW 2170 (Lot 103 DP 866530). The project proposes to utilise technologies aimed at treating waste to a level suitable for reuse, disposal to landfill or disposal to sewer. The project would process up to 270,000 tonnes of waste per annum including:

- Contaminated soils,
- Contaminated sludges; and
- Liquid wastes.

Source material would primarily be generated from industrial processes and contaminated sites. Hi-Quality Group head office would also be sited at this location within the existing office space.

The existing building and proposed building extension would house the Waste Treatment Facility with further new ancillary infrastructure to be constructed including:

- weighbridges and weighbridge office;
- new office and laboratory space configuration within the existing office space;
- new driveway;
- parking; and
- truck and wheel wash.

Existing Site Description

The existing site comprises approximately 9,100 m^2 (0.91 ha) and is located within land zoned IN3 Heavy Industrial under the provisions of *Liverpool Local Environmental Plan 2008* and is surrounded by IN3 Heavy industrial zoning. The nearest residential location is approximately 500 metres from the site while further noise-sensitive receivers are located 350 m west and north of the site.

The site is rectangular shaped and has an existing large warehouse building of 4,097m^2, with adjoining office facilities. Existing site features include a car park, a water tank (for the site water suppression system), a landscaped area and a pumphouse. There are two dual driveway entrances to the site along the eastern boundary (a northern entrance and a southern entrance), which access the existing building with direct roller door access.

The Proponent

Hi-Quality Waste Treatment Services Pty Ltd is a subsidiary of Hi-Quality Group, an Australian family-owned business providing waste treatment, waste management and resource recovery and recycling services in New South Wales, Queensland and Victoria.

The site is owned by the proponent.

Statutory Framework

The *Environmental Planning and Assessment Act 1979* and the accompanying *Environmental Planning and Assessment Regulation 2000* provide the statutory and regulatory framework for the environmental assessment and approval of development in NSW. Part 4 of the Act provides for the assessment of 'development' that requires development consent, whilst Division 4.1 of Part 4 provides for control of the assessment of State Significant Development.

State Environment Planning Policy (State and Regional Development) 2011 identifies projects that trigger SSD with the project considered as State Significant Development under Clause 23 of Schedule 1. The project is also identified as integrated development as it will require an Environmental Protection Licence in accordance with the *Protection of the Environment Operations Act 1997.*

Stakeholder Consultation

Consultation for the project has been underway for the project since inception. Hi-Quality Waste Treatment Services Pty Ltd has utilised a variety of methods to engage community and regulatory stakeholders including letters, emails and/or phone calls to nearby property owners, lessees and government agencies to inform of the project and invite further discussion. Provision of a dedicated email and website has been provided to facilitate this discussion, which includes project details and further contact information include through post. Feedback received from stakeholders has been incorporate into this Environmental Impact Statement.

Hi-Quality Waste Treatment Services Pty Ltd is committed to providing communication methods and channels of communication with stakeholders with regard to the Waste Treatment Facility and would continue to do so into the future.

Project Need and Justification

It is considered that there are a number of drivers for the strategic need and justification for the project, that arise from environmental, economic and social considerations, which are framed by legislation, policy and strategy documents of the Commonwealth and NSW.

The key objective of the project is to facilitate treatment technologies to reduce potential health and environmental impacts, diversion of waste from landfill for alternative uses and beneficial reuse, more efficient recovery of resources, and providing a strategic waste treatment service that would play a key role in the delivery of construction and development within Western Sydney and the wider region.

In providing and facilitating more efficient waste treatment processing, the project would result in better management of material flows to benefit human health, the environment and the economy. This includes higher diversion rates than are currently available and increased beneficial reuse of materials to contribute to a circular economy.

The project will provide a strategic asset and waste treatment service that would play a key role in the delivery of construction and development and provide for employment within Western Sydney and the wider region, is permissible with consent, and is consistent and aligned with objectives of relevant legislation, planning strategies, environmental planning instruments, guidelines and plans.

Summary of Environmental Issues

Materials and Waste Management

The materials and waste management chapter provides detail on waste management during construction and operation of the project including details of the process associated with the treatment of waste including classification, screening and acceptance of waste at the site, waste types, waste characterisation, waste

storage and handling, application of waste treatment technologies and validation and reporting in addition to waste tracking, staff training, and operational contingencies and handling of non-conforming waste.

As part of the environmental management system for the project, a construction environmental management plan and operations environment management plan will be completed documenting and addressing waste management process and practices and procedures at the site. A sampling and quality assurance plan will also be developed for the waste treatment processes.

Traffic and Transport

A traffic and transport assessment (Appendix D) has been completed by PeopleTrans to assess the transport implications of the Waste Treatment Facility including considerations of the existing traffic conditions surrounding the site, the traffic generating characteristics of the project, the proposed access, egress and circulation of traffic at the site and the transport impact of the project upon the surrounding road network.

The traffic and transport assessment identifies the road network surrounding the site is assessed as having satisfactory capacity to cater for additional traffic generated by the proposed Waste Treatment Facility with minimal impacts to the road network, levels of service and queuing currently experienced. As such, the Waste Treatment Facility is not anticipated to compromise the safety or function of the road network, public transport network, cycle network or pedestrian network.

Proposed on-site parking supply, site access and vehicle circulation (including potential weighbridge queuing) have been assessed for the Waste Treatment Facility and are considered suitable and sufficient for the project with no requirement for road upgrades and/or additional infrastructure works.

Noise

In accordance with the NSW EPA's Noise Policy, the noise and vibration assessment (Appendix E) provides details of existing noise levels at the site and noise-sensitive receptors, determines the noise impact criteria based upon existing noise levels and identifies noise levels that have been assessed as a result of the project in accordance with relevant legislation and guidelines.

The assessment demonstrates that the predicted noise emissions from the Waste Treatment Facility upon noise-sensitive receivers are low with the assessed noise levels during operation being similar to the existing background noise levels at noise-sensitive receiver locations. While no operational mitigation measures would be required for the project to meet relevant noise criteria requirements, standard management measures associated with plant, equipment operation and training would be undertaken to further mitigate noise associated with the project.

Air Quality, Odour and GHG

An air quality impact assessment has been completed to evaluate the air quality impacts of the project (Appendix F). This includes providing an air dispersion model (AERMOD) to predict the maximum ground level concentration of pollutants at the property boundary of the site in accordance with NSW Environmental Protection Authority (2016) "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales".

The model considered potential impacts from the project including the proposed three vertical exhaust ventilation stacks and truck movements at the site with results of the air quality modelling compared to 24 hour and annual NSW impact assessment criteria ($PM_{2.5}$, PM_{10}, TSP and lead) and priority individual pollutants criteria (arsenic, chromium, benzene, and trichloroethylene) and further air quality criteria for PFAS taking into consideration engineering and management controls.

Results of the conservative air quality modelling broadly indicate compliance with the relevant assessment criteria. Post-commissioning stack testing is proposed to be undertaken to validate the performance of the air emissions control system and to further validate the assessment model.

A greenhouse gas assessment has also been completed for the project (Appendix O), identifying the project would not meet the NGER facility-level reporting threshold with potential emissions assessed as low.

Soils and Water

Investigations and studies of the existing site have been undertaken with regard to the potential impacts of the project upon soil, surface water and groundwater and flooding. These studies have included a preliminary site investigation and limited detailed site investigation for contamination at the site (Appendix G) and a flooding and stormwater management study (Appendix H). The findings of these studies providing input into the design of the project include proposed design, mitigation and management controls, guidelines and systems to reduce the potential impacts of the project (including contingency measures where applicable).

Process water will be wholly managed within the bunded Waste Treatment Facility and separate from stormwater (as a closed system) and recycled and reused where possible. Thus, the natural environment and/or the Liverpool City Council drainage network will not receive leachate/process water from the project. Stormwater generated from the site will be captured within onsite storage tanks for reuse in the operations and/or discharged to Liverpool City Council's drainage network. The flood modelling considered baseline and post-development scenarios identifying that the project will not increase flood risks to the site and the adjacent areas under the modelled scenarios. During construction and operation, soil and water will be managed through implementation of a stormwater management plan as part of the construction environmental management system for the project.

Hazards and Risk

A preliminary risk screening has been completed for the project and is provided in Appendix I. This report identifies that based upon the the class, quantity and location of dangerous goods associated with the development, the project does not trigger the requirement for a preliminary hazards analysis and is not considered to be potentially hazardous in accordance with "Applying SEPP 33: Hazardous and Offensive Development Application Guidelines" (DoP, 2011).

Subject to complying with a future environmental protection licence, it is considered the project is not an offensive development or hazardous in accordance with SEPP 33, and that identified risk levels associated with the project do not preclude approval with appropriate mitigation and safeguards.

Human Health

The potential impacts of the Waste Treatment Facility upon human health have been assessed including a health impact assessment to assess the potential for community exposure to contaminants from the site (Appendix J). Findings of this study identify that the risk of community exposure to contaminants from the project is low after review of the contaminants, consequence and pathways to exposure, in addition to relevant technical studies findings and management measures to be adopted.

Details of measures to manage and monitor potential exposure to employees are provided within chapter 13 of the environmental impact statement, which includes the consideration of an appropriate hierarchy of controls for reducing potential impacts upon human health and is consistent with the *Work Health and Safety Regulation 2011.*

Fire and Incident Management

An assessment of fire and incident management has been completed by Core Engineering for the Waste Treatment Facility (Appendix K) and provides technical information on the design and fire protection measures

in relation to fire and incident management. This includes discussion and assessment of stockpile quantities, fire protective measures, building design and compliance with relevant legislation, guidelines and codes.

The project will be designed to comply with the performance requirements of the National Construction Code through a combination of deemed to satisfy provisions and performance solutions and proposes a number of mitigation and management measures to ensure potential fire and incident management is appropriately addressed.

Biodiversity

A flora and fauna assessment (Appendix L) was undertaken by Biosis at the site, identifying the Waste Treatment Facility is not likely to have any significant impact on biodiversity values. As such, a waiver for a Biodiversity Development Assessment Report was sought and approved by delegates of the Secretary of the Department of Planning, Industry and Environment and Environment, Energy and Science confirming a Biodiversity Development Assessment Report is not required as part of the EIS. The correspondence confirming this is provided in Appendix L.

Heritage

Located within an existing industrial area with the project proposing negligible ground disturbance/excavation, an exemption from preparing an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Waste Treatment Facility was sought. This exemption was supported by an Aboriginal Cultural Heritage Due Diligence Assessment (Appendix M). The outcome of this application was that Heritage NSW identified that an ACHAR is not required for assessment of the Waste Treatment Facility. The correspondence confirming this outcome is provided in Appendix M.

Environmental Management and Mitigation Measures

The environmental impact statement identifies that based upon the assessment completed to date, the project will have no significant environmental impacts, with potential impacts identified addressed through mitigation measures and management strategies identified throughout the environmental impact statement for construction and operation.

The environmental impact statement includes a consolidated summary of all the proposed environmental management and monitoring measures for the Waste Treatment Facility in Chapter 16.

Next Steps

The environmental impact statement addresses the form and content requirements of the Secretary's Environmental Assessment Requirements for the proposed Prestons Waste Treatment Facility (SSD-9346594) and in doing so assesses the social, environmental, and economic impacts and benefits of the proposal. The environmental impact statement defines and provides context of the proposed development, and examines those issues considered to be relevant for assessment. This includes the potential environmental effects of the project during construction and operation and proposes mitigation measures to prevent, reduce or offset significant adverse impacts on the environment. The aims of the environmental impact statement are:

- Identify constraints affecting future development on the site;
- Consider the economic, social and environmental impacts of the proposed development; and
- Assess the capability of the subject site to support the proposed development.

The assessment process has been utilized to inform the design of the proposed Waste Treatment Facility and ensure potential impacts of this facility are at a level that are in accordance with all regulation and that all stakeholders have had the opportunity to provide input to the project.

Once accepted for lodgement, the next steps in the process are:

- Public Exhibition of the environmental impact statement to provide an opportunity to stakeholders to provide comment on the Waste Treatment Facility.
- Hi-Quality Waste Treatment Services Pty Ltd would consider and address these submissions received during the public exhibition period in a Response to Submissions Report.

Consultation with the community and stakeholders would continue throughout the assessment, determination and post determination including during construction and operation.

All submissions and information obtained during the public exhibition period will be used in accordance with the *Privacy Act 1988*. As such all submissions received are regarded as public documents and any information contained in them may be published in subsequent assessment documents. If the author of a submission does not wish the information to be distributed, this needs to be clearly stated in the submission.

LIMITATIONS STATEMENT

This environmental impact statement has been prepared by Golder Associates Pty Ltd (Golder) on behalf of the proponent. To the best of Golder's knowledge, the project presented herein represents the intentions of the proponent at the time of printing of the environmental impact statement. However, the passage of time, manifestation of latent conditions or impacts of future events may result in the actual project and it's impact being modified from that described in this environmental impact statement. In preparing the environmental impact statement, Golder has relied upon data, designs and plans and other information provided by the proponent and other individuals and organisations referenced herein. Refer to Volume 1 of the Environmental Impact Statement for the full limitations statement of Golder Associates.

COVER PAGE

Submission of the environmental impact statement, prepared pursuant to the *Environmental Planning and Assessment Act 1979* and in accordance with the form and content requirements of clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

Environmental Impact Statement prepared by:

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In respect of:	Prestons Waste Treatment Facility	

Proponent, proposal and land details

Proponent name:	Hi-Quality Waste Treatment Services Pty Ltd Cnr Elizabeth Dr & Mamre Road, Kemps Creek NSW 2178
Proposed development (project title):	Prestons Waste Treatment Facility
Land to be developed:	9-13 Whyalla Place PRESTONS NSW 2170 Lot 103 DP 866530

Glossary

Term	Definition
ACHAR	Aboriginal Cultural Heritage Assessment Report
BDAR	Biodiversity Development Assessment Report
BOM	Bureau of Meteorology
C&D	Construction & Demolition
C&I	Commercial and Industrial
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	Environment Planning and Assessment Act 1979
EPA	Environment Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EMP	Environmental Management Plan
Golder Associates	Golder Associates Pty Ltd
The LEP	Liverpool Local Environment Plan 2008
MNES	Matters of National Environmental Significance
NCC	National Construction Code
Noise-sensitive receiver	In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios, places of worship/religious facilities (e.g. churches).
POEO Act	Protection of the Environment Operations Act 1997
the Site	9-13 Whyalla Place, Prestons NSW 2170
The Regulation	Environmental Planning and Assessment Regulation 2000
SEARs	Secretary's Environmental Assessment Requirements
SEPPs	State Environmental Planning Policies
SSD	State Significant Development
The Project	The project for which approval is being sought
Transport Strategy 2056	Future Transport Strategy 2056
Tpa	Tonnes per annum
WARR Act	Waste Avoidance and Resource Recovery Act 2001
WARR Strategy	Waste Avoidance and Resource Recovery Strategy 2014-2021 (EPA)

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APPENDICES

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1.0 INTRODUCTION

1.1 Project Background

This Environmental Impact Statement (EIS) has been prepared on behalf of Hi-Quality Waste Treatment Services Pty Ltd (the Proponent) to support the construction and operation of a Waste Treatment Facility (the Project).

The Proponent is an Australian family-owned business providing building and landscaping product supplies and waste management and resource recovery and recycling services in New South Wales, Victoria, the Australian Capital Territory and Queensland.

The Project is located at 9-13 Whyalla Place, Prestons NSW 2170 (the Site) and is strategically located within industrial land in Western Sydney. The Project proposes to utilise existing buildings and new infrastructure on the Site to provide treatment of soil and liquid waste to a level suitable for reuse, disposal to landfill or disposal to sewer.

The Waste Treatment Facility would process up to 270,000 tonnes of soil and liquid waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils;
- Contaminated Sludges; and
- Liquid Wastes.

New ancillary infrastructure would be constructed as part of the Project including:

- weighbridges and weighbridge office;
- warehouse extension;
- new office and laboratory space configuration within the existing office space;
- new driveway;
- parking; and
- truck and wheel wash.

The Proponent would utilise existing office space within the existing building on the Site.

The Project would result in a number of benefits that are consistent with relevant NSW legislative and policy objectives. These benefits include:

- utilising proven waste treatment technology to reduce potential health and environmental impacts of waste;
- utilising proven waste treatment technology that increases the beneficial reuse potential of materials and diversion from landfill;
- providing for recycling and resource recovery and diversion from landfill;
- assist the NSW and Australian governments in improving waste management, as per the aims and strategies of the National Waste Policy: Less waste, more resources (COAG SCBN, 2011);

- being centrally located in Western Sydney, the Site has good transport links to major urban areas thereby reducing the time, transport and further environmental costs associated with waste acceptance, treatment and/or reuse in the Western Sydney area;
- proximity to identified major projects to be constructed including the M12, Western Sydney Airport, Western Sydney Aerotropolis area makes the Site a strategic resource recovery asset that would play a key role in the delivery and construction of these projects;
- the Site and surrounding area is within an existing heavy industrial area that is compatible with the Project operations and is adequately separated from sensitive receivers (nearest residence approximately 550 m from the Site) with the proposed on-site activity being within the existing building located on the Site; and
- the Site provides contingency to treat waste in the Western Sydney Region such as treating large volumes of contaminated material in response to emergency environmental incidents involving contaminated soils or water.

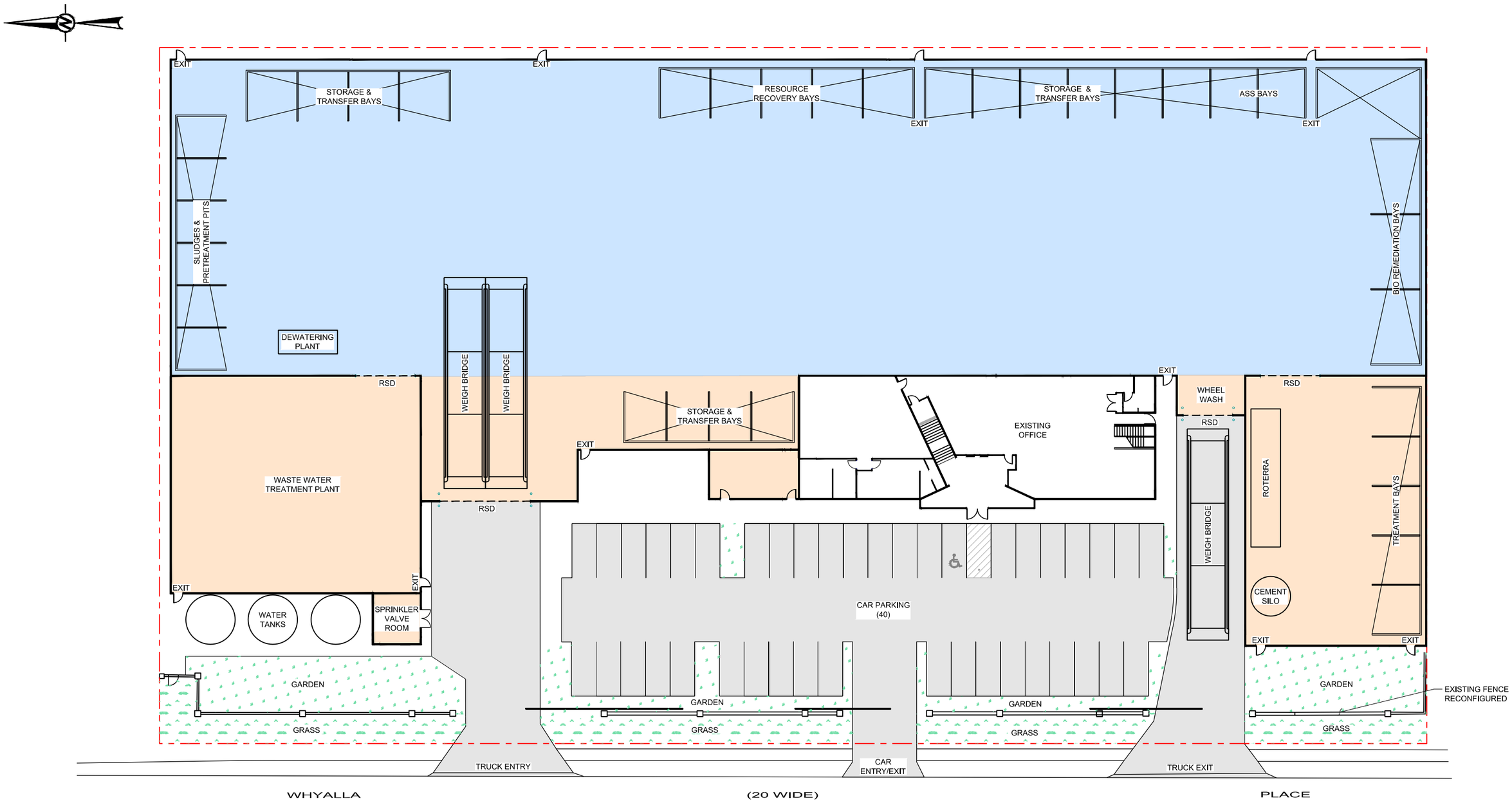
The Project is supported by strong market drivers for waste treatment, reuse and recovery. Construction activity in residential, non-residential and infrastructure sectors has expanded rapidly, particularly in the Western Sydney region in recent years and is forecast to continue. Treatment of waste to reduce the potential impacts will be required as part of addressing this construction activity in addition to further activities that generate waste that requires treatment in the Western Sydney area.

The Secretary's Environmental Assessment Requirements (SEARs) provided in Appendix A, were issued by the Department of Planning, Industry and Environment (DPIE) on 14 October 2020 (SEARs SSD-9346594), which outlines the format, content and assessment requirements to address within the EIS.

The purpose of this EIS is to:

- Provide a detailed description of the Project;
- Identify the key potential environmental impacts and issues associated with the Project;
- Assess the key potential environmental impacts associated with the Project; and
- Outline the Proponent's commitment to manage, where possible, any potential impacts identified.

Figure 1 presents the proposed layout for the Project. Additional detail of the Waste Water Treatment Plant is provided in Appendix N.



LEGEND

- WAREHOUSE - EXISTING
- WAREHOUSE - EXTENSION
- CONCRETE DRIVE
- GRASS
- GARDEN
- SITE BOUNDARY

PROJECT
PRESTONS WASTE TREATMENT FACILITY

TITLE
CONCEPTUAL LAYOUT

PROJECT NO.	CONTROL	REV.	FIGURE
	005	1	F001

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

0 25 mm

LEGEND

BOL	BOLLARD	SV	STOP VALVE
TEL	TELSTRA PIT	HYD	WATER HYDRANT
LP	ELECTRIC LIGHT POLE	DR	DRAIN
PP	POWER POLE	TAP	TAP
SP	SIGN POST	ELC	ELECTRICAL BOX
MH	MANHOLE		CONC. WALL
	SITE BOUNDARY		SERVICE - WATER
	S.W.D		SERVICE - COMS
	SERVICE - SEWER		SERVICE - ELECTRICITY

PROJECT
9 WHYALLA PLACE, PRESTONS

TITLE
PRESTONS WASTE TREATMENT FACILITY
EXISTING LAYOUT

PROJECT NO.	CONTROL	REV.	FIGURE
20142192	005	1	F002

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

0 25 mm

1.2 The Proponent

Hi-Quality Waste Treatment Services Pty Ltd (the Proponent) is a part of the Hi-Quality Group, which was established over 50 years ago and proudly remains an Australian family-owned business. The business is a diverse, dynamic organisation that can quickly respond to the needs and demands of its customers. The company has grown from a single business as a bulk transport contractor to a multidisciplinary contractor and a major integrated natural resource and recycled products supplier with associated businesses.

Hi-Quality's operations located over four Australian States and Territories specialise in:

- Waste treatment;
- Transport, logistics and plant hire;
- Civil and environmental services;
- Quarrying;
- Resource recovery and recycling;
- Waste management and landfill;
- Building and landscaping product supplies;
- Skip bins; and
- Property development.

Hi-Quality has 14 operational sites that provide extended market coverage and efficient supply and are located at:

- Greater Sydney at Kemps Creek (2), Menangle, Brandown, Bringelly, Wallacia, Mt Hunter, Londonderry and St Marys;
- NSW Southern Highlands at Windellama and Oallen Ford;
- ACT at Fyshwick;
- Queensland at Yatala; and
- Victoria at Sunbury.

Hi-Quality operate sites that have similar logistics, scale and/or operation to the Project including owning and operating a Waste Treatment Facility located in Yatala, Queensland. The Yatala Waste Treatment Facility is approved to accept and treat up to 350,000 tonnes of waste per annum, with similar waste type treatment technologies and operational and environmental controls. Waste types for this facility include regulated Solid and Liquid Wastes.

Hi-Quality's head office is currently situated at Kemps Creek, NSW, where general management and finance is located along with the transport division, maintenance workshop and landscaping yard.

Hi-Quality manages its operations with strict adherence to safety compliance, quality systems and environmental performance and sustainability and has achieved Integrated Management Systems (IMS) certification for quality management systems (AS/NZS ISO 9001- 2015), OH&S management systems (AS/NZS ISO 4801 - 2001) and environment management systems (AS/NZS ISO 14001 - 2015).

1.3 Objectives and Justification

The key objective of the Project is to facilitate treatment technologies to reduce potential health and environmental impacts, diversion of waste from landfill for alternative uses and beneficial reuse, more efficient recovery of resources, and providing a strategic waste treatment service that would play a key role in the delivery of construction and development within Western Sydney and the wider region.

It is considered that there are a number of drivers for the strategic need and justification for the Project, that arise from environmental, economic and social considerations, which are framed by legislation, policy and strategy documents of the Commonwealth and NSW. The Project supports key outcomes of relevant legislation and provides a viable waste solution with significant environmental benefits.

Refer to Chapter 2 of the EIS, which further addresses the strategic need of the Project.

1.4 Structure of the EIS

The EIS addresses the SEARs SSD-9346594 for the Project, including the form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. Table 1 addresses where the identified general requirements and key issues of the Project are predominantly addressed within the EIS.

Table 1: Structure of the EIS

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
General Requirements	*A detailed description of the development, including:* *- an accurate history of the site, including development consents and confirmation of the intention to surrender any existing development consents* *- the need for the proposed development* *- justification for the proposed development* *- likely staging of the development* *- likely interactions between the development and existing, approved and proposed operations in the vicinity of the site* *- plans of any proposed building works* *- contributions required to offset the proposal and* *- infrastructure upgrades or items required to facilitate the development, including measures to ensure these upgrades are appropriately maintained.*	Chapter 2 Project Description
	Consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments	Chapter 3: Statutory Framework
	Consideration of issues discussed in the public authority responses to key issues (available the Department's Planning Portal) including detailed responses to the EPA's key issues identified in its letter dated 7 October 2020.	Various chapters including EPA key issues addressed in Chapter 7 Waste Management.
	A risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment	Chapter 6: Environment Risk Assessment

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
	A detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: *- a description of the existing environment, using sufficient baseline data* *- an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes and* *- a description of the measures that would be implemented to avoid, minimise, mitigate and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/or contingency plans to manage significant risks to the environment.*	Refer to specific issues below.
	A consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.	Chapter 16 Compilation of Environmental Management Measures
	High quality files of maps and figures of the subject site and proposal.	Throughout EIS
	A report from a qualified quantity surveyor providing: *- a detailed calculation of the capital investment value (CIV) of the proposal (as defined in clause 3 of the Environmental Planning and Assessment Regulation 2000) of the proposal, including details of all assumptions and components from which the CIV calculation is derived. The report shall be prepared on company letterhead and indicate the applicable GST component of the CIV.*	Appendix P
	An estimate of the jobs that will be created by the development during the construction and operational phases of the proposed development.	Chapter 2: Project Description
	Certification that the information provided is accurate at the date of preparation.	Cover Page
Key Issues	*The EIS must include an assessment of the potential impacts of the proposal (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and/or offset these impacts.*	
Statutory and Strategic Context	*- detailed justification for the proposal and the suitability of the site* *- detailed justification that the proposed land use is permissible with consent* *- a detailed description of the history of the site, including the relationship between the proposed development and all development consents and approved plans previously and/or currently applicable to the site* *- demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. This includes, but is not limited to:*	Chapter 2: Project Description Chapter 3: Statutory Framework Chapter 4: Site Description

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
	■ *State Environmental Planning Policy (Infrastructure) 2007* ■ *State Environmental Planning Policy (State and Regional Development) 2011* ■ *State Environmental Planning Policy No. 55 – Remediation of Land* ■ *Liverpool Local Environmental Plan 2008* ■ *Greater Sydney Region Plan: A Metropolis of Three Cities* ■ *Our Greater Sydney 2056: Central City District Plan* ■ *Future Transport Strategy 2056.*	
Suitability of the Site	*A detailed justification that the site can accommodate the proposed waste treatment facility.*	Chapter 2: Project Description
Community and Stakeholder Engagement	*- a detailed community and stakeholder participation strategy, which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form(s) of the consultation, including a justification for this approach* *- a report on the results of the implementation of the strategy including issues raised by the community and surrounding occupiers and landowners that may be impacted by the proposal* *- details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the proposal and* *- details of the proposed approach to future community and stakeholder engagement based on the results of the consultation.*	Chapter 5: Stakeholder Consultation Appendix B: Consultation Materials
Waste Management	*- A description of the waste streams that would be accepted at the site including the maximum daily, weekly and annual throughputs and the maximum size and heights of individual stockpiles:* *- details of the source of the waste streams to justify the need for the proposed processing capacity* *- a description of waste processing operations (including flow diagrams for each waste stream), including a description of the technology to be installed, resource outputs and the quality control measures that would be implemented.* *- details of how waste would be stored (including the maximum daily storage capacity of the site) and handled on site, and transported to and from the site including details of how the receipt of non-conforming waste would be dealt with* *- detail the developments waste tracking system for incoming and outgoing waste* *- details of the waste management strategy for construction and ongoing operational waste generated and* *- details of the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.*	Chapter 2: Project Description Chapter 7: Waste Management Appendix C: NSW EPA Waste Codes

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
Air Quality, Odour and GHG	*- a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines* *- the details of buildings and air handling systems and strong justification for any material handling, processing or stockpiling external to buildings* *- a greenhouse gas assessment* *- details of proposed mitigation, management and monitoring measures.*	Chapter 10: Air Quality and Odour Appendix F: Air Quality Impact Assessment Appendix O: Greenhouse Gas Assessment
Noise and Vibration	*- A quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers* *- cumulative impacts of other developments and* *- details and justification of the proposed noise mitigation, management and monitoring measures.*	Chapter 9: Noise and Vibration Appendix E: Noise Impact Assessment
Soils and Water	*- An assessment of potential surface and groundwater impacts associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby* *- a detailed site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements* *- details of stormwater/wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water* *- description of the measures to minimise water use* *- detailed flooding assessment* *- description of the proposed erosion and sediment controls during construction* *- characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters and monitoring activities and methodologies) and* *- characterisation of the nature and extent of any contamination on the site and surrounding area.*	Chapter 11: Soils and Water Appendix G: Preliminary Site Investigation and Limited Detailed Site Investigation Appendix H: Flooding and Stormwater Management Study
Traffic and Transport	*- Details of all traffic types and volumes likely to be generated during construction and operation, including daily and peak traffic movements, and a description of key access / haul routes* *- an assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model* *- plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network*	Chapter 8: Traffic and Transport Appendix D: Transport Impact Assessment

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
	- details and plans of any, loading dock servicing and provisions, on-site parking provisions, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards *- details of the largest vehicle anticipated to access and move within the site, and swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site* *- details of road upgrades, infrastructure works or new roads or access points required for the development if necessary.*	
Human Health Risk	*An assessment of the potential impacts to employees at the facility and any off-site impacts including:* *details of measures to manage the exposure of employees to contaminants including the use of appropriate personal protective equipment and engineering controls at the facility to reduce exposure* *details of health monitoring of employees and awareness and education measures* *preventative measures for community exposure from the off-site transfer of contaminants* *details of work health and safety system consistent with the requirements of the Work Health and Safety Regulation 2011.*	Chapter 13: Human Health Appendix J: Health Impact Assessment
Hazards and Risk	*A preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011).*	Chapter 12: Hazards and Risk Appendix I: SEPP 33 Preliminary Risk Screening
Fire and Incident Management	*- identification of the aggregate quantities of combustible waste products to be stockpiled at any one time* *- technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and water flow rates at the hydrant) management and containment measures* *- details regarding the fire hydrant system and its minimum water supply capabilities appropriate to the site's largest stockpile fire load* *- details of size and volume of stockpiles and their management and separation to minimise fire spread and facilitate emergency vehicle access* *- consideration of consistency with NSW Fire & Rescue Fire Safety Guideline – Fire Safety in Waste Facilities (February 2020) and* *- detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code (NCC).*	Chapter 14: Fire and Incident Management Appendix K: Fire and Incident Management Assessment
Cultural Heritage and Aboriginal	*- identify and describe the Aboriginal cultural heritage values that exist across the development and document in an Aboriginal*	Chapter 15: Other Issues (Heritage)

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
Cultural Heritage	*Cultural Heritage Assessment Report (ACHAR) which may include the need for a surface survey and test excavations* *- consultation with Aboriginal people must be undertaken and documented in ACHAR* *- a description of the impacts on Aboriginal cultural heritage values.*	Appendix M: Material and correspondence Heritage assessment exemption
Biodiversity	*– including an assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.*	Chapter 15: Other Issues (Biodiversity) Appendix L: Material and correspondence Biodiversity Waiver
Ecologically sustainable development	*– including a description of how the development will incorporate the principles of ecologically sustainable development in the design, construction and ongoing operation of the development.*	Chapter 17: Ecologically Sustainable Development, Justification and Conclusion
Consultation	*During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and potentially affected landowners. In particular you must consult with:* ■ *Liverpool Council* ■ *Environment Protection Authority* ■ *Environment, Energy and Science Group* ■ *Heritage NSW* ■ *NSW Fire and Rescue* ■ *Sydney Water* ■ *Transport for NSW* *Surrounding local landowners and stakeholders* *The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.*	Chapter 5: Stakeholder Consultation Appendix B: Consultation Materials
References	*The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified…*	Chapter 18 References
Policies, Guidelines and Plans	*The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Environmental Planning and Assessment Regulation 2000. Provide these as part of the EIS rather than as separate documents.*	Figure 1 Proposed Site Plan.

SEARs Reference SSD-9346594		EIS Reference where the issue is predominantly addressed
	In addition, the EIS must include the following: *1. An existing site survey plan drawn at an appropriate scale illustrating:* ■ *the location of the land, boundary measurements, area (sq. m) and north point* ■ *the existing levels of the land in relation to buildings and roads* ■ *location and height of existing structures on the site* ■ *location and height of adjacent buildings and private open space* ■ *all levels to be to Australian Height Datum (AHD).* *2. Locality/context plan drawn at an appropriate scale should be submitted indicating:* ■ *significant local features such as heritage items* ■ *the location and uses of existing buildings, shopping and employment areas* ■ *traffic and road patterns, pedestrian routes and public transport nodes.* *3. Drawings at an appropriate scale illustrating:* ■ *detailed plans, sections and elevations of the existing building, which clearly show all proposed buildings* *4. Schedule of materials, colours and additions. finishes.*	Figure 2: Existing Site Layout Appendix N: Site Survey and Preliminary Design Drawings

2.0 PROJECT DESCRIPTION

The Secretary's Environmental Assessment Requirements:	Addressed
General Requirements – a detailed description of the development, including: *- the need for the proposed development* *- justification for the proposed development* *- likely staging of the development* *- likely interactions between the development and existing, approved and proposed operations in the vicinity of the site* *- plans of any proposed building works* *- contributions required to offset the proposal and* *- infrastructure upgrades or items required to facilitate the development, including measures to ensure these upgrades are appropriately maintained*. *- consideration of issues discussed in the public authority responses to key issues (available the Department's Planning Portal) including detailed responses to the EPA's key issues identified in its letter dated 7 October 2020.* *- an estimate of the jobs that will be created by the development during the construction and operational phases of the proposed development*.	Chapter 2: Project Description Chapter 7: Waste Management Appendix N: Existing Site Survey and Preliminary Design Drawings
Key Issues - Suitability of the Site – including: *- a detailed justification that the site can accommodate the proposed waste treatment facility.*	Chapter 2: Project Description

2.1 Overview

The Project is the Prestons Waste Treatment Facility proposing to utilise technologies aimed at treating waste to a level suitable for reuse, disposal to landfill or disposal to sewer.

The Project would process up to 270,000 tonnes of waste per annum of the following waste forms:

- Contaminated soils (Solid)
- Liquid
- Contaminated sludges (Sludge).

The above waste forms are consistent with the definitions used by NSW EPA for classifying wastes. Further information is presented in Chapter 7.

Source material would primarily be generated from industrial processes and contaminated sites. This includes:

- Property developers;
- Civil contractors;
- Industrial facilities producing regulated waste;
- Oil refineries (remediation);
- Local Council government areas;
- Mining industry;

- Department of Defence;
- Large State and Federal Infrastructure projects;
- Airports; and
- Other waste treatment and waste management companies.

The Proponent's head office would also be sited at this location, utilising existing office space.

New ancillary infrastructure would be constructed as part of the Project including:

- weighbridges;
- warehouse extension;
- new office and laboratory space configuration within the existing office space;
- new driveway;
- parking; and
- wheel wash and truck wash down bay.

2.2 Existing Site Layout

The Site is located within an existing industrial area that is bound by Whyalla Place to the West, which also serves as the principal pedestrian and vehicular access point to the Site. The existing building on the Site is comprised of approximately 4,100m2 warehouse and 910 m2 office floorspace. The spring height of the existing warehouse is 11.7 m whilst the ridge height is 12.2 m. The existing building is constructed of pre-cast concrete panels, supported internally by steel columns with concrete slab flooring and colour bond roof.

The existing layout for the Site is presented in Figure 2 and existing site survey is presented in Appendix N.

2.3 Proposed Site Layout

2.3.1 Waste Treatment Facility

The proposed layout for the Project is presented in Figure 1 and is described as follows. The Project will expand the existing warehouse with partial demolition of the external wall facing Whyalla Place. The Project seeks to increase the existing building on the Site to a total floor area of approximately 6,400 m2 (i.e. an extension of 1,300 m2). The roof height of the proposed extension by the Project is approximately 7.5 m. The existing warehouse building and warehouse building extension would house the Waste Treatment Facility. In accordance with the Liverpool Development Control Plan 2008 the building setback is 10m.

Concept drawings for the proposed extensions to the warehouse are presented in Appendix N.

2.3.2 Site Access and Egress

The Site would be accessed from Whyalla Place. Separate access points are proposed for trucks and light vehicles. Trucks would enter the Site via the northern driveway and exit the Site via the southern driveway. Employees would access the Site via a new driveway between the truck entry and exit driveways. (Refer Figure 1 and Figure 14.)

2.3.3 Weighbridges

Weighbridges would be constructed at the entrance and exit to the Waste Treatment Facility. The approximate location of the weighbridges is presented in Figure 1.

2.3.4 Wheel and Truck Wash

A wheel and truck wash would be located at the exit of the Waste Treatment Facility of a similar configuration as shown in Figure 3

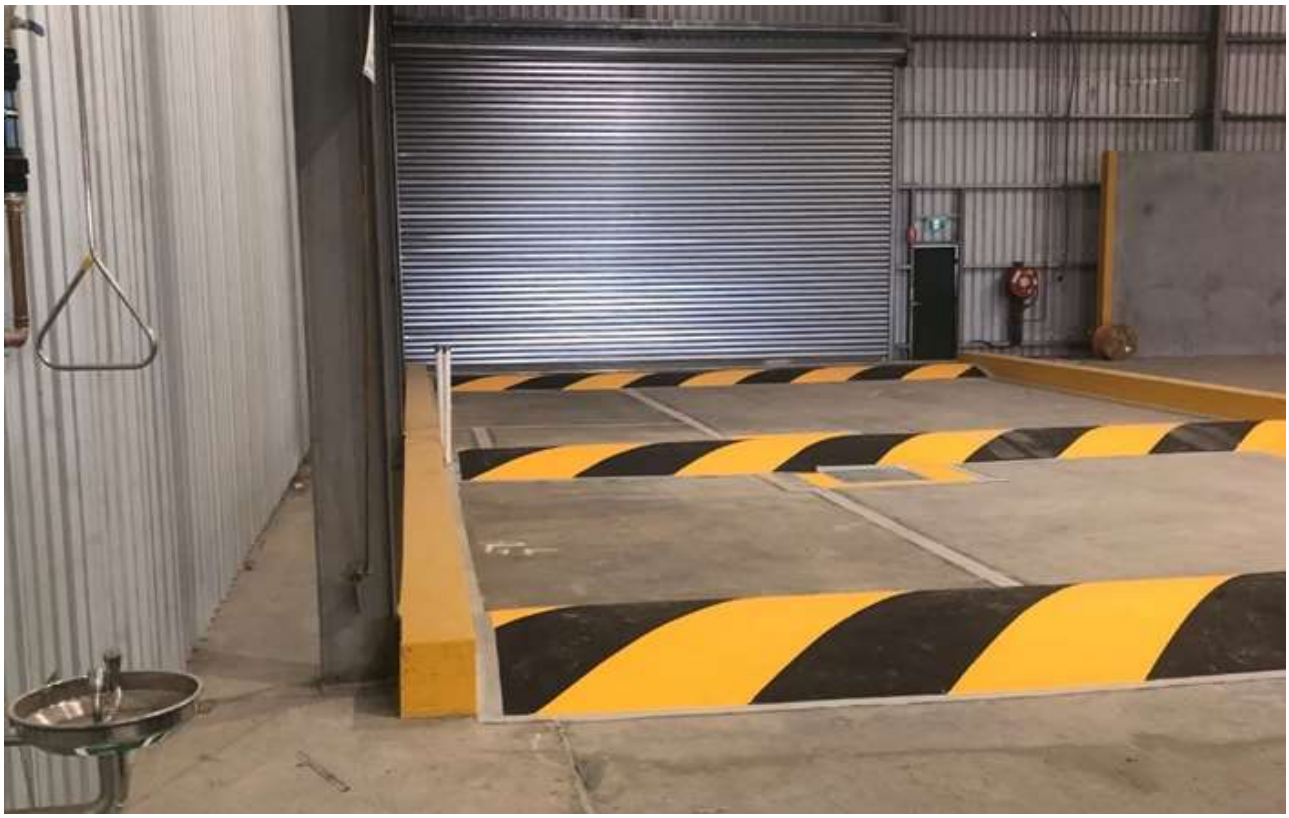


Figure 3: Typical wheel and truck wash bay

Concrete in the wheel and truck wash would be treated with a performance based sealant to prevent impregnation of contaminants into the concrete matrix.

2.3.5 Parking

The Project would provide parking spaces for visitors and for staff as shown in Figure 1 and as discussed in the Traffic Impact Assessment (Chapter 8 and Appendix D).

2.3.6 Landscaping

In accordance with the Liverpool Development Control Plan 2008 a landscaped area of 10m is provided along the primary frontage of the allotment.

2.3.7 Administration and Amenities

Existing office space and amenities within the existing building will be utilised.

Minor internal reconfiguration would be made to the office space to incorporate offices, staff decontamination facilities and laboratory. The reconfigured office layout is shown in Appendix N.

2.4 Waste Treatment Facility Overview

The Waste Treatment Facility would process up to 270,000 tonnes of waste per annum.

The Waste Treatment Facility would be located within the warehouse building as shown on Figure 1. All waste material would be received, treated, stockpiled and loaded out within the building.

All material entering and leaving the Site would be recorded by the weighbridges.

Internal bench scale testing would be carried out in the Proponent's laboratory onsite.

General processing activities would include the following:

- Bulk Soils Treatment;
- Sediments and Sludges Pre-Treatment;
- Acid Sulfate Soils Treatment;
- Liquid Waste Treatment; and
- Waste Storage and Transfer.

Treatment processes for soils and sludges would comprise one or a combination of the following technologies:

- Pre-treatment activities, which may comprise dewatering and/or the addition of additives to improve the treatability of sludges as part of a step process prior to treatment;
- Physical and chemical separation;
- Chemical Oxidation;
- Bioremediation;
- Immobilisation (stabilisation and / or solidification), using a high energy mobile mixing plant that can control the effective dosing rate;
- Acid Neutralisation
- Other treatment processes approved by NSW EPA.

Treatment processes for liquid waste would comprise treatment of industrial wastewater from third party industrial and commercial organisations and also internally generated liquid waste including leachate from potentially contaminated soils, decanted water from settled sludge, potentially contaminated water from internal truck and wheel wash.

Wastewater will be treated in a custom designed and built wastewater treatment plant located as shown on Figure 1 and with further detail provided in Appendix N. The wastewater will inherently be variable in composition. The proposed wastewater treatment plant will have the capability of treating waste waters contaminated with:

- Hydrocarbons (including TPH and PAH);
- Organics;
- Suspended Solids;
- Acidity and Alkalinity;
- Heavy Metals;
- Nutrients; and
- PFAS.

Drill Mud will be treated separately in a dedicated treatment plant (refer to Section 1.1).

Details of Waste Acceptance and Handling are provided in Chapter 7.

The Waste Treatment Facility building is proposed to contain equipment for treatment processes as well as dedicated bays and above ground pits to store and segregate waste material.

2.5 Soil & Sludge Treatment Technology Overview

2.5.1 General

The Waste Treatment Facility would treat up to 110,000 tonnes per annum of contaminated soil and sludges treated via chemical oxidation, bioremediation and immobilisation. Treatment technologies will generally focus on the destruction of contaminants (e.g.: chemical oxidation, bioremediation) or the separation of contaminants (e.g.: screening, chemical separation) from recoverable or more inert constituents. Preference is to be given to destructive technologies in the first instance, to achieve reduced total contaminant loads where material is to be disposed of to landfills. Of the estimated 110,000 tonnes per annum, it is expected that metals and metalloid impacted soils and sludges will form a high percentage of the waste stream. As such, it is expected that immobilisation, although not a priority technology per Part 10 of the *Protection of the Environment Operations (Waste) Regulation 2014* (herein referred to as the Waste Regulations 2014), will form an important treatment option for the Project.

In some instances, it is anticipated that individual waste streams will be preferentially immobilised, subject to their individual classification. We have therefore developed a comprehensive list of potential waste streams and grouped these according to their contaminant of concern (COC) and aligned these to a preferential treatment technology (refer Appendix C). There are four individual categories developed for the waste streams proposed for the Waste Treatment Facility, as summarised in Table 2 below.

Table 2: Summary of Waste Categories & Preferential Treatment Technologies

Category	Contaminant Group	Primary Treatment Technology	Secondary Treatment Technology
A	Organics	Bioremediation	Chemical Oxidation / Immobilisation
B	Halogenated Hydrocarbons	Chemical Oxidation	Bioremediation / Immobilisation
C	Metals & Metalloids[1]	Immobilisation	Chemical Reduction[2]
D	Other Specific Waste Streams	Immobilisation	Chemical oxidation / Bioremediation

Notes:

1. *Excludes solid slags derived from metals processing industries.*
2. *Chemical reduction will only be appropriate where a reduction in valency produces a less toxic chemical metal / metalloid form and may require both immobilisation and chemical reduction technologies to be undertaken to comply with waste disposal criteria (subject to chemical constituents).*

For each of the categories identified in Table 2, the waste streams will be subject to a treatment hierarchy appraisal to prioritise the application of destructive technologies. It is noted that some contaminants may require sequential application of primary treatment technologies in order to reduce both their toxicity, contaminant mass, or meet landfill leachability criteria (where appropriate). Further details of the material screening assessment to be undertaken prior to receipt of wastes is summarised in Chapter 7.

It is expected that familiarity with treating more commonly received waste streams will be gained and the appraisal of treatment preference may not be required over time. However, all new wastes will be subject to the same screening process to ensure prioritisation of destructive treatment technologies.

2.5.2 Physical Separation Technologies

2.5.2.1 Screening

Screening is a physical separation process that provides an opportunity to recover a proportion of inert, solid material from a largely contaminated soil matrix. An example would be the removal, by screening of inert concrete, brick and rubble from a contaminated fill where the predominant contaminant mass is present in a finer grained soil matrix. Similarly, the removal of coarser grained materials within a granular, non-cohesive soil where a recovery option exists to reduce the final mass forwarded to landfill following full scale treatment.

The facility intends to deploy three types of physical screening technology, as follows:

- The Reterra chemical stabilisation / mixing plant comes fitted with a screen to remove oversize materials which will be separated prior to stabilisation commencing;
- A mobile screen; and
- An excavator/loader with rilling / screening bucket attachment that will enable physical separation prior to treatment for soils not passing through the Reterra.

The deployment of a screening technology will be dependent on the particle size distribution and the grading of the materials and whether oversize removal will provide an effective reduction in the mass to be treated. 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 (See Section 2.5.2.2).

Physical separation often precedes the use of a secondary chemical treatment / destruction process, with the aim of reducing the final volume of materials to be treated.

The following volumes of materials are anticipated to be recovered per annum:

- Approximately 2,000 tonnes scrap metal;
- Approximately 1,000 tonnes cardboard and paper;
- Approximately 2,000 tonnes plastics;
- Approximately 5,000 tonnes wood waste; and
- Approximately 10,000 tonnes concrete, brick and rubble.

2.5.2.2 Chemical Separation

Chemical separation technologies will enable the physico-chemical difficulties to be overcome for heavy hydrocarbon impacted soils or soils containing Non Aqueous Phase Liquids (NAPLs). The use of surfactants may be appropriate where solid and hydrophobic liquid phases are combining to create particular soil waste that requires treatment. This is applicable where a proportion of the materials are fine grained (silt and clay) and the separation option may be viable where gross hydrocarbon impacts are not reported in the batch chemical test data. The separation of coal tar contaminated soil materials from NAPL can be achieved where surfactants are applied, subject to the physical constraints of any soil matrix, which contains the coal tar residuals. Surfactants can be an effective means of separation but will also enhance the performance of the primary destructive technologies such as bioremediation and chemical oxidation. Chemical separation technologies such as surfactants are not likely to be routinely used on the most likely waste streams to be received by the facility and are only likely to be selected where some form of physical separation will either:

- Result in a physical separation benefit, reducing total volumes of materials for treatment and disposal to landfill; and / or

- Will enhance the performance of destructive technologies in reducing contaminant concentrations in shorter timeframes.

2.5.3 Destruction Treatment Technologies

It is anticipated that Chemical Oxidation and Bioremediation destruction technologies will be prioritised to ensure that total contaminant mass (referred to as the specific contaminant concentration) can be lowered in the first instance, where technically practicable. This approach ensures that destruction technologies result in some or all of the following being achieved:

- Minimisation of waste and encourage the reuse of soil materials (where possible and permitted);
- A lower contaminant load is deposited at licenced landfill facilities; and
- A reduction in the total volume of contaminated wastes disposed of to an approved landfill facility.

This is consistent with the NSW Waste Regulations (2014) regarding the approval process for immobilisation. Further details of the technologies are presented below. Chapter 7 provides further detail on the facility management aspects of these technologies to ensure compliance with the NSW EPA (2014) “Waste Classification Guidelines - Part 2: Immobilisation of Waste” (Waste Classification Guidelines) and the Waste Regulations 2014 respectively.

2.5.3.1 Chemical Oxidation

Chemical oxidation is a contaminant destruction technology that can be applied to a range of waste streams, particularly those containing persistent organic pollutants (POPs) such as chlorinated hydrocarbons (e.g.: solvent impacted soils), polycyclic aromatic hydrocarbons (PAHs) and pesticides. The recalcitrance of these contaminants and their abundance, particularly derived from contaminated site remediation programs, result in their characteristics being a contaminant of concern.

Chemical oxidation by the addition of a strong oxidant such as peroxide, potassium permanganate or sodium persulphate result in the production of hydroxyl radicals, which react to treat the more recalcitrant hydrocarbons and is suitable for some metals. This results in the production of less hazardous and less toxic compounds that are more stable and less mobile (leachable).

Contaminants to be treated with chemical oxidation to non-hazardous or less toxic compounds that are more stable, less mobile or inert will include:

Monoaromatics (eg: BTEX) and TPHs where soils that have suffered fuel spills;

- PAHs;
- Phenols,
- Chlorinated hydrocarbons; and
- Some pesticides / herbicides.

2.5.3.2 Bioremediation

Bioremediation techniques are designed to break down contaminants via the stimulation of microorganisms which use the contamination as an energy source for development and growth. The range of bioremediation techniques can differ, depending upon the presence or absence of oxygen. For the Project we are proposing that bioremediation will exclusively be aerobic treatment of soils.

It is considered likely this technique is more amenable to the treatment of waste soils impacted with lighter and mid-range petroleum hydrocarbons generally with less than 35 carbon atoms. In accordance with CRC for

Contamination Assessment and Remediation of the Environment (2018) “National Remediation Framework Technology Guide: Bioremediation”, the addition of oxygen, coupled with an appraisal of micronutrient requirements and moisture content will result in optimum conditions being developed for destruction of petroleum hydrocarbons in soils to proceed. Oxygen release compounds (ORCs), can also be applied to enhance the aerobic treatment of hydrocarbon impacted soils, but this is more likely to fall in the category of chemical oxidation, particularly when considering strong oxidants such as permanganates and hydrogen peroxide.

Whilst anaerobic degradation processes are technically feasible for compounds such as chlorinated hydrocarbons, it is considered that maintaining anaerobic conditions for soil stockpiles at the Site is unfeasible and other destructive technologies such as chemical oxidation are more appropriate in this instance.

Soil contaminants to be treated via Bioremediation would include hydrocarbons including total petroleum hydrocarbons (TPH), lighter and mid weight polycyclic aromatic hydrocarbons (PAH), Monocyclic aromatic hydrocarbons (BTEX), phenols. Advanced bio-remediation technology is a proven method of treating hydrocarbon contamination to degrade organic species more rapidly. This approach may be enhanced by use of chemical separation techniques (e.g.: surfactants) that may increase the accessibility of hydrocarbons to biodegradation (refer Section 2.5.2). Enhancements may include the use of surfactants coupled with soil mixing (e.g.: Reterra) to break up clods for lower permeability, cohesive contaminated soils. It should be noted that highly cohesive materials with a clay content >10%, then bioremediation may not be an appropriate technology.

2.5.4 Immobilisation

Immobilisation is a chemical stabilisation process that can be applied to soils and sludges that qualify for treatment in accordance with the requirements set out in the NSW EPA (2014) Waste Classification Guidelines.

Contaminants to be treated using chemical stabilisation include metals, metalloids, some PAH impacted materials, some heavier coal tar contaminated soils / sediments and pesticide impacted materials. Waste streams to be treated include soils and sludge wastes only. The Project proposes to immobilise contaminated waste streams via chemical immobilisation and micro-encapsulation, with both aspects contributing to the reduction of the contaminants mobility. It is expected that chemical stabilisation / micro-encapsulation would form the bulk of immobilisation works carried out by the Project. Bulking produces a final solidified soil product that is in essence an impermeable monolith. However, reliance has to be made on reducing the mobility of leachable contaminants by chemical stabilisation and / or micro encapsulation and not by solidification, which reduces the infiltration of waters through the immobilised wastes.

Immobilisation is a proven treatment technology and is a treatment technique which contains contaminants within a final solidified / chemically fixated matrix, usually based on the addition of cementitious or pozzolanic binder materials, so as to prevent the contaminants from entering the environment by leaching at an unacceptable rate and meeting NSW EPA Waste Classification requirements. As there is a requirement to demonstrate performance of the immobilisation process, a robust technology has been proposed to ensure a high energy mixing process is adopted along with a controlled reagent dosing rate to achieve a uniform final mix. For this reason, a detailed waste screening process is proposed as part of the appraisal of waste treatability. This is further detailed in Chapter 7 Materials and Waste Management.

A wide range of binders have been demonstrated to provide successful validation of immobilisation to meet the definitions provided in the Waste Classification Guidelines. A range of primary and secondary binders are proposed for immobilisation by the Project, as follows:

- Primary cementitious binders include, including ordinary Portland cement (OPC), ground granulated blast furnace slag (GGBS), cement kiln dust (CKD); and
- Secondary binders including lime, sodium silicate, powdered / granulated activated carbon, organophilic clays, natural pozzolans (eg: zeolites) and bentonites.

Primary binders comprise cementitious materials, which are documented to be excellent at immobilising metals contaminated soils / sludges, hydrocarbon impacted soils / sediments and pesticide impacted wastes. Often, primary binders can be used in various different mix proportions to allow secondary pozzolanic reactions, increasing the durability of the final mix and allowing for slower curing times to increase transportation to landfill.

As some contaminants are not readily immobilised within hydrocarbon fractions and can affect pozzolanic reaction effectiveness, then secondary binders can be considered. Secondary binders are likely to perform both as replacements or enhancements to the use of primary binder immobilisation. Secondary binders are likely to be mixed first as a chemical or geochemical fixation step before addition of the primary binder to complete the micro- encapsulation step. The two-stage process is likely to be appropriate for difficult wastes such as coal tar impacted materials or contaminated soils, which contain a range of inorganic and organic COCs. The use of a secondary binders may be warranted to provide additional performance and durability where a broader range of COCs are present that may affect the performance of primary binders.

2.6 Acid Sulfate Soils

The Waste Treatment Facility would treat up to 30,000 tonnes per annum of acid sulfate soils.

The acceptance and treatment of acid sulfate soils to the Site will be in general accordance with the Waste Classification NSW EPA (2014) Waste Classification Guidelines: Part 4: Acid Sulfate Soils. Due to the risks inherent in developing acidification of the soils, it is a requirement that these materials need immediate treatment, with minimum allowance for stockpiling.

PASS must be kept wet at all times and is proposed to be received at the Site within 16 hours of being excavated from the source site (including travel times). The time of excavation of each load will therefore be a requirement of the initial acceptance procedure. As it is only ever to be likely that PASS will be received for treatment that is surplus to requirements at the source site, then the materials should clearly not meet the definition of virgin excavated natural material (VENM) under the *Protection of the Environment Operations Act 1997* and will not be disposed of to an above water table scenario.

Where PASS have become aerated and their pH has fallen to below 5.5, then these soils will be classified as actual acid sulphate (ASS) from a source term perspective and require immediate treatment with an appropriate pH amendment such as Aglime.

Disposal will require soil classification testing in accordance with Step 5 of Part 1 of the Waste Classification Guidelines, to include a determination of the presence of Secondary Contaminants of Concern (SCOC) within the soil matrix. A detailed history of the source material will need to be supplied by the source site to ensure these SCOC are identified. In some circumstances the presence of SCOC may warrant a more bespoke assessment of treatment requirements, which consider both SCOC immobilisation requirements and acid neutralisation requirements in tandem. Where PASS and SCOC are present, checks will need to be made with the final landfill destination to ensure that they are licenced to accept materials of this combined nature.

Acid sulphate soils will require classification testing to be completed prior to delivery to site. Quantitative laboratory analysis will be undertaken in accordance with AS4969-2008, to include one of the two recommended analytical suites for ASS, as follows:

- Suspension peroxide oxidation combined acidity and sulfate (SPOCAS); and / or
- Chromium reducible sulfur (CRS) suite.

The preferred laboratory analytical test method adopted will generally be consistent with preliminary classification and assessment results obtained from the source site. It is a requirement to determine the materials have been adequately characterised and what their current condition is on site. Where materials have been stockpiled ex-situ and test results are not representative of the initial condition, then the batch will be rejected.

It is considered that Acid sulfate Rock (ASR) will not be processed, handled or treated by the Project.

The quantity and type of acid neutralising agent for treatment of ASS will be determined in accordance with New South Wales Acid Sulfate Soils Management Advisory Committee (1998) “Acid Sulfate Soil Manual”, Stone, Ahem, Blunden.

Further soil classification, treatment and validation procedures are presented in Chapter 7.

2.7 Liquid Waste Treatment Technology Overview

It is estimated the Facility would treat up to 70 ML per annum of liquid waste.

Treatment processes for liquid waste would comprise treatment of:

- Internally Generated Liquid Waste from:
- Leachate from potentially contaminated soils.
- Decanted water from settled sludge.
- Potentially contaminated water from internal truck and wheel wash.
- Externally Generated Liquid Waste from:
- Industrial wastewater from third party industrial and commercial organisations.

Wastewater generated from the above sources will be treated in a custom designed and built wastewater treatment plant located as shown in Figure 1 with further details of fixed plant provided in Appendix N. The wastewater will inherently be variable in composition. The proposed wastewater treatment plant will have the capability of treating waste waters contaminated with:

- Hydrocarbons (including TPH and PAH);
- Organics;
- Suspended Solids;
- Acidity and Alkalinity;
- Heavy Metals;
- Nutrients; and
- PFAS.

The main process steps of the wastewater treatment plant comprise:

- Acid/caustic, coagulant and polymer dosing to prepare wastewater for gravity separation;

- Gravity separation via clarifier;
- Dissolved air floatation (DAF);
- Sand media filtration for particulate removal;
- Granular activated carbon filtration for hydrocarbon and PFAS adsorption;
- Ion exchange filtration for PFAS adsorption and final polishing;
- pH correction;
- Sludge thickening to treat sludge from the clarifiers and DAF units; and
- Sludge dewatering via screw press.

The treated wastewater would be analysed in accordance with the Sydney Water Trade Waste Acceptance Criteria. Approximately 70 ML per annum of the treated wastewater would then be disposed to sewer as liquid trade waste in accordance with a Sydney Water Trade Waste Agreement.

It is estimated approximately 4000 tonnes per annum of filter cake from the treatment process would be disposed of at an appropriately licenced landfill. If filter cake does not meet the landfill acceptance criteria the filter cake will be treated by the Bulk Soils Treatment Process.

Oils will be collected in an IBC for disposal at an appropriately licenced facility.

2.8 Dewatering Plant and Drill Mud Plant

A self-contained Dewatering and Drill Mud Plant would be located as shown in Figure 1.

The processing plant is contained within 1 x 20 ft container.

Approximately 10,000 tonnes of non-contaminated drilling mud waste would be processed at the Site per annum.

The Project would accept drilling mud from non-contaminated drilling operations. Drilling mud is a mixture of naturally occurring rock and soil during the drilling or non-destructive hydroexcavation. It is anticipated the primary source of waste would be from hydroexcavation operations.

The process would involve separation of the soil particles from the drilling mud using separation technologies including sieves, hydrocyclone and centrifuge. Process equipment would be as follows.

- Incoming Storage tanks
- Shaker sieve to separate larger particles
- Desilter hydrocyclone to separate smaller particles
- Decanter centrifuge to remove smaller drill cuttings
- Holding tanks for separated material and liquid.

Separated solids are placed in a Storage and Transfer Bay for sampling and testing in accordance with the NSW EPA “Treated drilling mud order 2014” and once dry would be transported for reuse or to an appropriately licenced facility.

Approximately 6000 tonnes per annum of recovered solids would be transferred to an appropriately licenced facility. Approximately 4000 kL of liquid waste per annum would be tested and classified either for re-use on site for dust suppression or discharged to sewer under a Trade Waste Agreement with Sydney Water.

2.9 Packaged Waste

Packaged waste for storage and transfer only would remain packaged and consolidated within the Waste Treatment Facility. Packaged waste would be stored in accordance with Australian Standards.

Packaged waste for treatment would be treated per Section 2.5.

Empty packaging would be shredded for offsite disposal to an appropriately licenced facility.

Equipment for the Packaged Waste would include:

- one forklift; and
- shredder.

2.10 Waste Storage and Transfer Only (No Treatment)

Approximately 60,000 tonnes per annum of Bulk Soils and Packaged materials would be accepted at the Site for storage, consolidation and transfer to an appropriately licenced facility. i.e. these materials would not be treated at the Site. Bulk materials would be unloaded, stored and loaded for transfer within the Waste Treatment Facility. Packaged materials would not be un-packaged.

Wastes for Storage and Transfer Only are listed in Table 2 Appendix C.

2.11 Operational Process Summary

2.11.1 Sediments and Sludges

2.11.1.1 Delivery

Sludges would be delivered to the Site by tankers. Tankers would unload sludge directly into the above ground pits located as shown on Figure 1. Pits would be pre allocated to maintain separation of each source material. No cross contamination or blending will be permitted. It is estimated the facility would treat up to 20,000 tonnes per annum of sediments and sludges.

2.11.1.2 Sludges Pre-treatment

Depending on the moisture content of as-received sludges, various pre-treatment processes may be required to improve the treatment and handleability of the materials. These include:

- For dry sludges, these will be sent to plate filter pressing area for further dewatering;
- For intermediate moisture content sludges, these may require thickening by the addition of bentonite in the sludge pits; and
- For wetter sludges, suspended solids will be removed by filtration or pre-treatment to flocculate suspended solids including dissolved air flotation (DAF) techniques.

Equipment would include:

- 1 x 12 t excavator (shared with Bulk Soils Treatment operation)
- filter press unit;
- Pre-treatment technologies for the Waste Water Treatment Plant (WWTP), including clarification steps to remove suspended solids.

2.11.1.3 Treatment

Once spadeable the material would be transferred to pre allocated Treatment Bays refer Figure 1 for treatment.

2.11.2 Bulk Soils Treatment

2.11.2.1 Delivery

Approximately 80,000 tonnes per annum of Bulk Soils would be treated by the Project. Principle treatment technologies will first consider contaminant destructive technologies.

Once material has satisfied the material “approval for delivery requirements”, the incoming material would be delivered by tipper or truck and dog and unloaded into pre allocated bays to maintain separation of each source material. No cross contamination or blending will be permitted and dedicated bays will be available for storage, conditioning and final validation respectively.

2.11.2.2 Separation

Consistent with NSW EPA waste classification guidelines (Part 1-Classifying Wastes), it is considered that physical and chemical separation operations will be proposed for the Project, subject to certain restrictions for some restrictions regarding “special wastes”. Physical and chemical separation techniques will be acceptable generally where this results in the different types of waste produced from the separation process being different in terms of risks to human health and the environment and would improve treatability.

Physical separation will be conducted on materials delivered to the Site that would benefit from a removal step for solid inert materials or oversize soil particles (eg: gravels) that present much lower contaminative risk to human health and the environment. The physical separation step will be undertaken within the Storage and Transfer Bays. The materials will be physically screened by either belt driven screen or with an excavator and drilling bucket.

For all soils identified as benefitting from physical screening, the following criteria will need to be met:

- The recovered materials would be stored in the Resource Recovery Bays as shown on Figure 1 and transported to appropriately licenced facilities for further processing. It is estimated that up to 20,000 tonnes per annum of scrap metal, cardboard and paper, plastics, wood waste and concrete brick and tile would be recovered per annum.
- Chemical separation would be undertaken in the treatment pits located as shown on Figure 1. Surfactant would be applied via spray application or similar and the soil mixed with a small excavator.
- The separated liquid phase would be collected and sent to the Liquid Waste Treatment Plant for treatment in accordance with 2.7. The solids fraction would be sent to Bulk Soils Treatment for chemical oxidation or bioremediation treatment.

Equipment would include:

- 1 x 12 t excavator (shared with Bulk Soils Treatment operation); and
- 1 x mobile screen

2.11.2.3 Chemical Oxidation

It is estimated the Project would treat up to 10,000 tonnes per annum of contaminated soil via chemical oxidation.

Chemical oxidation involves the addition of reagents / binders to destroy or immobilise contaminants. Treatment would be undertaken in a batch process with reagents added and mechanically mixed using a high

sheer mixer. Materials would be stored in dedicated Treatment Bays to maintain separation of each source batch.

After mixing, the treated materials would be cured and subjected to validation testing prior to classification being completed and transfer to an appropriately licenced waste disposal facility. The treatment and validation process are described further in Chapter 7 Materials and Waste Management.

Equipment for the Chemical Oxidation Treatment would include:

- 1 x 12 t excavator;
- 1 x one front end loader;
- 1 x 6-8 T dump truck; and
- 1 x High Sheer Mixer.

A High Sheer Mixer similar to that proposed for use at the Site is shown in Figure 4

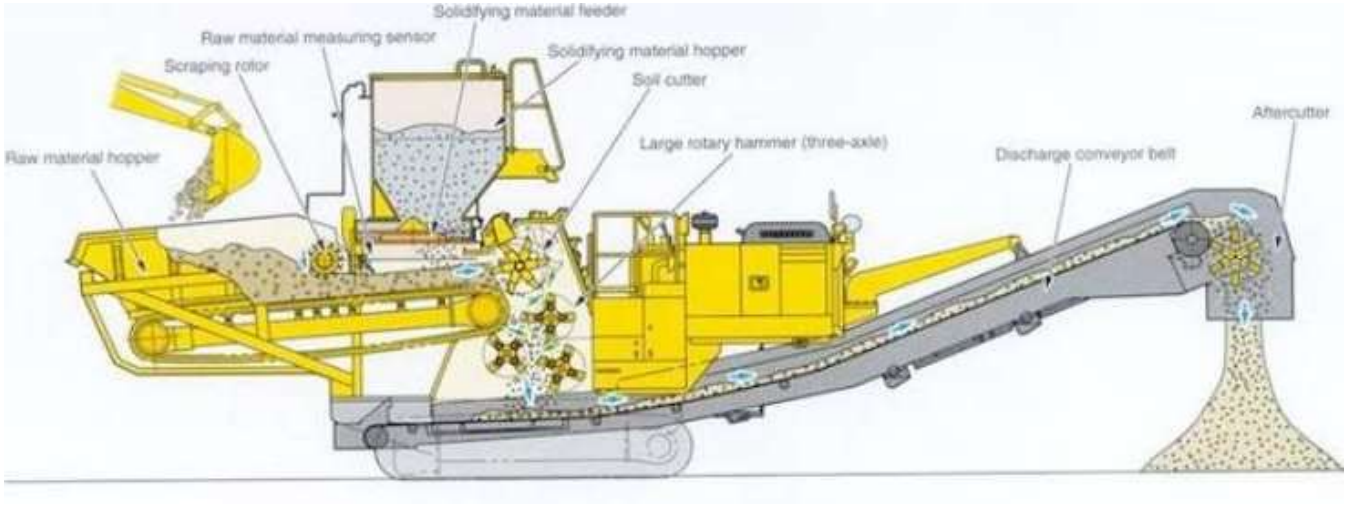


Figure 4: Reterra (source: Komatsu website)

The production rate of the Reterra is estimated as 250 t/hour.

The Reterra is a tracked machine that has a fully automated dosing rate capable of accurately replicating reagent dosing requirements in a control mixing chamber. The Reterra will also be a controlled system, whereby volatile and particulate emissions can all be controlled.

After mixing, the treated materials would be cured and subjected to validation testing prior to classification being completed and transfer to an appropriately licenced waste disposal facility. It is estimated 10,000 tonnes per annum of treated soil would be disposed of to an appropriately licenced facility per annum.

2.11.2.4 Immobilisation

It is estimated the Project would treat up to 60,0000 tonnes per annum of contaminated soil via immobilisation.

Treatment would be undertaken in a batch process with reagents added and mechanically mixed using a high sheer mixer (Reterra or similar). Materials would be stored in dedicated Treatment Bays to maintain separation of each source batch.

After mixing, the treated materials would be stockpiled, cured and subjected to validation testing prior to final classification being completed and transfer to an appropriately licenced waste disposal facility. The treatment and validation processes are described in Chapter 7.

Equipment for Immobilisation would be common with the Chemical Oxidation Equipment and would include:

- 1 x 12 t excavator;
- 1 x one front end loader;
- 1 x 6-8 T dump truck; and
- 1 x high sheer mixer (Reterra or similar).

The use of the Reterra in this immobilisation approach is particularly useful as loading and stockpiling can be controlled. The other key benefit is the fact that some form of pre-treatment will be required to maintain the material running on the feed belt to be of a target moisture content range and removal of oversize to ensure uniform, homogeneous mixing will be achieved.

Treated materials would be subjected to validation testing prior to final classification being completed and transfer to an appropriately licenced waste disposal facility. It is estimated 60,000 tonnes per annum of treated soil would be disposed of to an appropriately licenced facility per annum.

2.11.2.5 Bioremediation

It is estimated the Project would treat up to 10,000 tonnes per annum of contaminated soil via bio-remediation processes. The treatment and validation process are described further in Chapter 7.

Treatment would be undertaken in a batch process. Reagents would be dosed via an enclosed automated liquid dosing system and mechanically mixed. Materials would be stored in dedicated Bioremediation Bays to maintain separation of each source batch. Soil would be cured in windrows with a GORE cover system or similar with air sparing or turning for aeration. Off gases would be collected and passed through an activated carbon scrubber to remove volatile and semi volatile hydrocarbons.

Equipment for Bioremediation would include:

- 1 front end loader (shared with the Chemical Oxidation and Immobilisation process);
- GORE or similar cover system;
- Reterra (shared with the Chemical Oxidation and Immobilisation process);
- Pumping system and Aeration equipment.

Treated materials would be subjected to validation testing prior to final classification being completed and transfer to an appropriately licenced waste disposal facility. It is estimated that approximately 10,000 tonnes per annum of treated soil will be reused or disposed of to an appropriately licenced facility.

2.11.2.6 Acid Sulfate Soils

It is estimated the Project would treat up to 30,000 tonnes per annum of acid sulphate soils. The treatment and validation processes are described further in Chapter 7.

Treatment would be undertaken in a batch process. Acid neutralising reagents would be mixed in small stockpiles within the dedicated ASS Bays or using the Reterra, soil mixing plant where batches are greater than 500 tonnes.

Equipment for treatment of Acid Sulfate Soils would be in common with the Chemical Oxidation and Immobilisation process and include:

- 1 x 12 t excavator;

- 1 x one front end loader;
- 1 x 6-8 T dump truck; and
- 1 x high sheer mixer (Reterra).

Treated materials would be subjected to validation testing prior to final classification being completed and transfer to an appropriately licenced waste disposal facility. It is estimated 30,000 tonnes per annum of treated acid sulphate soils will be disposed to an appropriately licenced facility.

2.11.2.7 Transportation

Handling and transportation of any waste will be undertaken in accordance with guidelines and is described further in Chapter 7.

2.11.3 Liquid Wastes

2.11.3.1 Delivery

Liquid waste treatment would take place within the Waste Treatment Facility as shown in Figure 1. Approximately 70 ML per annum of wastewater would be treated at the Site or approximately 1-2 ML/day. Wastewater would be delivered to the Site in tankers and unloaded into the holding tanks.

Drill mud would be delivered to the Drill Mud Plant for treatment.

Other liquid wastes will be sent directly to the Wastewater Treatment Plant (WWTP).

2.11.3.2 Liquid Waste Treatment

Liquid waste would be treated in 50 kL batches and validated on a per batch treated. Wastewater would be pumped from the holding tanks to the mixing tank to equalise influent concentrations. Reagents will be added to the mixing tank via an enclosed automated dosing system, as determined by bench scale testing. The mixing tank is mechanically mixed to keep solids in suspension and to ensure reagents contact time. Reagents to thicken or flocculate suspended solids will be dosed.

From the Mixing Tank, wastewater is pumped to the Clarifier where suspended solids are allowed to settle. The Clarifier will be a tank with a conical base allowing sludge to settle for transfer to the sludge thickener, oil would be separated for disposal and supernatant pumped to the DAF for further treatment. The solids collected by suspended solids removal will be managed as a separate soil / sludge waste stream. If further dewatering is required, a plate filter press will be used to reduce moisture content further to improve solid waste treatment.

Sludge from the DAF is similarly pumped to the sludge thickener, and oil separated, collected and stored separately prior to disposal. From the DAF the wastewater is pumped to the filter feed tank before being passed through the sand filter and granular activated carbon filters. Backwash from the filters is returned to the holding tanks. Wastewater is pumped to the treated water tank for final pH correction prior to sampling and discharge to sewer in accordance with appropriate licencing/agreements. Sludge from the sludge thickener is pumped to the screw press, whilst water from dewatering is pumped back to the holding tanks.

Equipment for the Liquid Waste Treatment Facility may include:

- 8 x 200 kL Holding tanks or equivalent custom tank/s;
- 4 x 50 kL Mixing tanks or equivalent custom tank/s;
- 1 x 50 kL Clarifier;
- 1 x 20 kL Sludge Thickener

- 1 x 20 kL DAF;
- 2 x 20 kL Filter Feed Tanks
- 6 x 2 kL Sand Filters;
- 4 x 2 kL GAC Filters; and
- 4 x Ion exchange filters
- 2 x Plate Filter Press
- 1 x Screw press4 x 50 k L Treated Water Tank or equivalent custom tank/s.

All tanks would be fitted with overflow protection, alarms and automation.

Residual wastes from the treatment of wastewater treatment include:

- Waste oil. This will be collected in a 1 kL IBC and sent to an appropriately licenced oil recycler.
- Filter cakes from the filter press will be tested and disposed of at an appropriately licenced facility. It is estimated approximately 4000 tonnes of filter cake would be disposed per annum.

Treated wastewater would be sample and disposed to sewer in accordance with Sydney Water Trade Waste Agreement. It is estimated 65 ML per annum would be disposed to sewer.

The Wastewater Treatment Plant would be bunded in accordance with relevant Australian Standards.

2.11.3.3 Drill Mud Treatment

Drill mud would be treated in batches.

Process equipment would be as follows.

- 1 x 50 kL Storage tank
- Shaker sieve
- Desilter hydrocyclone
- Decanter centrifuge
- 1 x 50 KL Holding tank

Equipment would include

- 1 front end loader (shared with the Bulk Soils Treatment).

Separated solids are placed in Storage and Transfer Bays for sampling and testing in accordance with the NSW EPA “Treated drilling mud order 2014” and once dry would be transported for reuse or to an appropriately licenced facility.

Typical processing equipment is shown in Figure 5.

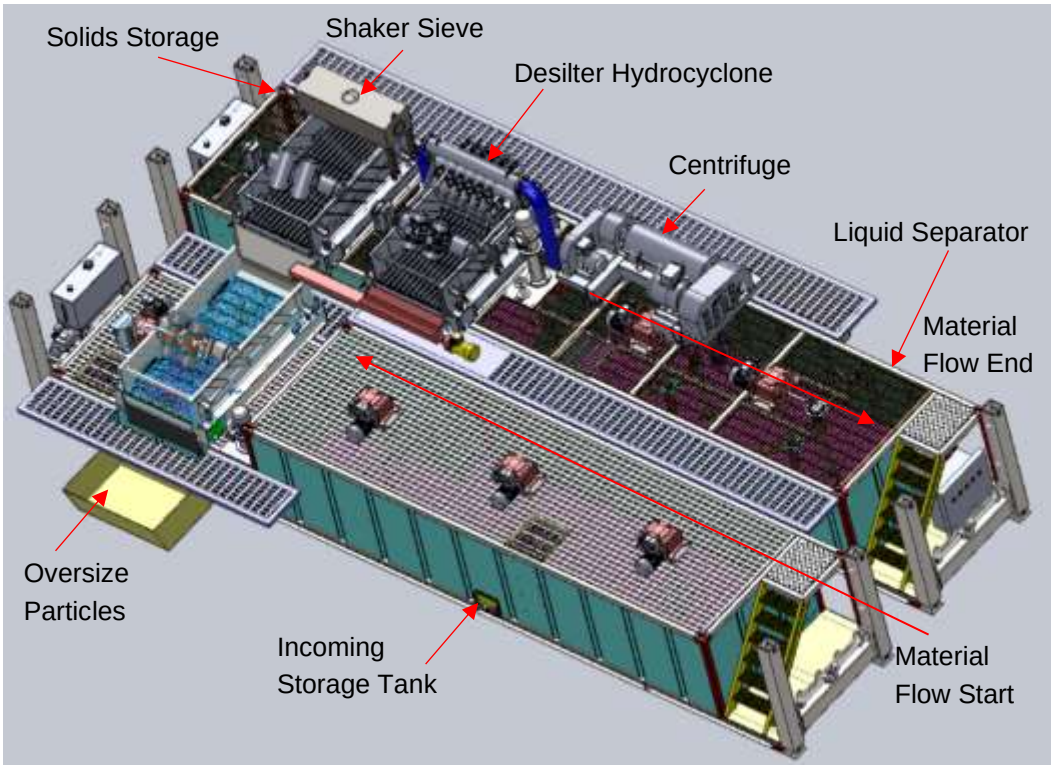


Figure 5: Drilling Mud Processing Layout supplied by the Proponent (GN Solids Control)

Approximately 6 000 tonnes per annum of recovered solids would be transferred to an appropriately licenced facility. Approximately 4000 kL of liquid waste per annum would be tested and classified either for re-use on site for dust suppression or discharged to sewer under a Trade Waste Agreement with Sydney Water.

2.12 NSW EPA Waste Codes, Storage and Containment and Storage and Treatment Times

The Project will be licensed to accept the waste codes list in Appendix C.

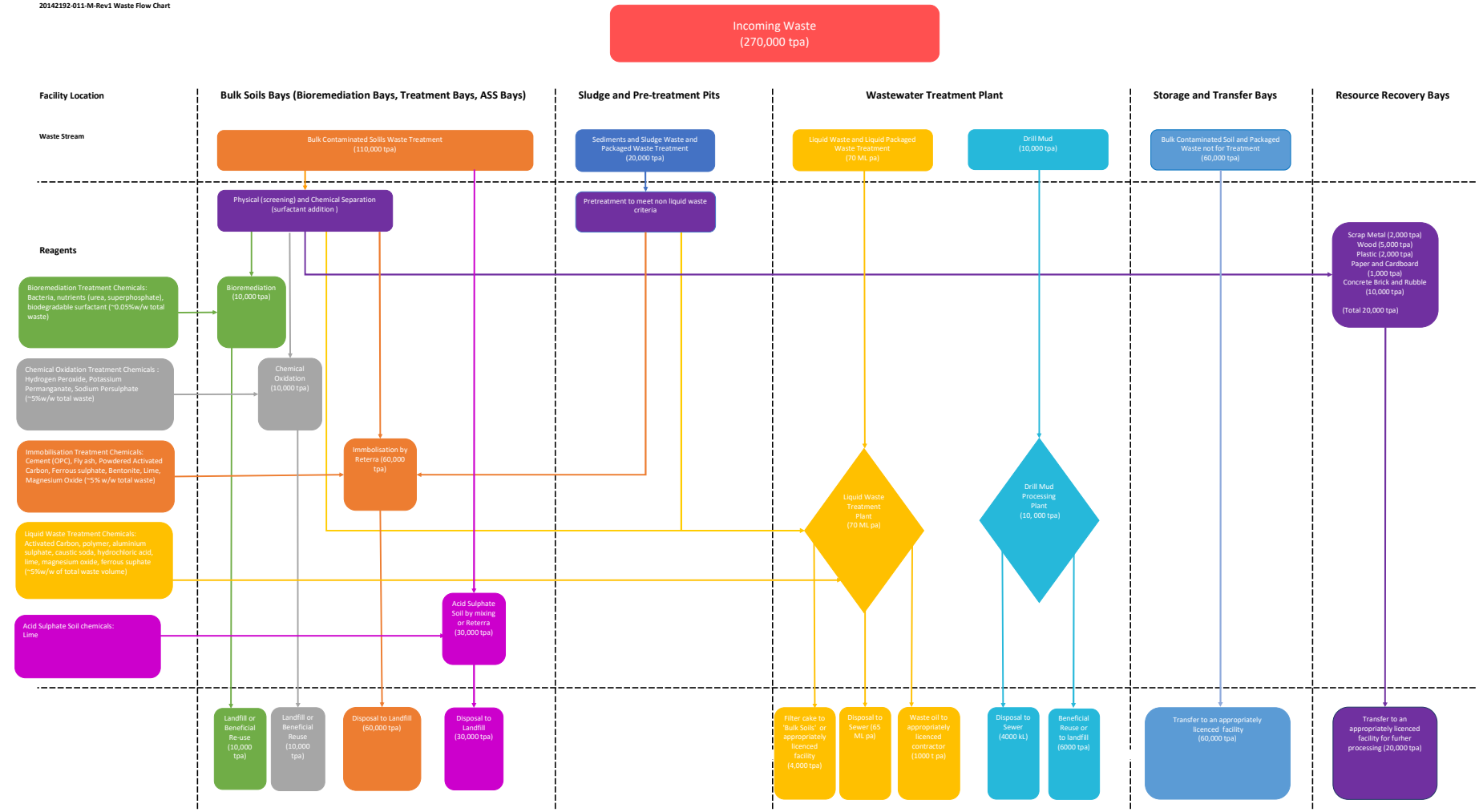
Appendix C also provides the maximum storage volumes for each waste type, storage and containment details and maximum storage and treatment time.

2.13 Waste Flows

The general waste flows at the Site are shown on Figure 6.

Prestons Waste Treatment Facility Waste Flows

12/11/2021
JM/TR/jm
20142192-011-M-Rev1 Waste Flow Chart



Note: Bulk soils may be stored in the storage and transfer bays upon receipt at the facility prior or awaiting dispatch.
Drill Mud solids would be stored in the storage and transfer bays prior to dispatch

2.14 Storage of Reagents

Cement would be stored in 1 x 50 tonne silos located as shown on Figure 1. The silo would be fitted with overflow protection.

Activated Carbon would be stored in bags. Approximately 10 tonnes would be stored onsite at any one time.

The onsite storage volumes for other reagents would be as follows:

- 2 t hydrogen peroxide (DG Class 5.1)
- 1 t potassium permanganate (DG Class 5.1)
- 1 t sodium persulphate (DG Class 5.1)
- 5 t ferrous sulphate (powdered)
- 1 t bacteria
- 5 t urea
- 5 t super phosphate (powdered)
- 2 t biodegradable surfactant
- 2 t polymer (powder or liquid)
- 20 t finely crushed limestone or “aglime”.
- Primary Cementious stabilising agents (OPC, GGBFS, Pulverised Fuel Ash, Cement Kiln Dust);
- Secondary stabilising agents (Lime, Sodium Silicate, Carbons, Organophilic clays, natural pozzolans, bentonites) to enhance primary stabilisation performance where combination of contaminants are present;
- 5 t aluminium sulphate (28% w/w, or powdered)
- 5 t hydrochloric acid (37% w/w) (DG Class 8)
- 5 t caustic soda (30% w/w) (DG Class 8)
- 5 t magnesium oxide (powdered)

In addition, the following reagents and volumes would be stored at the Wastewater Treatment Plant within the bunded chemical dosing area:

- 2 tonne Hydrochloric Acid
- 2 tonne Caustic soda
- 2 tonne Aluminium sulfate
- 2 tonne Polymer
- 2 tonne Activated Carbon
- 2 tonne Magnesium Oxide
- 2 tonne Ferrous sulfate

Corrosive substances (Class 8) would be stored and handled by following the methods outlined in AS 3780-2008, The storage and handling of corrosive substances.

Storage and handling of Class 5.1 oxidizing substances would be undertaken in accordance with AS 4326-2008, The storage and handling of oxidizing agents.

Liquids would be stored in IBC's and powders would be stored in bags.

The application of these treatment chemicals will be via enclosed automated dosing systems minimising the potential for worker exposure to the reagents.

2.15 Stormwater Management System

All waste unloading, treatment and loading will be undertaken within the Waste Treatment Facility Buildings. Trucks would remain covered until unloading within the facility. The proposed stormwater management system would ensure segregation between clean stormwater runoff and potentially contaminated runoff, refer to Chapter 11 of the EIS.

The Project would primarily utilise the existing stormwater management infrastructure at the Site with some minor modifications. The proposed surface water management system is presented in Chapter 11 and Appendix H.

An underground rainwater tank would be located in landscaped area for collection and reuse of rainwater collected from the roof.

2.16 Leachate Management System

Leachate collection pits would be installed within the Waste Treatment Facility building to capture potentially contaminated runoff within the building. The leachate collection pits would pump to the Waste Water Treatment Plant for treatment of liquid waste prior to discharge to sewer.

The proposed leachate management system would ensure segregation between clean stormwater runoff and potentially contaminated runoff, refer to Chapter 11 of the EIS.

2.17 Air Quality Management

To provide a safe work environment, air emissions generated in specific work areas are to be collected by the heating, ventilation and air conditioning system (HVAC) (see Appendix N for HVAC System Design). The HVAC system design is based on:

- the future building configuration;
- the number of air exchanges needed to provide fresh air and for comfort heating/cooling; and
- to maintain slight negative pressure on the building envelope (to minimize fugitive air emissions).

Contaminated air collected by the HVAC system is sent for treatment in air emissions control devices prior to discharge to air. The proposed air emissions treatment systems include Particulate Matter (PM) filters and Activated Carbon (AC) filters to remove Volatile Organic Compounds (VOCs) and odour.

Air emissions from the facility will be discharged from vertical strobic fans at 11.7 m above ground level. The strobic fans will be controlled dynamically, operating at higher flow rates when dusty or volatile materials are being delivered, handled or treated, and operating at lower intensities in the evening or at night, when only waste delivery is scheduled to occur.

Further detail on the HVAC system design and operation is provided in Appendix F.

2.18 Fire Management System

The Waste Treatment Facility will be equipped with fire safety measures to comply with the building category and use. Refer to the Fire and Incident Management Assessment (Appendix K) and Chapter 14 of the EIS for further details.

2.19 Water Supply

Water demand would be met through an existing connection to Sydney Water supply that runs along Whyalla Place and rain water captured for reuse. Refer to Chapter 11 and Appendix H for further details.

2.20 Utilities

The Project would utilise existing utilities connections.

It is noted that the electrical room would be relocated to outside the building as shown in the Concept Drawings in Appendix N.

2.21 Staging

The construction and operation of the Project would be developed in two stages. Stage 1 is depicted in Figure 7. Stage 2 and final development is depicted in Figure 1.

Stage 1 operations would only comprise:

- Storage, classification and transfer of all types of soil for all waste codes proposed in Section 2.12.
- Storage, classification and transfer of all types of water and sludge for all waste codes proposed in Section 2.13 in IBCs only. No bulk liquid waste or sludges would be accepted during Stage 1.
- Bioremediation per Section 2.5.3.2
- Gravity Separation per Section 2.5.2.1 to remove inert concrete, brick, tile etc.
- Acid sulfate Soil Treatment per Section 2.6 where batch is suitable for treatment using a bucket.

Mobile soil immobilisation may be undertaken from time to time during Stage 1, however would be the subject of a Specific Immobilization Application and Approval.

It is expected the Waste Treatment Facility will operate as Stage 1 for a period of up to 2 years before construction and operation of Stage 2.

EXIT
EXIT
STORAGE & TRANSFER BAYS
RESOURCE RECOVERY BAYS
EXIT
STORAGE & TRANSFER BAYS
ASS BAYS
EXIT
BIO REMEDIATION BAYS
EXIT
EXIT
WEIGH BRIDGE
WEIGH BRIDGE
STORAGE & TRANSFER BAYS
EXIT
EXISTING OFFICE
EXISTING SPRINKLER TANK
EXISTING SPRINKLER VALVE ROOM
RSD
EXISTING HARDSTAND
CAR PARKING (40)
EXISTING HARDSTAND
GARDEN
GRASS
GARDEN
GRASS
GARDEN
GRASS
GARDEN
GRASS
EXISTING FENCE RECONFIGURED
TRUCK ENTRY
CAR ENTRY/EXIT
TRUCK EXIT
WHYALLA
(20 WIDE)
PLACE

LEGEND

- WAREHOUSE - EXISTING
- WAREHOUSE - EXTENSION
- CONCRETE DRIVE
- GRASS
- GARDEN
- SITE BOUNDARY

PROJECT
PRESTONS WASTE TREATMENT FACILITY

TITLE
CONCEPTUAL LAYOUT
STAGE 1

PROJECT NO.	CONTROL	REV.	FIGURE
	005	1	F007

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3
0 25 mm

2.22 Construction of the Project

Construction methods would be determined at the time of construction in accordance with the Project approval requirements.

2.22.1 Stage 1

Stage 1 construction time is estimate at 1-2 months. Stage 1 construction would comprise the following key activities:

- Minor demolition;
- Minor earthworks;
- Construction of weighbridges;
- New driveway;
- Building extension;
- HVAC System Stage 1;
- Fire Management System Upgrade; and
- Internal fit out.

Demolition: Minor demolition of a portion of the existing slab in the carpark, minor demolition of portions of walls of the existing warehouse would have a construction period of approximately 1 month.

Minor earthworks: Minor earthworks for footings, slabs, drainage, landscaping etc would have a construction periods of approximately 1 month.

Weighbridges: Construction of the new weighbridges would have a construction period of approximately 1 month.

New Driveway and entry gates: A new driveway and gate configuration will be constructed and would involve minor earthworks and minor concrete works would have a construction period of approximately 1 month.

Building Extension Stage 1: The building extension would be construction from pre fabricated concrete panels and would have a construction period of approximately 2 months.

HVAC System Stage 1: A heating, ventilation and air conditioning system would be installed within the existing and would have a construction period of approximately 1 month.

Fire Management System Upgrade : Upgrade of the sprinklers and fire fighting infrastructure onsite. Construction period of approximately 1 month.

Building internal fit out Stage 1: Installation of push walls and bays and internal leachate drainage, truck and wheel wash, office reconfigurations, decontamination facility, laboratory. Fit out of the Waste Treatment Facility would have a construction period of approximately 1 month.

2.22.2 Stage 2

Stage 2 construction time is Construction methods would be determined at the time of construction in accordance with the Project approval requirements. estimated at approximately 4 months. Construction would comprise the following key activities:

- Minor demolition;

- Minor earthworks;
- Building extension;
- HVAC System Stage 2;
- Fire Management System Upgrade; and
- Internal fit out – pits, push wall, bunding, water treatment plant, fire wall.

Demolition: Minor demolition of a portion of the existing slab in the carpark, minor demolition of portions of walls of the existing warehouse would have a construction period of approximately 1 month.

Minor earthworks: Minor earthworks for footings, slabs, drainage etc would have a construction periods of approximately 1 month.

Building Extension Stage 2: The building extension would be construction from pre fabricated concrete panels and would have a construction period of approximately 2 months.

HVAC System Stage 2: A heating, ventilation and air conditioning system would be installed within the building extension and would have a construction period of approximately 1 month.

Fire Management System Upgrade : Upgrade of the sprinkler, tanks and fire fighting infrastructure onsite. Construction period of approximately 1 month.

Building internal fit out Stage 2: installation of waste treatment equipment including tanks, pits, silos, pumping and dosing systems. Fit out of the Waste Treatment Facility would have a construction period of approximately 3 months.

2.22.3 Equipment

Equipment necessary for the construction of the Project would include compaction equipment, backhoes, excavators, rollers, truck, concrete pumping equipment, air compressors, concrete vibrators and saws, mobile cranes and welders.

2.22.4 Construction Hours

Standard construction hours of 07:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays with no work on Sundays and public holidays is proposed. The construction phase duration is expected to be 4 months.

2.22.5 Work Force

The construction workforce would vary throughout the construction period depending on the activities underway. Typically, the construction workforce would be up to 10 persons.

2.23 Operation of the Project

2.23.1 Hours of Operation

The Project would receive waste 24 hours a day, while processing and dispatch operations undertaken between 7:00 am and 6:00 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays.

2.23.2 Work Force

A total of up to 10 personnel is estimated for the operation of the Waste Treatment Facility, whilst four people would be required outside of operational hours for receipt of material.

Staff per shift and shift times for operations are as follows:

- Day Shift (7 am-3pm) 10 staff maximum;
- Afternoon Shift (3 pm-11pm) 4 staff maximum;
- Night Shift (11 pm-7am) 4 staff maximum;
- Up to a maximum of 30 employees utilising the office space only accessed predominantly during operation of the Waste Treatment Facility.

While this would result in up to 48 employees for the Project, due to shift times all employees would not access the Site at the same time.

2.23.3 Capital Investment Value

The Project will have a Capital Investment Value (CIV) of approximately $6,376,000 (excl GST).

Refer to Appendix P for detailed calculation of the CIV for the Project.

2.24 Justification and Strategic Need

As identified in Section 1.3, the key objective of the Project is to utilise proven waste treatment technology to reduce potential health and environmental impacts of waste, increase beneficial reuse and facilitate recovery of resources and therefore increase diversion from landfill.

It is considered the Project will provide a strategic asset and waste treatment service that would play a key role in the delivery of construction and development within Western Sydney including the M12, Western Sydney Airport, Western Sydney Aerotropolis area and the wider region being centrally located in Western Sydney.

As outlined in Section 2.24.1 urban development is one of the highest contributors to contaminated soil generation. Review of the current market trends indicates an increasing need for waste treatment and processing facilities to meet state targets and support industry. The products and services offered by the Project would contribute to meeting current and future demand for waste treatment, processing and resource recovery.

Being centrally located in Western Sydney, the Site has good transport links to major urban areas thereby reducing the time, transport and further environmental costs associated with waste acceptance, treatment and/or reuse in the Western Sydney area. The Site also provides contingency to treat waste in the Western Sydney Region such as treating large volumes of contaminated material in response to emergency environmental incidents involving contaminated soils or water.

With more efficient waste treatment processing, the Project would result in better management of material flows to benefit human health, the environment and the economy. This includes higher diversion rates than are currently available, which would also result in increased beneficial reuse of materials to contribute to a circular economy. For example, the treatment of contaminated soils, sludges and liquid wastes would provide for destruction of contaminants whilst providing for beneficial reuse of materials by industry.

It is considered that there are a number of drivers for the strategic need and justification for the Project, that arise from environmental, economic and social considerations, which are framed by legislation, policy and strategy documents of the Commonwealth and NSW.

2.24.1 National Waste Policy 2018

Waste management at a national level in Australia is guided by the Commonwealth Government of Australia (2018) “National Waste Policy 2018”. The National Waste Policy provides a national framework for waste and resource recovery in Australia. It outlines roles and responsibilities for collective action by businesses,

governments, communities and individuals and provides a framework for collective, national action on waste management, recycling and resource recovery to 2030. It reflects thinking about waste as a resource, and it applies principles of waste management to support better and repeated use of our resources.

The “National Waste Policy Action Plan 2019” presents targets and actions to implement the 2018 National Waste Policy. These targets and actions are to guide investment and national efforts to 2030 and beyond. The “National Waste Report 2020” provides a summary of the status of waste in Australia in 2018-19, including data on waste generation, source streams, materials and fates.

Growth in the generation and management of hazardous waste grew by 66% over the period 2006-07 to 2019-19. Drivers includes unprecedented level of urban growth causing 200% increase in generation of contaminated soils in NSW, QLD and VIC. The construction industry produces large quantities of contaminated soils. (*Note: For the purpose of the National Waste Policy ‘Hazardous Waste’ includes all Trackable Waste in NSW not just waste with a NSW Hazard Waste Classification.)*

The National Waste Policy guides continuing collaboration between all Australian governments, businesses and industries and sets a path for Australia to transition toward a circular economy identifying the following five principles that underpin waste management recycling and resource recovery.

- Avoid waste;
- Improve Resource Recovery;
- Increase use of recycled material and build demand and markets for recycled products;
- Better manage material flows to benefit human health, the environment and the economy; and
- Improve information to support innovation, guide investment and enable informed consumer decisions.

The above principles identified in the National Waste Policy have corresponding strategies to address each issue. Whilst the Project supports all of these five principles, of most relevance to the Project are:

- Avoid waste

  Strategy 2 Design: *Design systems and products to avoid waste, conserve resources and maximise the value of all materials used at every stage of a product’s life.*

  Strategy 3 Knowledge sharing, education and behaviour change: *Implement coordinated knowledge sharing and education initiatives, focused on the waste hierarchy and the circular economy, that address the needs of governments, businesses and individuals, and encourages the redesign, reuse, repair, resource recovery, recycling and reprocessing of products.*

- Improve Resource Recovery

  Strategy 4 Product stewardship: *Develop and implement partnerships across government and business to ensure ownership and responsibility for action to minimise the negative impacts from products, ensure the minimisation of waste and maximise reuse, repair and recycling of products and materials throughout their life cycle.*

  Strategy 7 Increasing industry capacity: *Identify and address opportunities across municipal solid waste, commercial and industrial waste, and construction and demolition waste streams for improved collection, recycling and energy recovery, to deliver ongoing improvements in diversion from landfill, improved quality of recycled content and use of the waste hierarchy.*

- Better manage material flows to benefit human health, the environment and the economy

> Strategy 11 Sound management of chemicals and hazardous waste[1]: *Manage and regulate chemicals and wastes throughout their lifecycle to minimise environmental and human health impacts and meet Australia's national and international obligations.*

The above principles and strategies enable addressing Australia's commitment to the United Nations Sustainable Development Goal 12: Responsible Consumption and Production. As stated in the National Waste Policy:

> Achieving Goal 12 requires a strong national framework for sustainable consumption and production that is integrated into national and sectoral plans, sustainable business practices and consumer behaviour, together with adherence to international norms on the management of hazardous chemicals and wastes.

The Project will contribute to addressing the management of hazardous chemicals and wastes (as defined by the National Waste Policy) to facilitate the better management of the flows of materials within our economy to benefit human health, the environment and deliver opportunities for wealth creation.

In facilitating and providing increased reuse and resource recovery the Project will also address and enable strategies of the National Waste Policy including knowledge sharing, education and behaviour change (Strategy 3), product stewardship (Strategy 4) and increasing industry capacity (Strategy 7) and design (Strategy2). As identified on page 1 of the National Waste Policy Action Plan 2019:

> *"…for every 10,000 tonnes of waste recycled, 9.2 jobs are created, compared with only 2.8 jobs if the same amount goes to landfill. Each year $2.9 billion is raised through sales of recovered materials. By working together, businesses, governments, communities and individuals can support our economy, while protecting human health and reducing environmental impacts."*

2.24.2 Hazardous Waste in Australia Report 2019

Amounts of Hazardous waste arising in Australia are identified as increasing each year faster than other waste, and faster than the rate of population growth. Average annual growth in arisings between 2010-2011 and 2014 was 9% per year, with a 34% increase between 2017-2019. This large increase in the growth of waste is largely due to contaminated soils and asbestos. NSW trends indicate contaminated soil is a driving force in this trend.

Note: For the purpose of the Hazards Waste in Australia 2019 report 'Hazardous Waste' includes all Trackable Waste in NSW (refer Appendix A of the Report), not just waste with a NSW Hazard Waste Classification. Therefore, this report is considered applicable to the waste streams proposed to be accepted at the Site.

2.24.3 Waste and Sustainable Materials Strategy

In June 2021, DPIE released the "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027", which outlines actions over the next six years (Stage 1 of the strategy), to deliver on long-term objectives of the NSW *Waste Avoidance and Resource Recovery Act 2001* (refer to Section 3.3 of the EIS). To support the "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027", DPIE also released in 2021 the "NSW Waste and Sustainable Materials Strategy: A Guide to Future Infrastructure Needs" (the Guide).

The Waste and Sustainable Materials Strategy updates the NSW *Waste Avoidance and Resource Recovery Strategy 2014–2021* and seeks to address resource recovery targets through emphasising the circular

1 The National Waste Policy defines Hazardous Waste as "Wastes requiring higher levels of control to avoid impacts on human health and the environment. They may contain hazardous substances or have hazardous characteristics". P17

economy, aimed at minimising waste and promoting the continual reuse of resources to keep products, equipment and infrastructure in use for longer, thus improving the productivity of these resources.

The "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027" identifies three (3) focus areas:

1) Meeting future infrastructure and service needs. As waste volumes continue to grow, infrastructure and services will need to keep pace. We need to ensure we have the capacity to meet our critical future needs, such as residual waste capacity, as well as stimulating investment in a pipeline of innovation.

2) Reducing carbon emissions through better waste and materials management. Transitioning to a circular economy means increasing our resource efficiency and reducing our carbon footprint. If we can make our materials more productive by improving their durability through design, reusing or repairing them, recycling and remanufacturing them or extracting their embodied energy, we can reduce our reliance on emissions-intensive virgin materials.

3) Building on our work to protect the environment and human health from waste pollution. If poorly managed, waste can cause enormous damage to our natural environment and threaten the health and well-being of our community. Pollution from waste can be caused by littering, illegal dumping and mishandling of hazardous wastes, and it costs NSW millions of dollars each year. Maintaining strong regulations will help to stop this waste pollution, while engaging with businesses and consumers will help to drive positive behaviour change.

The Project directly supports each of these focus areas, which directly relate to the identified key objectives of the Project. This includes providing capacity for waste treatment in the Western Sydney area, promoting a circular economy through increasing resource recovery and resource efficiency and treating wastes appropriately to reduce the potential impact upon the environment and human health from waste pollution.

Of particular relevance to the Project, the "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027" identifies that there are potential capacity constraints for hazardous waste treatment including capacity constraints for liquid waste treatment.[2] In relation to this, the Guide states:

NSW hazardous waste arisings (defined here as the delivery of waste to processing, storage, treatment, or disposal infrastructure) for 2019–20 are estimated to be 2,400,000 tpa. Excluding tyres, the highest volume waste types are:

- *asbestos (including asbestos contaminated soils): 900,000 tpa*
- *contaminated soils: 839,000 tpa*

The Guide goes on to identify NSW has immediate capacity deficits in hazardous waste landfill and it is estimated that hazardous waste arisings will exceed available capacity in:

- Soils treatment facilities by 2028; and
- Chemical/physical treatment plants by 2027.[3]

The Guide provides a market summary of hazardous waste in NSW stating the following:

…the hazardous waste management sector in NSW is dominated by three companies by market volume. Excluding contaminated soils, these companies receive 60% of hazardous waste arisings but again account

[2] DPIE (2021) "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027" p11-12.

[3] DPIE (2021) "NSW Waste and Sustainable Materials Strategy: A Guide to Future Infrastructure Needs" p27.

for only 30% of NSW hazardous waste facilities. This has resulted in an infrastructure network characterised by single point dependencies that are, in some cases, ageing and approaching capacity.[4]

As such, the Project would positively contribute to the infrastructure network for hazardous waste management and provide new infrastructure, needed capacity and contribute to reducing single point dependency.

As further identified within the Guide, the challenges to address hazardous waste are as follows:

Due to the human health and environmental risks inherently posed by hazardous wastes, it is critical that sufficient capacity is available to store, treat, and dispose or recycle these wastes safely. There is increasing pressure on critical hazardous waste infrastructure in NSW, associated with growing waste quantities, key site closures, and the emergence of new waste streams.

For example, expected reductions in NSW hazardous waste landfill and liquid waste treatment capacity will increase reliance on interstate facilities for the treatment and disposal of certain waste streams, including solvent wastes. This may expose NSW to hazardous waste management risks due to regulatory, political, economic, and strategic factors outside of NSW control.

With approval, the Project would contribute to addressing immediate and future capacity deficits within NSW as identified within the "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027" and the Guide and provides for the appropriate treatment of waste to a level suitable for reuse, disposal to landfill or disposal to sewer.

Note: It is understood 'Hazardous Waste' includes all Trackable Waste in NSW, not just waste with a NSW Hazard Waste Classification. Therefore, this report is considered applicable to the waste streams proposed to be accepted at the Site.

2.24.4 Site Suitability

As assessed and discussed throughout the EIS, the Site is considered suitable for the Project based upon a number of reasons including:

- The Site is located within an appropriately designated land use of IN3 Heavy Industrial precinct that provides a suitable buffer to potentially sensitive receivers.
- The Site contains existing infrastructure and buildings, which are proposed to be augmented and utilized for the Project as detailed throughout this chapter and the EIS;
- The Site is readily accessible, utilizing major roads for the majority of potential journeys to and from the Site;
- The Site is centrally located in Western Sydney and in proximity to identified major projects for the Western Sydney area, thereby reducing the time, transport and further environmental costs associated with waste acceptance, treatment and/or reuse.
- As identified throughout the EIS, the potential impacts of the Project are within acceptable relevant requirements of policy, guidelines and legislation.

[4] Ibid p26.

3.0 STATUTORY FRAMEWORK

The Secretary's Environmental Assessment requirements:	Addressed
General Requirements – a detailed description of the development, including: ■ *Consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments*	Chapter 3: Statutory Framework
Key Issues – Statutory and strategic context – including: ■ *detailed justification for the proposal and the suitability of the site* ■ *detailed justification that the proposed land use is permissible with consent* ■ *demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. This includes, but is not limited to:* ▪ *State Environmental Planning Policy (Infrastructure) 2007* ▪ *State Environmental Planning Policy (State and Regional Development) 2011* ▪ *State Environmental Planning Policy No. 55 – Remediation of Land* ▪ *Liverpool Local Environmental Plan 2008* ▪ *Greater Sydney Region Plan: A Metropolis of Three Cities* ▪ *Our Greater Sydney 2056: Central City District Plan*[5] ▪ *Future Transport Strategy 2056.*	Chapter 3: Statutory Framework

3.1 Commonwealth Legislation

3.1.1 Environment Protection and Biodiversity Act 1999

The *Environmental Protection and Biodiversity Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas and species, populations and communities and heritage items. The approval of the Commonwealth Minister for the Environment is required for:

- An action that has, would have, or is likely to have a significant impact on matters of National Environmental Significance (NES matters);
- Actions that are likely to have a significant impact on the environment of Commonwealth land;
- Actions taken on Commonwealth land that are likely to have a significant impact on the environment anywhere; and

[5] Note the Site is located within the Western City District and as such is assessed in accordance with "Our Greater Sydney 2056: Western City District Plan".

- Actions by the Commonwealth that are likely to have a significant impact on the environment anywhere.
- NES matters include:
- World heritage properties;
- National heritage places;
- Wetlands of international importance;
- Listed threatened species and communities;
- Migratory species protected under international agreements;
- Commonwealth marine environment;
- Great Barrier Reef Marine Park;
- Nuclear actions (including uranium mines); and
- A water resource, in relation to coal seam gas development and large coal mining development.

The requirement for a Commonwealth approval is assessed through a referral process to the Commonwealth Department of Agriculture, Water and the Environment. If the Minister for this Department determines that a project is likely to have a significant impact, the project would become a controlled action and approval of the Commonwealth Minister is required.

The need for a referral is based on two triggers. The first is that it must relate to NES matters. The second is that it must have a significant impact on such matters.

Based upon the assessment completed in this EIS a referral will not be made to the Commonwealth Minister.

3.1.2 National Waste Policy 2018

Refer to Chapter 2 that considers and discusses the Commonwealth Government of Australia (2018) “National Waste Policy 2018” in regard to this policies’ principles and objectives and the strategic need of the Project to meet these aims.

3.2 NSW State Legislation

3.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act (and the associated EP&A Regulation) is the primary legislation for establishment of controls on land use planning, establishing the framework for environmental planning and assessment in NSW.

The objects of the EP&A Act are:

a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State’s natural and other resources,

b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,

c) to promote the orderly and economic use and development of land,

d) to promote the delivery and maintenance of affordable housing,

e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,

f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),

g) to promote good design and amenity of the built environment,

h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,

i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,

j) to provide increased opportunity for community participation in environmental planning and assessment.

The Project is consistent with the objects of the EP&A Act and is considered capable of fulfilling the statutory requirements. The environmental risk assessment has identified that the Project will not result in any significant negative impacts that cannot be adequately mitigated or managed. This EIS confirms that the Project can be undertaken in a manner that will promote a better environment through the management, development and conservation of the State's resources and will promote the orderly and economic use of the land in a manner, which will provide an improved level of waste management into the future.

State Significant Development

Part 4 of the EP&A Act establishes an assessment and approval regime for development that is declared as State Significant Development (SSD). *State Environmental Planning Policy (State and Regional Development) 2011* describes development that is subject to the approval process established under SSD. Of most relevance, Section 4.36 of the EPA Act enables a State Environmental Planning Policy to declare any development, or any class or description of development, to be SSD. This clause states:

(1) For the purposes of this Act, State significant development is development that is declared under this section to be State significant development.

(2) A State environmental planning policy may declare any development, or any class or description of development, to be State significant development.

State Environment Planning Policy (State and Regional Development) 2011 identifies projects that trigger SSD. The Project would be considered SSD under Clause 23 of Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011*, which refers to:

23 Waste and resource management facilities

…

(3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.

Thus, the Project is to be assessed as SSD.

Clause 4.38(2) of the EP&A Act identifies that development consent may not be granted if the development is wholly prohibited by an environmental planning instrument.

As confirmed in Section 3.4, the Project, which is defined as a resource recovery facility, is permissible with consent within the IN3 Heavy Industrial zoning under the provisions of *Liverpool Local Environmental Plan 2008* and hence the Consent Authority may grant consent to the SSD application.

Environmental Planning and Assessment Regulation 2000

The Project meets the requirements of designated development under Clause 32 (waste management facilities or works) of Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*, which refers to:

(1) Waste management facilities or works that store, treat, purify or dispose of waste or sort, process, recycle, recover, use or reuse material from waste and:

…

(b) That sort, consolidate or temporarily store waste at transfer stations or materials recycling facilities for transfer to another site for final disposal, permanent storage, reprocessing, recycling, use or reuse and:

…

(iii) That have an intended handling capacity of more than 30,000 tonnes per year of waste such as glass, plastic, paper, wood, metal, rubber or building demolition material.

However, under Clause 4.10 of the EP&A Act, the Project is not designated development due to its classification as SSD whereby Clause 4.10 (Designated Development) states:

(1) Designated development is development that is declared to be designated development by an environmental planning instrument or the regulations.

(2) Designated development does not include State significant development despite any such declaration.

Integrated Development

In accordance with Clause 4.46 of the EP&A Act, the Project would be assessed as integrated development as it will require an Environmental Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*, to authorise the carrying out of scheduled development work at the Site.

Under Clause 4.4 Development that is integrated development, of the EP&A Act:

(2) Before granting development consent to an application for consent to carry out the development, the consent authority must, in accordance with the regulations, obtain from each relevant approval body the general terms of any approval proposed to be granted by the approval body in relation to the development. Nothing in this section requires the consent authority to obtain the general terms of any such approval if the consent authority determines to refuse to grant development consent.

(3) A consent granted by the consent authority must be consistent with the general terms of any approval proposed to be granted by the approval body in relation to the development and of which the consent authority is informed. For the purposes of this Part, the consent authority is taken to have power under this Act to impose any condition that the approval body could impose as a condition of its approval.

(4) If the approval body informs the consent authority that it will not grant an approval that is required in order for the development to be lawfully carried out, the consent authority must refuse consent to the application…

Therefore, terms of approval will be sought from the NSW Environmental Protection Authority (EPA) as a minimum in relation to the Project.

3.3 Further relevant NSW legislation

In addition to the EP&A Act, NSW legislation relevant to the Project and the preparation of the EIS are outlined below.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) relates to pollution management and waste disposal in NSW and establishes the requirements for licensing of certain activities that are listed in Schedule 1 of this Act including the recovery of general waste and waste storage facilities.

The Site will require an Environmental Protection Licence (EPL) under the POEO Act.

Clause 43 identifies the types of licence as including:

Environment protection licences may be issued for the following purposes:

(a) To authorise the carrying out of scheduled development work at any premises, as required under section 47,

(b) To authorise the carrying out of scheduled activities at any premises, as required under section 48,

Therefore, to provide for the acceptance of waste at the Site will require the Project to have an EPL. This will be considered as part of the SSD assessment process through the consideration of the Project as integrated development. Appropriate consultation with the relevant agency will ensure obligations of the POEO Act are met.

Contaminated Lands Management Act 1997

The *Contaminated Lands Management Act 1997* regulates contaminated sites in NSW.

The Project will be managed in accordance with the *Contaminated Lands Management Act 1997*. This includes consultation with the relevant authorities and management of ground contamination in accordance with this act. Refer to Chapter 11 of the EIS for further details.

Waste Avoidance and Resource Recovery Act 2001

The *Waste Avoidance and Resource Recovery Act 2001* (WARR) provides the framework under which the "Waste Avoidance and Resource Recovery Strategy" can be made and implemented (refer to Section 3.5).

The objectives of the WARR Act are to:

(a) To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,

(b) To ensure that resource management options are considered against a hierarchy of the following order:

(i) Avoidance of unnecessary resource consumption,

(ii) Resource recovery (including reuse, reprocessing, recycling and energy recovery),

(iii) Disposal,

(c) To provide for the continual reduction in waste generation,

(d) To minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,

(e) To ensure that industry shares with the community the responsibility for reducing and dealing with waste,

(f) To ensure the efficient funding of waste and resource management planning, programs and service delivery,

(g) To achieve integrated waste and resource management planning, programs and service delivery on a state-wide basis,

(h) To assist in the achievement of the objectives of the protection of the environment operations act 1997.

It is considered the Project is consistent with the WARR Act as further addressed in Chapter 7 of the EIS.

3.4 Environmental Planning Instruments

Within the framework of the EP&A Act, Environmental Planning Instrument (EPIs) are required to be addressed as part of SSD assessment. The following EPIs are considered to be relevant to the Project and are addressed below.

- *Liverpool Local Environment Plan 2008*
- State Environmental Planning Policies (SEPP)
  - *State Environmental Planning Policy (State and Regional Development) 2011 (refer to Section 3.2.1 for further discussion)*
  - *State Environmental Planning Policy (Infrastructure) 2007*
  - *State Environmental Planning Policy 33 Hazardous and Offensive Development*
  - *State Environmental Planning Policy No. 55 – Remediation of Land*

Liverpool Local Environment Plan 2008

The relevant local planning instrument is the *Liverpool Local Environment Plan 2008* (the LEP), which identifies the Site is zoned as IN3 Heavy Industrial. The objectives of this zoning are as follows:

1) Objectives of zone

- To provide suitable areas for those industries that need to be separated from other land uses.
- To encourage employment opportunities.
- To minimise any adverse effect of heavy industry on other land uses.
- To support and protect industrial land for industrial uses.
- To preserve opportunities for a wide range of industries and similar land uses by prohibiting land uses that detract from or undermine such opportunities.

In accordance with the LEP “Resource recovery facilities” are permitted with consent in IN3 Heavy Industrial zoning where resource recovery facilities are defined as:

resource recovery facility means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration.

The Project meets this definition and is therefore permissible with consent.

There are no principal development standards in relation to floor space ratio controls relating to the Site, nor is the land identified as impacting on identified heritage items under the provisions of the LEP (refer to Table 3)

Table 3: The LEP relevant provisions

Provision	Consideration	Outcome
Zone IN3 Heavy Industrial	The Project proposes a use permissible with consent in Zone IN3 Heavy Industrial.	Complies
4.1 Minimum subdivision lot size	The Project does not propose to change the lot size.	N/A
4.3 Height of buildings	Maximum height of 30 metres applies to the Site.	Complies
4.4 Floor space ratio	There is no maximum floor space ratio restrictions applied to the Site.	Not applicable
5.10 Heritage conservation	There are no items of heritage significance relating to the Site, or immediate surrounds.	Not applicable

State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP)

Under the Infrastructure SEPP, IN3 Heavy Industrial is a prescribed zone in accordance with Clause 120. This clause identifies a resource recovery facility as:

resource recovery facility *means a facility for the recovery of resources from waste, including such works or activities as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from waste gases and water treatment, but not including re-manufacture of material or goods or disposal of the material by landfill or incineration.*

In addition, a resource recovery facility is defined as a type of waste or resource management facility under the following definition:

Waste or resource management facility *means a waste or resource transfer station, a resource recovery facility or a waste disposal facility.*

Under Clause 121 of the Infrastructure SEPP:

a) *Development for the purpose of waste or resource management facilities, other than development referred to in subclause (2),[6] may be carried out by any person with consent on land in a prescribed zone.*

The Project is therefore defined in accordance with Clause 121 and is therefore permissible with consent under the Infrastructure SEPP.

Clause 104, in conjunction with Schedule 3 Column 1, of the Infrastructure SEPP identifies resource recovery or waste transfer stations of any size or capacity as being a traffic generating activity. The provisions of this SEPP require the consent authority to give written notice of the development application and consider any responses received from the consent authority, in this case Transport for NSW (TfNSW). The Traffic Impact

[6] Subclause 2 of Clause 121 identifies that *Development for the purposes of a waste or resource transfer station may be carried out by any person with consent on - …(c) land on which development for any of the following purposes is permitted with consent under any environmental planning instrument – (i) industry.*

Assessment (TIA) in Appendix D of the EIS has been prepared having regard to the provisions of being a traffic generating activity in accordance with the Infrastructure SEPP.

State Environmental Planning Policy No. 33 - Hazardous and Offensive Development (SEPP 33)

SEPP 33 seeks to ensure that development that is deemed a hazardous or offensive industry is identified and assessed appropriately and includes any measures proposed to be employed to reduce the impact of the development so that the consent authority has sufficient information to assess the development and impose any relevant conditions. The first step in this assessment is the preparation of a preliminary risk screening. Should this preliminary risk screening identify the Project is “potentially hazardous”, a “Preliminary Hazard Analysis” would be prepared for further assessment.

A preliminary risk screening of the Project in accordance with SEPP 33 has been prepared and is provided in Appendix I and discussed in Chapter 12, identifying the Project is not identified as potentially hazardous and as such, the Project would not be a significant risk to human health, life or property or the biophysical environment and is permissible under SEPP 33.

In accordance with the Department of Planning (2011) “Applying SEPP 33: Hazardous and Offensive Development Application Guidelines”, ‘waste landfilling/processing’ is a potentially offensive industry. However, in accordance with the guideline the key consideration is that the consent authority is satisfied there are adequate safeguards to ensure emissions from a facility can be controlled to a level at which they are not significant.

Adequate safeguards include gaining approval and meeting the requirements for an EPL under the POEO Act. The Proponent will seek an EPL for the Project prior to operation and subject to this licence being approved, the Project is considered to satisfy the requirements for assessment of a potentially offensive industry under SEPP 33.

State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)

Under the provisions of SEPP 55 it is necessary to establish if the Project is to be undertaken on land which has been declared or found to be contaminated, where rezoning of the land is proposed or where development contemplates a change of use. The Project has been assessed in accordance with SEPP 55 including a Phase 1 and limited Phase 2 assessment as provided in Appendix G and is considered suitable for the Site.

Refer to Chapter 11 for further discussion of contamination and suitability of the Site for the Project.

3.5 State and Regional Planning Strategies and Policies

NSW Waste Avoidance and Resource Recovery Strategy 2014-21

The NSW “Waste Avoidance and Resource Recovery Strategy 2014-21” (the Strategy) provides targets for the reduction in waste to 2021. The objectives and targets of the Strategy are to:

1) *Avoid and reduce waste generation;*
2) *Increase recycling;*
3) *Divert more waste from landfill;*
4) *Manage problem wastes better;*
5) *Reduce littering;*
6) *Reduce illegal dumping;*

The need to treat waste to a level suitable for reuse or disposal in an environmentally sound manner is a critical step to managing problem wastes and reducing the environmental impacts of contaminated materials. Treating waste reduces the risk of leaching at levels of concern, which occurs when waste is disposed directly into landfill and that otherwise has the potential to cause contamination of surface water, groundwater and soil. In turn, leachate leakages cause long-term and irreversible environmental and social consequences. For this reason, the "NSW Waste Avoidance and Resource Recovery Strategy 2014-21" and further legislation such as the National Waste Policy (refer to Chapter 2) aims to ensure that potential problem wastes are reduced and that waste recovery, handling and disposal are consistent, safe and accountable.

The Project aligns with national and state waste management objectives and would reduce the environmental risk of waste directly, through the treatment of contaminated soils, contaminated sludges and liquid wastes. Furthermore, the Project would provide the opportunity to divert waste from landfill through the recovery and recycling of materials during treatment including the recovery of metals for recycling, and recovery of construction and demolition material for re-use. These measures would assist towards satisfying the NSW Government's objectives of waste avoidance, recovery and recycling as provided in the *Waste Avoidance and Resource Recovery Act 2001* and the NSW "Waste Avoidance and Resource Recovery Strategy 2014-21" and contributing to the NSW State Government 2021 key priority goal 23 to increase recycling of municipal solid waste, and commercial and industrial waste.

Also refer to Section 2.24.3, which further discusses the "Waste and Sustainable Materials Strategy 2041" that updates the "Waste Avoidance and Resource Recovery Strategy 2014-21".

Greater Sydney Region Plan: A Metropolis of Three Cities

The "Greater Sydney Region Plan - A Metropolis of Three Cities" (the Plan) is the key strategic document for the growth of Sydney. The Plan was prepared by the Greater Sydney Commission and was released in March 2018, providing a growth framework for Sydney over the next 20 years. The Project is aligned with the Plan that aims to:

- Set a 40-year vision (to 2056) and establishes a 20-year plan to manage growth and change for Greater Sydney in the context of social, economic and environmental matters;
- Inform district and local plans and the assessment of planning proposals;
- Assist infrastructure agencies to plan and deliver for growth and change and to align their infrastructure plans to place-based outcomes; and
- Inform the private sector and the wider community of the growth management and infrastructure investment intentions of government.

In relation to waste, the Greater Sydney Region Plan's Planning Priority W19 seeks to optimise self-sufficiency through developing greater localised precinct-wide waste processing capacity that promotes efficiency. In addition, W19 identifies "…new approaches to how waste materials and resources are re-used within a circular economy will help reduce impacts on the environment".

Approval of the Project is consistent with this planning priority, with the location of the Project including its proximity to identified major projects to be constructed and its access to transport links including the M7 (and future M12) makes the Site a strategic resource recovery asset that would play a key role in achieving this vision.

In addition, Objective 35 identifies that more waste should be re-used and recycled to support the development of a circular economy and that while "…the provision of waste management is an essential

service to communities. Existing waste management facilities do not have the capacity to accommodate projected growth" (Greater Sydney Commission's 2018).

Our Greater Sydney 2056: Western City District Plan

With regard to recycling and reducing waste, the Western City District Plan states:

There is diminishing capacity for land filling in Greater Sydney, with more waste being landfilled outside the region. The West District has a number of waste treatment facilities including landfills, transfer stations and organic treatment facilities. As the District's population grows, the need for new recycling and resource recovery infrastructure will help manage the growth in waste. Additional sites for resource recovery in Greater Sydney would reduce waste going to landfill and the associated transport costs.

In providing for waste treatment and resource recovery of materials for reuse, the Project aims to keep resources circulating in our economy to maximise value, generate local jobs and minimise waste. As such, it is directly related and aligned with the Western City District Plan actions including:

- 83. Protect existing and identify new locations for waste recycling and management.
- 84. Support innovative solutions to reduce the volume of waste and reduce waste transport requirements.

In addition to recent policy produced by Government agencies including:

- NSW EPA (October 2018) "Too Good To Waste" Discussion paper on a circular economy approach for NSW.
- NSW EPA (October 2018) NSW Circular Economy Policy Statement "Too Good To Waste".
- Greater Sydney Commissions (October 2018) "A Metropolis that Works": Thought Leadership Series: TLP 2018–1.

Future Transport Strategy 2056

The Future Transport Strategy 2056 is a 40 year strategy, supported by plans for regional NSW and for Greater Sydney. The Strategy sets the 40 year vision, directions and outcomes framework for customer mobility in NSW, which will guide transport investment over the longer term.

As identified within Future Transport Strategy 2056, there are a number of new infrastructure projects, which the Project is well placed to service. These include the Western Sydney Infrastructure Plan and the M12, the Western Sydney Airport, the Outer Sydney Orbital and Western Sydney Aerotropolis in addition to further projects. Recycling and waste treatment capacity will be required to support these projects and enable them to meet their environmental requirements in relation to resource recovery targets and development of a circular economy.

NSW Waste Less, Recycle More Initiative

The NSW Government's $337 million Waste Less, Recycle More program includes $48 million to support the development of new infrastructure for both municipal, commercial and construction and demolition waste materials. The Project is consistent with this funding aim proposing new infrastructure for waste materials.

3.6 Local Planning Framework

Liverpool City Council (Council) Local Strategic Planning Statement

'Connected Liverpool 2040' is Liverpool City Council's Local Strategic Planning Statement (LSPS). It is Council's long-term plan to shape Liverpool's future which will help guide the development of suburbs and

balance the need for development, jobs and services as well as parks, open spaces and the natural environment.

One of the themes for shaping the City is that of Environmental Sustainability. In this regard, the LSPS notes that Council will:

Pursue waste outcomes that are safe, efficient, cost-effective, maximise recycling and that contribute to the built form and liveability of the community.

It is considered that the Project will safely efficiently and cost-effectively treat waste materials and facilitate resource recovery and recycling thereby contribute to achieving Council aims of the LSPS.

Liverpool Development Control Plan 2008

Table 4 summarises relevant controls of the "Liverpool Development Control Plan 2008" (the DCP) that apply to the Project and the Site. Whilst development control plans are not EPIs and thus not specifically required to be considered when assessing SSD projects, the relevant provisions of the DCP are identified in this section, which are further addressed in the respective chapter of the EIS that principally addresses each issue

Table 4: Liverpool DCP relevant provisions

Provision	Consideration	Outcome
Part 1: General Controls for all Development		
6.1 Water Cycle Management	■ Stormwater runoff shall be connected to Council's drainage system by gravity means. Mechanical means (i.e. pump) for disposal of stormwater runoff will not be permitted except for basement car parks. Charged systems will not be permitted.	The Project will comply. Refer to Chapter 11 and Appendix H.
8.0 Erosion and Sediment Control	■ All development applications over 2,500 sqm shall be accompanied by a Soil and Water Management Plan.	The Project will comply. Refer to Chapter 11 and Appendix H.
9.0 Flooding Risk	■ Flood Risk controls vary depending on: ▪ 1. Sensitivity of a land use to flooding ▪ 2. Severity of flood impact on site ▪ 3. Specific Floodplain in which a site is located	The Project will comply. Refer to Chapter 11 and Appendix H.
25.0 Waste Disposal and Re-use Facilities	■ A Waste Management Plan (WMP) shall be submitted with	The Project will comply. Waste Management is discussed further in Chapter 7 and a

Provision	Consideration	Outcome
	a Development Application for any relevant activities generating waste.	Waste Management Plan would be submitted as part of post approval requirements.
Part 7: Development in Industrial Zones		
2 Site Area	■ Minimum site area of an allotment: 2,000sqm	The Project will comply.
3 Site Planning	■ Where possible, site planning allows for the retention of significant trees and vegetation, particularly near the street frontage. ■ The development must be designed around the site attributes such as slope, existing vegetation and land capability.	The Project will comply. Refer to Chapter 2 Project Description.
4. Setbacks	■ The Primary Setback (ground floor) of all buildings shall be 10m. ■ First floor 7.5m and Secondary Setback of 5m.	The Project will comply. Refer to Appendix N on the Design drawings for the Project.
5. Landscaped Area	■ A minimum of 10% of the site is to be landscaped at ground level. ■ A development must provide a landscaped area along the primary and secondary frontages of an allotment of 10m for lots over 4000 sqm.	The Project will comply. Refer to Appendix N on the Design drawings for the Project.
6 Building Design, Streetscape and Layout	■ Various controls in relation to façade treatment, materials and colours, building design, lighting, utilities and service areas.	The Project will comply. Refer to Appendix N on the Design drawings for the Project.
7 Landscape and Fencing	■ Various controls in relation to landscape treatment, trees, and fences at front boundary.	The Project does not seek to modify the existing landscape treatment.

Provision	Consideration	Outcome
		Refer to Appendix N on the Design drawings for the Project including landscape and fencing for the Project.
8 Car Parking and Access	■ Various controls in relation to car parking and access.	The Project will comply with car parking design and layout of driveways. Refer to Chapter 8 and Appendix D for further details.
9 Amenity and Environmental Impact	■ Various controls on external activities, stockpiles, noise and hours of operation in relation to amenity.	The Project will generally be housed within the building on the Site. Technical assessments in relation to amenity (such as noise, air etc.) are provided in appendices of the EIS and discussed within relevant chapters of the EIS.
10 Site Services	■ Various controls in relation to site services	The Project will comply. Refer to Chapter 2 Project Description.
11 Change of use of existing buildings	■ All buildings on site shall if needed be upgraded to comply with the Building Code of Australia relevant to the proposed use.	The Project will comply. Refer to Chapter 2 Project Description.

4.0 SITE DESCRIPTION

The Secretary's Environmental Assessment requirements:	Environmental Impact Statement
General Requirements – a detailed description of the development, including: ■ *an accurate history of the site, including development consents and confirmation of the intention to surrender any existing development consents* ■ *A description of the existing environment, using sufficient baseline data*	Chapter 4: Site Description Chapter 4: Site Description and respective key issues chapters
Key Issues – statutory and strategic context – including: ■ *a detailed description of the history of the site, including the relationship between the proposed development and all development consents and approved plans previously and/or currently applicable to the site*	Chapter 4: Site Description

4.1 Site Locality

The Site at 9-13 Whyalla Place, Prestons, NSW (Lot 103/DP866530) is located within the Liverpool Local Government Area (LGA), approximately 5 km west of Liverpool CBD and is within the established industrial area of the suburb of Preston.

Table 5 summarises the identification, location and setting of the Site.

Table 5: Site Identification, location and setting

Item	Details
Street Address	9-13 Whyalla Place, Prestons, NSW 2170
Legal Property Description	Lot 103 in DP 866530
Approximate Area	9,100 m2 (0.91 ha)
Current Land Use	Industrial warehouse with a car park and office.
Approximate Geographic Co-ordinates (GDA94-MGA56)	E 304000 N 6243360
Local Government Area and Land Use Zoning	Liverpool City Council IN3 Heavy Industrial

4.2 Zoning and Surrounding Land Use

The Site is zoned IN3 Heavy Industrial under the provisions of *Liverpool Local Environmental Plan 2008* (the LEP) and is surrounded by heavy industrial zoning. Land zoned approximately 200 m to the north west is zoned as B6 Enterprise Corridor while 300 m to the west of the Site is zoned RE2 Private Recreation (refer to Figure 8).

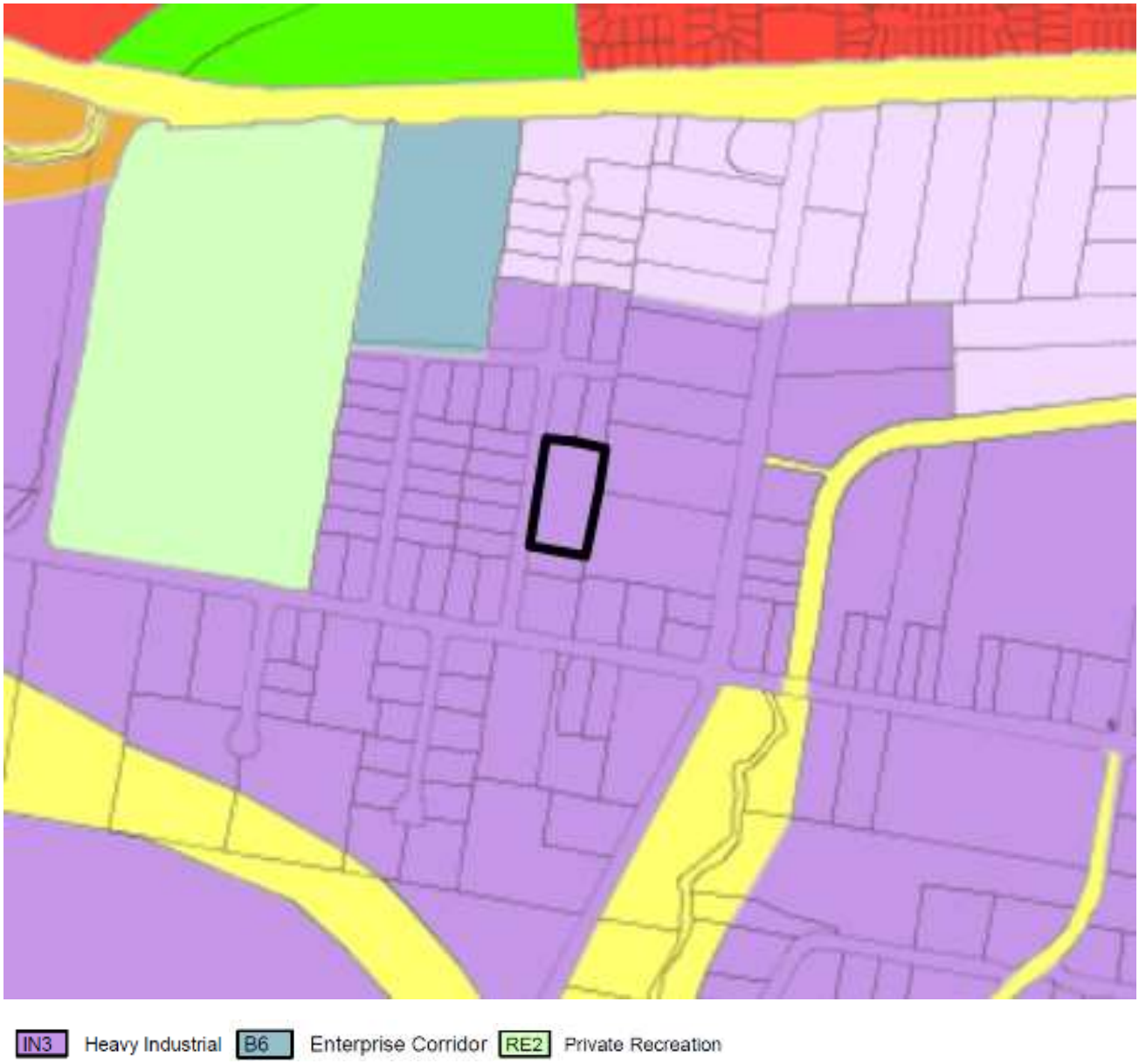


Figure 8: Zoning for the Site and Surrounds (Source eplanning.liverpool.nsw.gov.au)

Whyalla Place adjoins the Site along the western boundary of the Site. The Site is located approximately 500 m to the north of the M7 and approximately 500 m south of the nearest residents across Hoxton Park Road. Maxwells Creek is located approximately 300 m to the east of the Site. In addition, a Church is located within an industrial building approximately 350 m to the North of the Site in proximity to Hoxton Park Road and a recreational oval and sporting facility, identified as Liverpool Catholic Club and the Mercure Hotel, are located approximately 350 m to the north west of Site.

The majority of land located between Hoxton Park Road to the north and the M7 to the east, south and west has been developed for commercial/industrial uses, with various land uses in proximity to the Site requiring EPLs to operate. For example, two concrete plants and an asphalt plant are located within 150m of the Site. Activities at concrete and bitumen batching plants typically involve the storage of fuels (including USTs) and the use of fuels (such as diesel). Steel galvanising and sites for manufacturing/packaging are subject to current EPLs and are located approximately 200 m south east and 200 m east, respectively, of the Site.

These land uses/companies are licenced for the scheduled activities of chemical production and waste generation.

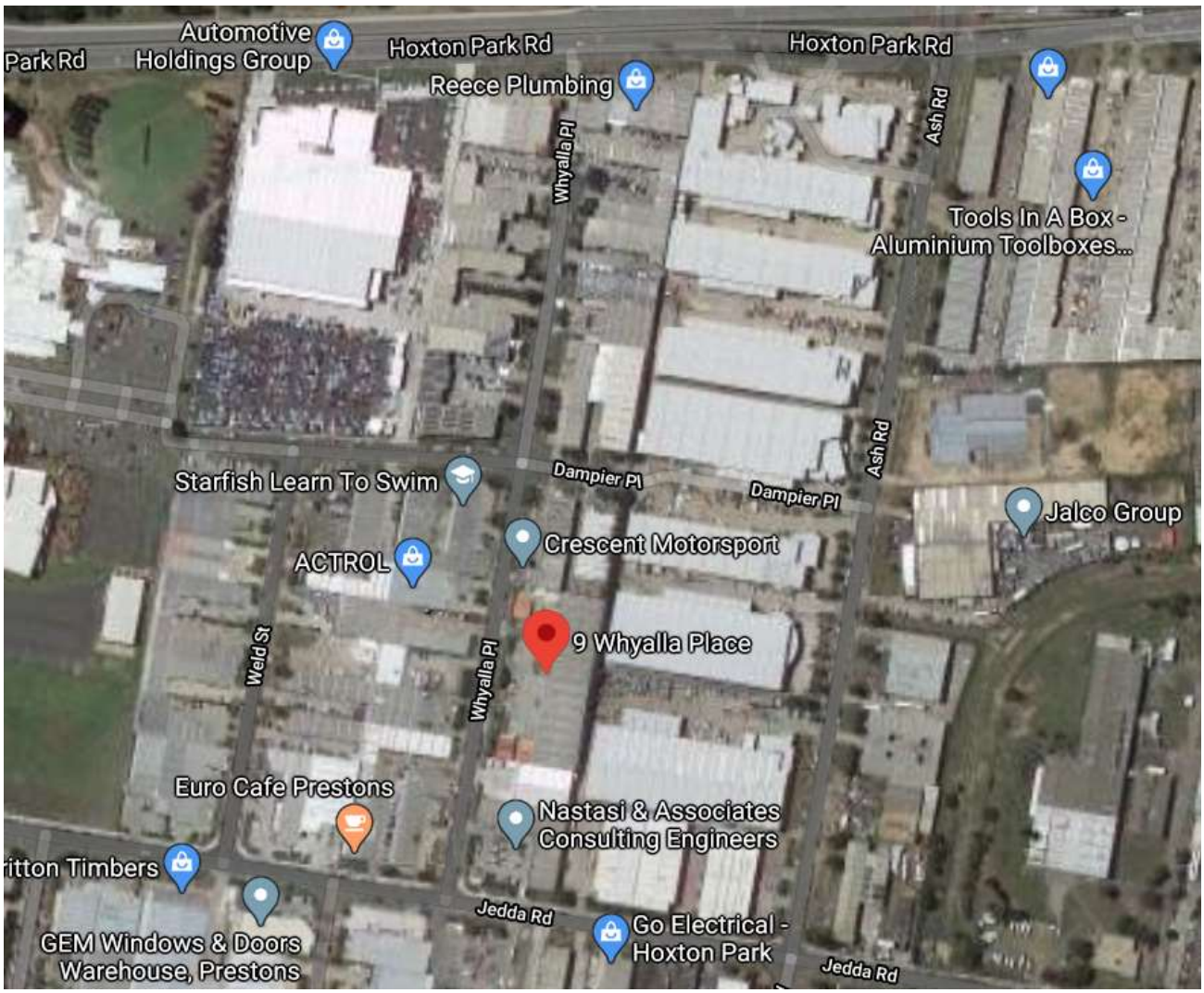


Figure 9: The Site and Surrounding land use (Source: Nearmap)

4.3 Land Ownership and Current Land Use

The Site is owned by the Proponent and is currently used as industrial warehousing, with a large warehouse building and adjoining office facilities.

The Site is approximately 9,000 sqm in total size and has an existing large warehouse building of 4,097 sqm, with adjoining office facilities. Existing primary site features include a car park, a water tank (for the Site water suppression system), a landscaped area and a pumphouse. There are two dual driveway entrances to the Site along the eastern boundary (a northern entrance and a southern entrance), which access the existing building with direct roller door access. The existing site locality and site features are presented in Figure 9.

4.4 Site History

As further detailed in the Phase 1 assessment within Appendix G of the EIS, based upon a review of historical aerial photographs, current and historical Certificates of Title, previous environmental assessment reports for the Site and on-line records, the Site appeared to be part of a larger undeveloped rural property until the

1970s. Aerial imagery shows an increase in the clearing of bushland in the surrounding area clearing during the 1970s, with the Site cleared of trees by 1978, and developed by 2000.

The land titles show that the current title was created in 1997. Land titles indicate that the Site was owned by Girotto Properties Pty Ltd in 1997. Girotto Properties currently manufacture pre-fabricated wooden buildings at off-site locations. Between 2005 and 2014 the Site was leased to companies, which manufactured pre-cast concrete slabs for the construction industry. Between 2014 and 2020 the Site was leased to an audio & video equipment manufacturing and warehousing company.

4.5 Existing Development Consents

Known development consents that currently apply to the Site as determined by Liverpool City Council:

- DA-1381/2013 change of use for the warehouse and distribution of media products and internal fitout involving pallet racking.
- DA-1148/2013 construction of a water tank and pump room and associated installation of sprinklers within an existing factory.
- CD-653/2013 removal of internal office walls.

While these development consents have not been made available, it is the intention that these development consents be surrendered with approval of the Project.

4.6 Topography

The Site is at an elevation of approximately 23 mAHD, with the area gently sloping to the north east and east.

4.7 Surface Water

The two major nearby surface water receptors are identified as Maxwells Creek and Cabramatta Creek. Maxwells Creek, located approximately 300 m to the east of the Site, flows in a northerly direction and connects with the Cabramatta Creek approximately 2.2 km northeast of the Site. The Cabramatta Creek is located approximately 680 m to the north of the Site and flows in an easterly direction eventually leading into the Georges River at Warwick Farm.

4.8 Geology, Soil Landscapes and Lithology

The Site is located in an area mapped with Quaternary sediments as the underlying formation. The Quaternary sediments comprises medium-grained sand, clay and silt.

The Site is located on the soil landscape type ‘Disturbed Terrain’, as shown on the Penrith 1:100 000 soil landscape sheet (refer to Appendix G). The Disturbed Terrain soil landscape is where the original soil has been removed, greatly disturbed or buried due to industrial activities. Residual soils at the Site are of the *kurosol* soil order. The dominant soils are typically “hard acidic red soils” with “hard neutral acidic yellow mottled soils”. This soil landscape indicates the potential for fill material at the Site (as confirmed by the Site investigation summarised in Chapter 11 and Appendix G).

4.8.1 Acid Sulfate Soils

Acid sulfate soils (ASS) information was sourced from CSIRO and from DPIE. The potential for ASS at the Site was described as “extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.”

4.9 Hydrogeology

The hydrogeology of the area, as described by Geoscience Australia (refer to Appendix G) is described as “porous, extensive aquifers of low to moderate productivity.”

A search of on-line records held by the NSW Department of Primary Industry Office of Water was performed by Lotsearch (refer to Appendix G). A summary of the groundwater bores within 500 m of the Site is presented in Table 6. This bore is upgradient.

Table 6: Groundwater bores summary

GW ID	Approximate distance from the Site	SWL (mbgl)	Salinity (mg/L)	Total Depth (mbgl)
GW102015	200 m south	3.00	Brackish	9.00

mbgl - metres below ground level
mg/L - milligrams per litre

4.9.1 Groundwater Elevations and Inferred Flow Direction

Groundwater elevations are presented in Appendix G. These show that groundwater, encountered in the natural water bearing zone, is flowing in an easterly – north easterly direction, towards Maxwells Creek.

Groundwater was encountered within silty clay. The water strike depth (i.e. water bearing zone encountered) during drilling was greater than approximately 3.5 mbgl.

4.9.2 Groundwater Management Zones

The Site is not located within a Groundwater Management Zone managed by the NSW government.

4.10 Climate

Meteorological conditions at the Site have been inferred from long term records for the Horsley Park Equestrian Centre AWS (in operation since 1997), which is located approximately 9km to the north of the Site. The mean annual rainfall would be approximately 750 mm, the wettest month being February and the driest month being July. The mean maximum temperature would be in the order of 23.9°C. The warmest month would be January, with the highest temperature recorded at Horsley Park Equestrian Centre of 47.0°C recorded on 4 January 2020. The mean minimum temperature would be in order of 12.1°C. The coldest month would be July, with the lowest temperature recorded at Horsley Park Equestrian Centre of -2.3°C recorded on 17 July 2007.

Prevailing winds from the Site are shown in the wind rose provided in Figure 10, which identifies the wind speed and direction as blowing from the Site for 2018.

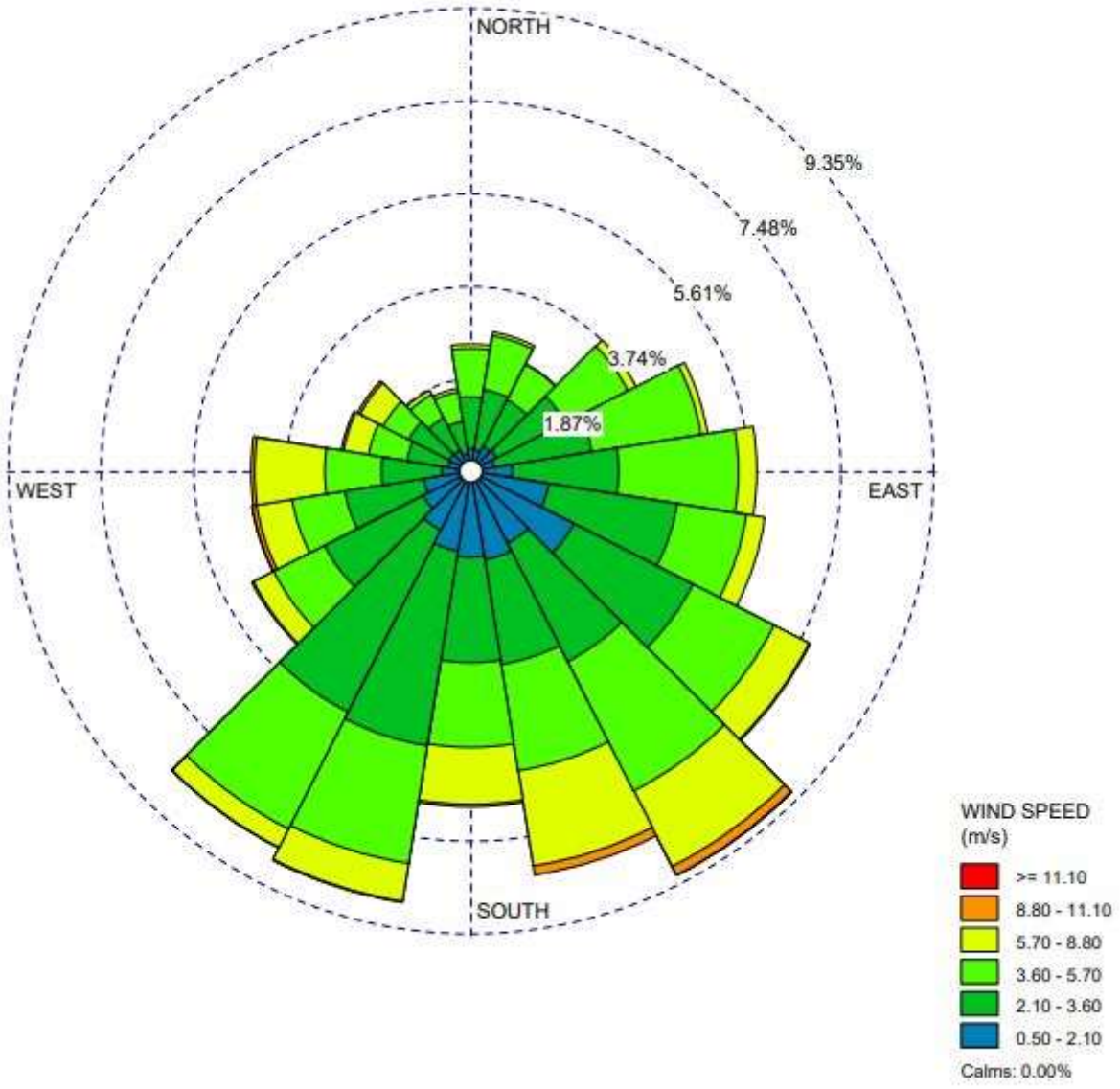


Figure 10: Prevailing winds from the Site for 2018 (as calculated for the Air Quality Impact Assessment: Appendix F).

5.0 STAKEHOLDER CONSULTATION

The Secretary's Environmental Assessment requirements:	Environmental Impact Statement
Community and Stakeholder Engagement – including: ■ *a detailed community and stakeholder participation strategy which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form(s) of the consultation, including a justification for this approach* ■ *a report on the results of the implementation of the strategy including issues raised by the community and surrounding owners and occupiers that may be impacted by the proposal* ■ *details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the proposal and* ■ *details of the proposed approach to future community and stakeholder engagement based on the results of the consultation.*	Chapter 5: Stakeholder Consultation Appendix B: Consultation Materials.
***Consultation** – During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with:* ■ *Liverpool Council* ■ *Environment Protection Authority* ■ *Environment, Energy and Science Group* ■ *Heritage NSW* ■ *NSW Fire and Rescue* ■ *Sydney Water* ■ *Transport for NSW* ■ *surrounding local landowners and stakeholders* *The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.*	Chapter 5: Stakeholder Consultation Appendix B: Consultation Materials.

To inform the development of Project and the EIS, the Proponent has sought feedback from government and regulatory agencies and the local community. The feedback received has contributed to develop a comprehensive EIS that has considered the needs of the community and requirements of regulatory and government agencies.

This chapter outlines:

- the consultation methodology and purpose;
- the community and stakeholder engagement activities undertaken;

- how stakeholders were identified;
- the promotional activities used to inform the community and identified stakeholders of the Project and ways to provide feedback and;
- the feedback raised and how this feedback has been addressed in the EIS.

All collateral, materials and correspondence related to this chapter are provided in Appendix B of the EIS.

5.1 Objective of Consultation

The Proponent is committed to undertaking meaningful community and stakeholder engagement and consultation throughout the life of the Project. A Project Community and Stakeholder Engagement Strategy was implemented for the Project in September 2020 with the key objectives of providing accessible and fit-for-purpose communication and stakeholder consultation activities that:

- identify stakeholders that have been consulted and a justification for their selection;
- provides accessible and sufficient opportunity for stakeholder input;
- provides accurate and timely information concerning the Project;
- informs stakeholders and the broader community about the main features, related issues and benefits of the Project; and
- identifying and addressing stakeholder feedback during the preparation of the draft EIS.

5.2 Consultation Methodology

Consultation activities for the Project commenced following submission of the Scoping Report (3 September 2020), which principally involved contact with relevant government agencies and identifying community stakeholders and setting up appropriate engagement tools.

The Proponent identified a number of near-neighbour businesses and residents to seek feedback from. These were identified based upon their geographical location to the Project and land use. Promotional activities included a notification letter mailout identifying the Project, the EIS process and seeking feedback that could be addressed in the EIS. Feedback methods included email, post or via a dedicated website setup for the Project http://hiqualityprestons.com (refer to Section 5.4). These channels were chosen as they are considered to provide appropriate methods to communicate project information appropriately to targeted stakeholders.

5.3 Identify Community Stakeholders

Identification of community stakeholders included consideration of individuals or groups who potentially could be impacted by or have interest in the Project. These stakeholders include:

- nearby property owners and lessees;
- nearby residences and businesses;
- stakeholders identified with the SEARs SSD-9346594; and
- potential sensitive receiver land uses such as residences, schools, child care centres, places of worship and/or health care institutions.

5.4 Community Engagement Activities

Community engagement activities were undertaken to seek feedback and raise awareness of the Project with stakeholders throughout the development of the Project and the draft EIS. Community consultation activities undertaken in preparation of this EIS are listed below:

- Letters, emails and/or phone calls to the community and Government agency stakeholders.
- Provision of website with project details and contact information.
- Provision of dedicated email address to receive feedback via email.
- Provision of postal address for written feedback to be posted.

A notification letter mailout to the community providing details about the Project, contact details, the EIS process and seeking feedback through the methods identified above was mailed to identified community stakeholders (as defined within the Community and Stakeholder Participation Strategy (refer to Figure 11 and Appendix B) on the 9 March 2021 by the Proponent.

Figure 11: Distribution of the Project notification letter

A copy of the letter can be found in Appendix B Consultation Materials.

5.5 Government and Regulatory Agency Consultation

In addition to community engagement activities, regulatory stakeholder and government agencies were consulted to inform the EIS and planning of the Project. This commenced with the Scoping Meeting held with NSW DPIE on the 16 September 2020. Summary consultation with regulatory agencies during the preparation of the EIS are provided below. Responses to regulatory feedback and discussion are provided in relevant appendices as identified and chapters of the EIS.

- Consultation with Liverpool City Council regarding clarification of Council's comments on the SEARs including stormwater management information for the Site. In addition, clarification was sought on potential management plan requirements should the project be approved. These issues are addressed in the relevant sections of the EIS (refer to Appendix B for correspondence).
- Consultation with the Environment Protection Authority (EPA) has been sought, with the EPA advising no further comment other than what has been previously provided in comments to the SEARs for the Project (refer Appendix B for correspondence).
- Consultation with Environment, Energy & Science Group referring to a Biodiversity Waiver that was received in correspondence for the Project (refer to Appendix L).
- Consultation with Heritage NSW regarding the need for an Aboriginal Cultural Heritage Report (ACHA). Heritage NSW identified that an ACHAR is not required for assessment of the Project 27 November 2020 (Appendix M).
- Consultation with NSW Fire and Rescue on the Project has been sought through phone contact on 25/06/21 and 29/06/21, but no response has been received to date. It is noted that in NSW Fire and Rescue comments to the SEARs they seek to provide comment 'once approvals have been granted'.
- Consultation with Sydney Water regarding the Trade Waste Application was undertaken 18 September 2020 with Sydney Water advising a Tappin Application should be made closer to EIS submission.
- Consultation with Transport for NSW has been made through PeopleTrans in preparing the Transport Impact Assessment (Appendix D) and specifically in relation to confirming the status of nearby road project upgrades, which provide for improved operational performance of the overall road network.

5.6 Community and Stakeholder Feedback and Future Engagement

Based upon the community engagement activities undertaken for the Project (as identified in Section 5.4), three responses (provided in Appendix B Consultation Materials) have been received by the community. These generally support the Project. The feedback received on the Project to-date from Government and regulatory agencies has informed iterations of the Project design and where relevant have been addressed through technical assessments within the EIS.

Issues identified during consultation have influenced how the Project has been assessed and the potential adoption of mitigation measures to reduce residual risk. This includes consideration of the mitigation management framework of "avoid, mitigate, offset" to ensure that residual risks are in accordance with relevant stakeholder regulatory policy parameters.

The website utilised for consultation activities http://hiqualityprestons.com is envisaged to be maintained during exhibition, construction and operation of the Project. This will include maintaining up-to-date contact information, enabling the community to engage and provide feedback on site activities. Future community and stakeholder consultation procedures will also be documented within the management plans for the Project prior to commencement

6.0 ENVIRONMENTAL RISK ASSESSMENT

The Secretary's Environmental Assessment Requirements:	
General Requirements – a detailed description of the development, including: ■ *A risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment.*	Chapter 6: Environment Risk Assessment

The environmental risk assessment process for the Project commenced during project formulation and was documented at the preparation of the Scoping Report (2014192-005-R-Rev0) to request the SEARs for the Project, and has been further developed in the preparation of this EIS.

6.1 Identification of Key Issues – SEARs

The Scoping Report identified key environmental issues, which were further refined by the SEARs for the Project (SEARs SSD-9346594). The key environmental issues as identified in the SEARs are:

- Waste Management
- Air Quality and Odour (and Greenhouse gas)
- Noise and Vibration
- Soils and Water
- Traffic and Transport
- Human Health
- Hazards and Risk
- Fire and Incident Management
- Cultural Heritage and Aboriginal Cultural Heritage
- Biodiversity
- Ecologically sustainable development

Upon further assessment and consultation with relevant agencies, Cultural Heritage and Aboriginal Cultural Heritage and Biodiversity are identified as not being considered a key issue as a heritage assessment exemption and biodiversity waiver have been granted. Refer to Chapter 15: Other Issues and Appendix L and M for further details.

6.2 Risk Assessment Methodology

The risk assessment methodology has been adopted from the principles of AS/NZS ISO 31000:2018 Risk Management. This analysis involved evaluating the risk of potential impacts of the Project by identifying the consequences of the impact and the likelihood of the impact occurring.

6.2.1 Evaluating Likelihood

The likelihood of an impact occurring is best described in terms of probability and frequency of the activity over a given time period. Each identifiable potential impact can be assigned a likelihood between 'remote' and 'almost certain'.

Table 7 identifies the criteria used to determine the likelihood of an impact for the Project.

Table 7: Description of likelihood

Likelihood	Description	Probability
Remote	May occur in exceptional circumstances	<1%
Unlikely	Not expected to occur in most circumstances	1-20%
Possible	May occur	21-49%
Likely	Probably will occur	50-85%
Almost Certain	Expected to occur	>85%

6.2.2 Evaluating consequence

The consequences of an impact requires a degree of subjective assessment, which may consist of several elements as described in Table 8 and Table 9. The consequence of an impact used in the risk assessment is the reasonably foreseeable consequence.

Table 8: Evaluating consequence (General Elements)

Element		Description
Magnitude	Spatial	The area over which the impact will occur, from square metres to square kilometres.
	Intensity	The level of impact within the spatial area, from minor disruption to total destruction. A low intensity impact over a large area could be worse than a high intensity impact in a small area, depending upon other elements.
Temporal	Duration	The length of time of the impact, from a single event to a permanent change.
	Timing	Short term events may create significant impacts if they occur often. They may also coincide with particularly sensitive times in the receiving environment such as breeding cycles.
Ecological/ Physical	Values	The quality of the receiving environment, generally identified through the declaration of conservation areas, identification of protected species and other features of natural conservation value.
	Sensitivity	The capacity of the receiving environment to regenerate or adapt to the impact (resilience). The sensitivity of an environment to a potential impact will require informed judgement.
Social	Number of people	The number of people directly or indirectly affected through lost opportunities for enjoyment or other values such as equity or existence values.
	Heritage	The impact on known or possible items of heritage or cultural value.

Element		Description
	Political	The measure of the likely political implications or level of community interest.
Economic		The financial cost of the impact through lost productivity or the cost of remediation.

Table 9: Evaluating Consequence (Project Specific Elements)

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Magnitude					
Spatial	Localised within 3m2	On the subject site	Impacts on neighbouring properties within a 100m radius	Impact on the Liverpool LGA	Impact to hundreds of hectares
Intensity	Low level behavioural, or conditional effect	Acute impacts on some species	Moderate impacts on growth, recruitment or survival rates	Lethal impacts on some species	Lethal for individuals or communities
Temporal					
Duration	Single incident or transient event	Short term impact, single generation	Medium term	Long term, multiple generations	Permanent
Timing	Brief interruption during non-peak or outside breeding times	Occasional interruption	Sustained interruption for a period of time /Interrupts one life cycle	Regularly interruption	Permanent interruption
Ecological					
Values	Previously disturbed areas	Parkland	Nature conservation area	Conservation area, listed species or other conservation feature of NSW significance	Wilderness, nationally threatened species or other conservation feature of national significance
Sensitivity	Will recover completely	Will recover with some changes	Moderate change to ecosystem functioning	Significant change to ecosystem functioning	Will not recover
Social					
Number of people	Some people	Some people directly impacted or	Several people directly	Large number of people	Loss of life

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
	indirectly impacted	several indirectly	impacted or many indirectly	directly impacted	
Heritage	Impact on item of minimal significance	Impact on multiple items of low significance	Impact on significant item	Impact on multiple significant items	Major impact on protected item
Political	Single negative press article	Multiple negative press articles	Significant public interest	Leads to an inquiry	Change of government
Economic					
Economic	Minimal losses	Several thousand dollars lost revenue or remediation costs	Half million dollars in lost revenue or remediation costs	One million dollars in lost revenue or remediation costs	Several million dollars in lost revenue or remediation costs

6.2.3 Pre-Management and Mitigation Risk Assessment Matrix and Rating

Based on the assessment of likelihood and consequence any foreseeable impact can be assigned a risk rating. Table 10 illustrates the risk rating process as a matrix. Increased consequence from left to right and increased likelihood from top to bottom. The resulting juncture of consequence and likelihood produces the risk rating on a scale of negligible to significant.

Table 10: Risk Assessment Matrix

		Consequence				
		Minimal	Minor	Moderate	Major	Catastrophic
Likelihood	Remote	Negligible (1)	Negligible (2)	Very low (3)	Low (4)	Medium (5)
	Unlikely	Negligible (2)	Low (4)	Medium (6)	Medium (8)	High (10)
	Possible	Very low (3)	Medium (6)	Medium (9)	High (12)	Very high (16)
	Likely	Low (4)	Medium (8)	High (12)	Very high (16)	Significant (20)
	Almost certain	Medium (5)	High (10)	Very high (15)	Significant (20)	Significant (25)

6.2.4 Mitigation Risk

The potential effectiveness of proposed management and mitigation measures to avoid, minimise, mitigate and if necessary offset impacts are provided in the relevant key issues chapters. These are also consolidated in Chapter 16 of the EIS. The effectiveness of these management and mitigation measures have been assessed and identified within Table 11 with the degree of effectiveness of these measures classed as:

- **Very effective** – the measure would decrease the risk rating score by 12 points – for example, from 20 (high) to 8 (medium).
- **Effective** – the measure would decrease the risk rating score by 7 points – for example, from 12 (high) to 5 (medium).
- **Partly effective** – the measure would decrease the risk rating score by 3 points – for example, from 6 (medium) to 3 (low).
- **Not effective** – the measure would not change the risk rating.

6.3 Environmental Risk Assessment Findings

Table 11 presents the findings of the ERA for the Project. This includes identified risks prior to management and mitigation measures (Table 11: Unmitigated Risk) and with implementation of mitigation and management measures (Table 11: Mitigated Risk). As noted in Section 6.2.4, mitigation measures and their effectiveness are identified within the relevant key issues chapters, which are also consolidated in Chapter 16 of the EIS.

Table 11: Risk Assessment

Identified Risk	Description	Likelihood	Consequence	Unmitigated Risk	Effectiveness	Mitigated Risk
Waste	Receipt of non-conforming materials at the Site not permitted to be handled.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
	Unplanned disruption to processing operations resulting in large quantities of materials being stored on site.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
Soils and Water	Soil erosion and sedimentation due to operation and construction activities.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
	Contamination of soil, surface water and groundwater as a result of uncontrolled release of waters/waste from processing activities during operation.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
	Unexpected contamination finds	Unlikely	Minor	4 Low	7 Effective	1 Negligible
	Flooding of the Site	Remote	Major	4 Low	3 Partly Effective	1 Negligible
Air Quality	Increased vehicle, plant and operations emissions impacting upon air quality and increasing contribution to greenhouse gas	Likely	Minimal	4 Low	3 Partly Effective	1 Negligible

Identified Risk	Description	Likelihood	Consequence	Unmitigated Risk	Effectiveness	Mitigated Risk
	emissions during construction and operation.					
	Dust from construction reducing local air quality.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
	Dust, air pollutants and odours from waste during operations.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
Human Health	Health impacts from exposure to contaminants during construction and operation.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
Noise and Vibration	Noise and vibration impacts on the amenity of sensitive receivers during construction and operation.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
Traffic and Transport	Increase in traffic congestion and reduced network efficiency during construction	Unlikely	Minor	4 Low	3 Partially Effective	1 Negligible
	Release of dust and air pollutants	Unlikely	Minor	4 Low	7 Effective	1 Negligible
	Reduced availability of on street parking	Unlikely	Minor	4 Low	7 Effective	1 Negligible
Fire and Incident Management	Risk of fire during operation or construction.	Possible	Moderate	9 Medium	7 Effective	2 Very Low
Hazards and Risk	Impacts of dangerous goods or hazardous material	Unlikely	Major	8 Medium	7 Effective	1 Negligible
Biodiversity	Potential impact upon fauna and flora biodiversity at the Site and surrounding area.	Unlikely	Minimal	2 Very Low	3 Partially Effective	1 Negligible
Cultural Heritage	Impacts to unanticipated heritage items during construction	Remote	Moderate	3 Very Low	7 Effective	1 Negligible

Identified Risk	Description	Likelihood	Consequence	Unmitigated Risk	Effectiveness	Mitigated Risk
Visual Amenity	Road user and occupant views from Whyalla Street.	Possible	Negligible	3 Very Low	3 Partially Effective	1 Negligible
Socio-Economic	Potential changes in market and property values due to development of the Project.	Remote	Minimal	1 Negligible	0	1 Negligible
Ecologically sustainable development	The project has a threat of serious and permanent impact upon the environment.	Unlikely	Moderate	6 Medium	7 Effective	1 Negligible

6.4 Environmental Risk Assessment Findings

Based upon the environmental risk assessment completed in Table 11, it can be recognized that the unmitigated risk of issues identified for the Project range from medium to negligible.

Chapters 7 through 17 of the EIS provide assessment of these issues identifying design engineering and/or mitigation and management measures and controls that reduce the environmental risk of the Project. The potential effectiveness of these management and mitigation measures are summarized within Table 11, identifying that mitigated environmental risks range from very low to negligible.

The range of this mitigated risk rating suggests that the Project will have a very low to negligible potential for environmental risk with the application of identified environmental management measures provided throughout the EIS including within Chapter 16 Compilation of Environmental Management and Mitigation Measures, in addition to conditions of consent, and normal working practices. For this reason, it is considered that the Project is ecologically sustainable development, as it does not propose a threat of serious and permanent impact upon the environment as identified within Table 11.

7.0 WASTE MANAGEMENT

The Secretary's Environmental Assessment Requirements:	
General Requirements – a detailed description of the development, including: ■ *consideration of issues discussed in the public authority responses to key issues (available the Department's Planning Portal) including detailed responses to the EPA's key issues identified in its letter dated 7 October 2020.*	Chapter 2: Project Description Chapter 7: Waste Management
Key Issues – Waste Management – including: ■ *a description of each of the waste streams that would be accepted at the site including maximum daily, weekly and annual throughputs and the maximum size for stockpiles* ■ *details of the source of the waste streams to justify the need for the proposed processing capacity* ■ *a description of waste processing operations (including flow diagrams for each waste stream), including a description of the technology to be installed, resource outputs and the quality control measures that would be implemented.* ■ *details of how waste would be stored (including the maximum daily storage capacity of the site) and handled on site, and transported to and from the site including details of how the receipt of non-conforming waste would be dealt with* ■ *detail the developments waste tracking system for incoming and outgoing waste* ■ *details of the waste management strategy for construction and ongoing operational waste generated and* ■ *details of the measures that would be implemented to ensure that the development is consistent with the aims, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.*	Chapter 2: Project Description Chapter 7: Waste Management Chapter 3: Statutory Framework

7.1 Demolition and Construction Phase

The Project involves minor demolition of a portion of the existing slab in the carpark and minor demolition of portions of walls of the existing warehouse at the Site.

The waste streams anticipated to be generated onsite during the demolition phase of the Project are summarised in Table 12.

Table 12: Summary of Demolition Waste

Waste Type	Waste Identified	Waste Description	Storage	Reuse/ Recycling/Disposal Method
General solid waste non-putrescible	C&D waste	concrete, steel, plastic, timber,	Skip bins	Offsite recycling by appropriately licenced contractor
General solid waste (putrescible)	Site office waste	General waste from workers (i.e. lunches etc.)	2 cum Skip bins within the building	Offsite disposal by appropriately licenced contractor
General solid waste (non-putrescible)	Site office waste	Paper cardboard and comingled recycling	2 cum Skip bin within the building	Offsite recycling by appropriately licenced contractor

Table 13: Summary of Construction Waste

Waste Type	Waste Identified	Waste Description	Storage	Reuse/Recycling /Disposal Method
General solid waste (non-putrescible)	Soil	Earthworks spoil from preparing foundations	Skip bins	Offsite disposal by appropriately licenced contractor
General solid waste (non-putrescible)	Construction Waste	Timber, packaging, metal, asphalt, concrete, glass plastic, runner, plasterboard, ceramics, bricks,	Skip bins	Office site recycling by appropriately licenced contractor
General solid waste (non-putrescible)	Grit, sediment, gross pollutants	Collected in erosion and sediment control devices	Skip bins	Offsite disposal by appropriately licenced contractor
General solid waste (non-putrescible)	Site office waste	Paper cardboard and comingled recycling	2 cum Skip bins within the building	Offsite recycling by appropriately licenced contractor
General solid waste (non-putrescible)	Site office waste	Generated from works i.e. lunches.	2 cum Skip bins within the building	Offsite disposal by appropriately licenced contractor

The Construction Environmental Management Plan (CEMP) will outline waste management practices during the demolition and construction phase.

7.2 Operational Phase – Office, administration, laboratory, general

Waste streams generated because of site activities include:

- General Waste from operational staff; and
- Used reagent packaging.

Table 14: Operational Waste - Office and Admin

Waste Type	Waste Identified	Waste Description	Storage	Reuse/Recycling/Disposal Method
General solid waste (non-putrescible)	Site office waste	Paper cardboard and comingled recycling	2 cum Skip bins within the building	Offsite recycling
General solid waste (non-putrescible)	Site office waste	Generated from works (i.e. lunches etc.)	2 cum Skip bins within the building	Offsite disposal
Various	Used Reagent Packaging	Generated from operations. Used Reagent Packaging	Within bunding until collection	Under no circumstances is used reagent packaging to be placed in the general waste bin. Reuse where possible. Offsite disposal

In accordance with Liverpool City Council DCP requirements, the design of the garbage/waste storage areas shall comply with the following:

a. The rooms shall be fully enclosed with concrete floor and concrete or cement rendered walls to the floor.

b. A hose cock for hosing the garbage bin bay and a sewered drainage point in or adjacent to the bin storage area shall be provided. The drainage point should have a fine grade drain cover sufficient to prevent coarse pollutants from entering the sewer. If the hose cock is located inside the bin storage bay, it is not to protrude into the space indicated for the placement of bins.

c. The room shall have a floor waste, which is to consist of a removable basket within a fixed basket arrestor and is to comply with Sydney Water requirements.

d. The room must include a tight-fitting, self-closing door and mechanical ventilation.

Layout of the facility is discussed in Chapter 2.

The mitigation measures proposed to be in place to prevent waste tracking from the Site include:

- Loads covered until inside the building and before leaving the building.
- A truck and wheel wash would be installed for trucks prior to exiting the building.
- Entry and exit signage to advise transport operators of procedures.
- Unloading and loading within the building.

7.3 Operational Phase – Waste Treatment

7.3.1 Prior to Receipt of Waste at Site

Prior to accepting wastes at the Site, a number of general requirements need to be met, consistent with the NSW EPA requirements for handling and receiving wastes. This documentation will be compiled and retained at the Site as part of an individual “enquiry management process” to ensure compliance with NSW EPA Guidelines and provide the necessary material handling and tracking requirements.

In accordance with the NSW EPA Waste Classification Guidelines Part 1- Classifying Waste (NSW EPA Waste Classification Guidelines), the Step Process is to be adopted. In particular, the following records will need to be generated prior to receipt of any waste:

- Wastes are permitted to be accepted to the Waste Treatment Facility, ensuring that the generator of such waste ensures that:
  - The materials are not classified as special wastes in accordance with Step 1.
  - Liquid wastes will not be subject to immobilisation or may be defined as sludges and first passed through a pre-treatment stage to reduce moisture content (if technically acceptable).
  - Sludges defined as such may require pre-treatment to change their physical properties prior to the primary treatment technology being undertaken. This is to demonstrate they are first compliant with the requirements rendering them NOT liquid wastes in accordance with Step 2.
  - Determine whether the wastes may be pre-classified (Step 3), consistent with the classifications in Schedule 1 of the *Protection of Environment Operations Act 1997* (POEO Act). The specific management requirements of a particular waste that is pre-classified will then need to be met at the Waste Treatment Facility (where applicable). It is anticipated that a list of pre-classified materials will be kept at the weighbridge and updated on a minimum monthly basis.
  - Appraisal of the characteristics in accordance with Step 4 of the NSW EPA Waste Classification Guidelines.
  - A preliminary report of the materials classification in accordance with Step 5 of the NSW EPA Waste Classification Guidelines will need to be provided by the waste generator before shipment of the material has commenced from the waste source / site.
- The waste generator (source of waste stream) will need to demonstrate compliance with the NSW Waste Classification Guidelines to ensure the general requirements for waste classification are being met and the data needs are available that enable an appraisal of treatability to be completed.

In addition to NSW EPA Waste Classification Requirements the waste will be screened at the Waste Treatment Facility in accordance with 7.4.4 to ensure treatability. Section 7.4.4 and Section 7.5.2 outline the documentation requirements and decision-making process.

7.3.2 Weighbridge Operational Requirements

All incoming wastes enter via the weighbridge.

The weighbridge office will be responsible for all waste acceptance to the Waste Treatment Facility. The entry weighbridge is located to the west of the facility at the northern most gate.

Records will be made regarding the waste classification as per the NSW EPA Waste Classification Guidelines and onsite waste screening. Results will be maintained at the Site.

The weighbridge operator will ensure that all incoming wastes are weighed, recorded and the waste delivery matches the waste classification and screening records. If inconsistencies exist and / or the wastes are not consistent with the delivery expectations, the waste load will be rejected.

Where waste deliveries match their site waste screening records (refer 7.4.4 and 7.5.2), they will be directed by the weighbridge operator into the building and assigned to an appropriate unloading area.

Visual inspection of load will be undertaken upon unloading. If inconsistencies exist and / or the wastes are not consistent with the delivery expectations, the waste load will be rejected.

When loads of non-conforming waste are identified, the customer is asked to leave the facility immediately with the load and the weighbridge operator records the information in the rejected loads register.

7.3.3 Waste Classification & Tracking

All wastes to be received at the facility will be tracked from waste producer through to destination facility (eg: landfill), consistent with NSW EPA Guidelines.

The Waste Treatment Facility will document the following as part of waste tracking:

- The waste form;
- The NSWEPA waste code (Table 1), consistent with the Controlled Waste National Environment Protection Measure (NEPM);
- Documented limits for any wastes that are subject to Chemical Control Orders (CCOs), noting that the NSW EPA Waste Classification Guidelines provide criteria for the following:
  - Limits for Aluminium Smelter Wastes (Fluoride / Cyanide).
  - Limits for solids contaminated with PCBs.
  - Oranotins;
  - Schedule Wastes.

Scheduled Wastes are those contaminants as listed in the NSW EPA Waste Classification Guidelines, Table 1, footnote 11.

Dioxins as defined in the CCOs, will not be accepted at the facility.

The following general waste tracking will be followed:

- The waste generator will provide a consignment authorisation number (CA) along with the waste.
- The waste generator shall provide any UN Hazard Codes.
- The wastes will be tracked through the facility using the waste generators CA, form and code.
- The facility will review the analytical data provided by the waste producer and ensure the classifications provided are correct.

In accordance with the *Protection of Environment Operations (Waste) Regulations 2014*, the Waste Treatment Facility will maintain the following records:

- Waste type.
- Waste form and waste code (including CA Number).
- Vehicle transport in details.
- Weighbridge details (waste in codes and consignment reference number and total tonnage).
- Contaminants of concern.
- Waste destination and transporter details.

Detailed weighbridge procedures for screening and acceptance of waste will be presented in the OEMP.

7.3.4 General Approach to Treatment Selection

7.3.4.1 Hierarchy of Solid Waste Treatment

Consistent with NSW EPA Waste Classification Guidelines, the Waste Treatment Facility will adopt the three broad treatment hierarchies below to ensure that the best technical process is selected to suit the particular physical and chemical characteristics of the waste material. The hierarchy will be as follows:

- **Contaminant Separation**. Separation can include:
  - Physical separation of inert solid materials.
  - Chemical separation, involving the release of chemicals from the matrix binding to enable destruction and / or collection.
- **Contaminant destruction technologies**. This may include the following general approaches.
  - Lowering of the total contaminant mass. This will be limited to bioremediation and chemical oxidation for solid wastes. The use of abiotic reactive mediums can also be considered for certain contaminants of concern within the waste stream.
  - Reducing the toxic form of a particular contaminant of concern (e.g. chemical reduction to change valency).
- **Contaminant immobilisation.** For solid wastes, a wide range of reagents are deemed suitable for the individual contaminants of concern and will be selected based on the principal contaminant being immobilised and the range of other contaminants (where applicable). These reagents are generally chemically neutral and alter the mobility of contaminants within the final mix. These reagents will form part of the wastes disposed to landfill AFTER treatment has been verified.

It should be noted that combinations of approaches may be deemed suitable in reducing contaminant mass and toxicity by using combinations of the above technologies.

7.3.5 General Approach to Solids Immobilisation

Where immobilisation as a technology has been identified as the most suitable technology based on the waste screening and / or historical waste classification, the weighbridge will be responsible for documenting the following with regards to immobilisation:

- Assessment of potential alternatives to immobilisation for a particular waste stream have been undertaken by the waste producer. This is likely to be more applicable when treating highly variable wastes (e.g.: contaminated land soil remediation projects) to ensure that preference is given to chemical destruction and / or separation as the preferred remediation technology approach.
- A General Immobilisation Approval (GIA) is not currently in place that can first be referenced by the Waste Treatment Facility. This is only likely to be the case for very specific waste streams where general immobilisation approvals have been granted and gazetted previously by the NSW EPA;
- Where a Specific Immobilisation Approval (SIA) is in place for the facility prior to acceptance of the material (based on the waste streams approved under a specific SIA) and it is demonstrated that the material cannot practicably be treated by preferred contaminant destructive / separation technologies, then SIAs will be established for categories of wastes that will apply to families of contaminants.

It should also be noted that materials classified as liquid wastes cannot be subject to immobilisation, consistent with the requirements of Part 1 of the NSW EPA Waste Classification Guidelines. In particular, with

reference to the following with regards immobilisation, prior approval will need to document compliance with the following:

- Step 2 of Part 1 of NSWEPA Classification Part 1: Classifying Wastes; and
- NSW EPA Waste Classification Guidelines: Part 2 Immobilisation of Waste, the materials have no free liquids when tested in accordance with the USEPA Paint Filter Liquid Test – Method 9095 (USEPA 1986).

As the Waste Treatment Facility will deploy a Reterra Soil Mixing unit and also provide rotary bucket mixing equipment (waste specific), it is considered only the finest grained, cohesive materials (e.g.: clay content >10%) would not be suitable for immobilisation as a single treatment operation. It is expected that the Reterra plant and machinery can achieve excellent reagent mixing capability for fine grained soils with some cohesive properties; the unit will also require separation of oversize materials in order to effectively mix and avoid damage to the internal mixing paddles. The Reterra will also be a controlled system, whereby calculated reagent dosing rates, volatile and particulate emissions can all be controlled.

7.4 Waste Types

This section describes the waste types to be received at the Waste Treatment Facility and the associated treatment technologies.

7.4.1 Treatable Waste Categories

A series of treatable wastes categories containing anthropogenic substances have been summarised. The wastes (solid / sludge / liquid) to be accepted by the Waste Treatment Facility can be grouped into the following individual categories summarised in Table 15 below.

Table 15: Summary of Individual Waste Categories (Anthropogenic)

Category	Title	General Description
A	Organics	Wastes containing volatile and semi volatile substances, petroleum hydrocarbons, mineral oils, coal tar impacted materials, refinery wastes, biodegradable (aerobic) materials. Category A wastes are where there are more opportunities to destroy contaminant mass. This category excludes chlorinated (halogenated) hydrocarbon containing wastes.
B	Halogenated	Including chlorinated solvent impacted soils which may contain potentially separate phase liquids entrapped within the soil matrix, residues from industrial waste treatment / process operations. Category B materials can be chemically degraded and oxidised as a preferred treatment approach.
C	Metals / Metalloids	Wastes from electrical processing sources, contaminated soils from property development, treatment wastes from mining, metals refining, waste from chlor-alkali plants and fly ash (power station wastes). Excludes solid waste slags.
D	Other	Including contaminants of a unique or special composition, such as inorganic contaminants, non-toxic salts, organic phosphorous compounds, wastes containing peroxides, biocide and phytopharmaceutical wastes (biocide manufacture), isocyanate compounds (polymer wastes), chlorates (disinfection by products from water treatment), PFAS contaminated soils will not be treated at the facility, but only stored and transferred to an EPA approved treatment facility.

Category	Title	General Description
		Soils containing ACM will not be treated at the facility. Soils containing ACM will be transferred to appropriately licenced other facilities for management and final disposal to a licenced landfill facility.

These waste categories are grouped into general organics, halogenated organics and metals / metalloids. Category D includes a broad list of waste types that are considered to be similar in terms of grouping and will have a similar treatment “profiles” in terms of common primary treatment technology. It should be noted that PFAS contaminated soils will not be treated at the Waste Treatment Facility. PFAS contaminated sludges will also not be accepted at the facility.

A list of individual waste stream descriptions, relevant EPR codes, facility tonnage limits and non-regulated solid waste thresholds have been summarised in Appendix C of the EIS.

7.4.2 Treatment Technology Overview

7.4.2.1 Solids

For solids / sludges, the following technologies are considered suitable in order of preference:

- Chemical oxidation, suitable for CATA, B & C and part of CAT D.
- Bioremediation, predominantly CAT A wastes.
- Immobilisation to chemically fixate (bind) contaminants into a cementitious bound matrix that meets stringent leachability criteria rendering the material a lower category of waste consistent with Step 5 of Part 1 of the NSW Waste Classification Guidelines (CAT A, B, C D).

Both chemical oxidation and bioremediation of solids / sludges are considered to be the preferred contaminant destruction technologies and will be individually assessed against the contaminants of potential concern (COPC) as being suitable.

The categories of wastes will form the basis of selecting the preferred technology but does not represent the final treatment technology selection.

For each treatment technology proposed, a series of physical and chemical waste parameters have been developed to assess treatment technology suitability. These individual parameters are a means of assessing the treatability of each individual waste stream. The criteria should be used during the following stages when appraising waste treatability and final validation.

Consistent with NSW EPA Waste Classification Part 2 - Immobilisation, immobilisation is only a preferred technology for metals (Category C) and coal tar impacted contaminated soils / wastes derived from gasworks redevelopment (subject to composition of coal tar wastes and reagent suitability in the presence of high naphthalene content). It should be noted that a General Immobilisation Approval (NSW EPA GIA 2005/14) is currently in place for coal tar impacted soils / wastes, and these materials should be treated and managed in accordance with this GIA. However, the Waste Treatment Facility will still appraise the suitability of accepting coal tar impacted soils, particularly where heavily impacted, as these may require additional odour controls and further pre-treatment in order to be successfully immobilised. This is be discussed further below.

It should be noted that the preferred technology is the one identified as the preferred and is not definitive. For example, some waste types have treatment technology options; these are summarised in Table 1 of Appendix C.

7.4.2.2 Liquids

A range of treatment technologies are proposed for treating wastes at the facility, as follows:

- For liquids, precipitation, chemical oxidation and adsorption technologies are considered viable for removing dissolved phase contaminant mass to comply with discharge consents.
  - Precipitation will involve simple pH adjustment for metals contaminated liquids.
  - Chemical oxidation is a contaminant destruction process which will be suitable for a range of organic contaminated liquids (refer CAT A, B & C).
  - Adsorption technologies (e.g.: Granular Activated Carbon) with filtration will also be appropriate for halogenated hydrocarbons, surfactants and plasticiser liquid effluents. The use of high grade ion exchange resins is also included as an adsorption technology selected for the Waste Water Treatment Plant.

For simple acid / base contaminants (e.g.: basic alkaline solutions), simple pH adjustment may all that is required to treat these materials.

Table 16 below summarises the most likely treatment technology to be adopted for a range of contaminants. Both liquid and soil waste streams have been summarised.

We have assigned 'preferred' as 1 down to 3 as 'not preferred or suitable'.

Table 16: Summary of Preferred Treatment Technology by Waste Groups

Principal Waste Type	Preferred Technology				
	Soils (inc Sludge Residues)			Liquids	
	Immobilisaton[2]	Chemical Oxidation	Bioremediation[4]	Precipitation[1]	Adsorption[1]
Metals Wastes Soil / Sludge[2]	1	n/a	n/a	n/a	n/a
Metals Wastes - Liquids	n/a	2	n/a	1	2
Volatile / Semi Volatile Wastes – Soil[4]	3	1	1, 2	n/a	n/a
Coal Tar Impacted Soils / Wastes[5]	1	2	n/a	n/a	n/a
Volatile / Semi Volatile Wastes – Liquids[3]	n/a	1	n/a	n/a	1
Special Wastes - Soil	1	2	3	n/a	n/a
Special Wastes - Liquid	n/a	2	n/a	2	1

Notes:

1. *Precipitation and adsorption largely applies to liquid waste treatment, subject to relevant moisture content.*

2. *Immobilisation highly preferential for metals contaminated waste treatment to meet landfill leachability criteria. Immobilisation is referred to as the stabilisation of contaminants either by chemical stabilisation or micro-encapsulation. Whilst solidification provides benefits in terms of physical reduction in mass permeability of treated materials, stabilisation (chemical / micro-encapsulation) is the primary immobilisation process.*
3. *The presence of volatile / semi volatile substances shall be determined for contaminated wastes as the presence of volatiles may adversely affect the cementitious curing for immobilisation technologies to be less effective. For volatile substances alone, the preferred treatment technology for solids is dependent upon the solid particle size distribution. Refer to physical testing criteria in solids treatment technology sections below.*
4. *Bioremediation success for volatiles / semi volatiles is dependent upon the compounds present. Halogenated aliphatic volatiles (e.g.: chlorinated solvents) will not be amenable to bioremediation as per the proposed technology of the facility as the controlled environment would largely be aerobic. The high volatility of some chlorinated hydrocarbons could be enhanced and managed by the treatment of soils in a controlled vapour collection system with the addition of simple amendments.*
5. *General Immobilisation Approval 2005/14 in place for coal tar impacted soils / wastes.*

7.4.3 Acid Sulfate Soils

Acid sulfate soils is the common definition given to naturally occurring soil and sediment containing sulfidic minerals with the potential to generate acidic conditions when exposed to the atmosphere. These materials are naturally occurring and are referred to as potential acid sulfate soils (PASS).

PASS is proposed to be treated at the Waste Treatment Facility. It is likely that treatment of natural PASS soils and sediments by acid neutralisation (e.g.: liming) will be undertaken where it has been demonstrated that the potential for acidification has been realised in the materials. I.e., the natural sulfidic minerals have partially oxidised and have resulted in a pH of less than 5.5. Circumstances where waste producers have a potentially acid sulfate soil (PASS) which, once excavated, would generate acid conditions, would need to be classified as such in accordance with the NSW EPA Waste Classification Guidelines: Part 4: Acid sulfate Soils, November 2014. In particular, the waste producer will need to first document and appraise the waste stream to check that it will meet the definition of “virgin excavated natural material” (VENM) under the POEO Act. It is likely the waste producer generating the PASS has assessed the material in order to identify a potential direct disposal route prior to excavation without the need for treatment. As such, the VENM screening will have been undertaken by the waste producer and a direct route for suitable disposal to below the water table cannot be met. This appraisal will help determine the treatment requirements prior to acidification, and more importantly will assist in the final classification of the materials following treatment and prior to disposal to a licensed facility.

Where an enquiry is made from an external producer to undertake treatment of actual acid sulfate soils (ASS), the producer will need to provide documentation to the Waste Treatment Facility, which clearly states the material either does not meet the definition as a VENM, cannot be disposed at a licensed facility that will maintain the material below the water table, or has already actual acid sulfate soil (ASS) conditions present. The materials will then require characterisation in accordance with NSW “Acid Sulfate Soil Manual 1998, section 4”.

Treatability of actual acid sulfate soils (ASS) will also need to consider the potential presence of secondary anthropogenic contaminants of concern within soils. Some coastal materials are known to be in former industrial areas, and natural acid sulfate soils can also contain anthropogenic contaminants, which will require further consideration in terms of treatment. Consistent with Step 5 of Part 1 of the NSW Waste Classification Guidelines, classification of the material will need to be considered as part of treatment and validation process. The presence of additional anthropogenic contaminants may alter the ASS treatment technology, to include consideration of the above.

Acid Sulfate Soils will be classified individually and will remain separate from Classifications A, B and C. This will ensure that the waste stream takes into account that the primary treatment process is acid neutralisation and not contaminant destruction or immobilisation. ASS will be included in Category D unless characterisation testing indicates other contaminants of concern are present.

7.4.4 Waste Screening Procedure

Wastes will undergo a series of waste screening steps prior to acceptance at the Waste Treatment Facility, as summarised in Table 17 below. This shall be applied to both liquid wastes and solid / sludge wastes. respectively.

Table 17: General Waste Screening Steps

Section	Content / Output
Batch Control Procedure	Establishment of waste tracking procedure through the Waste Treatment Facility. Issue of batch control number and sub-batch numbers.
Preliminary Waste Screening	■ Source of Waste ▪ Waste Type ▪ 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 ■ Do the solid wastes contain PFAS? (Y/N) ■ Acid Sulfate Soils (Y/N) ▪ Does the ASS contain anthropogenic materials?
Identify Preliminary Treatment	■ Where the primary treatment technology would benefit from a preliminary treatment with the aim of: ▪ Reduce contaminant mass by physical separation. ▪ Enhance the performance of destructive technologies by providing improvements via chemical separation.

Section	Content / Output
	▪ Improve mixability for immobilisation.
Identify Primary Treatment Technology	■ Identify the principal contaminants of concern ■ Assign a category (A, B, C, D) ■ Shortlist the preferred treatment technology, adopting the treatment hierarchy in Section 7.3.4 ■ Summarises the optimum treatment technology and process requirements (e.g.: review of previous results) ■ Preliminary dosage rates for solids / sludges (chemical oxidation and immobilisation) ■ Mixing requirements and the need to add chemical separation agents (bioremediation) ■ Preliminary dosage rate for liquids (chemical oxidation / precipitation) ■ Shortlist suitable treatment reagents ■ Summarise the target treatment criteria and validation parameters
Bench Scale Testing	■ Select the test methods and standards to be adopted in demonstrating the treatability of the material in meeting the criteria ■ Summarise input parameters ■ Finalise Reagent selection & dosage
Waste Receival	■ Issue batch number and sub batch number ■ Undertake verification testing to confirm material properties
Validation Testing & Reporting	Final Test Report ■ Analytical Results ■ Summarise NATA lab reports against batch records ■ Provide validation report for waste supplier and landfill ■ Compile disposal facility documentation, including field testing (where applicable)

7.5 Solid & Sludge Waste Treatment

7.5.1 Solid Waste Characterisation

All solid wastes accepted to the Waste Treatment Facility will require physical and chemical characterisation. The Step process as described in NSW EPA Waste Classification Guidelines – Part 1 Classification will be followed.

As wastes will require final classification prior to disposal, it is also necessary to assess the physical properties that may influence treatment technology selection.

7.5.1.1 Chemical Characterisation

Chemical constituents that may affect the treatment technology selection will be tested by the waste generator. This will be undertaken *prior* to any wastes being accepted at the Waste Treatment Facility. These preliminary chemical analysis results will initially be used to confirm the contaminants of potential concern (COPC) within the solid waste consignment and their variability. A range of chemical constituents will be targeted to inform on the technology selection process.

The contaminant characterisation tests to be adopted are technology and contaminant specific and are presented in the relevant technology sections below.

7.5.1.2 Physical Characterisation

As per the chemical characterisation testing, physical parameters of the solid waste consignment will also need to be tested by the waste generator. This will identify the preferred technology and may result in a modification of the preferred technology due to constraints identified in being able to meet a uniform treatment outcome. Changes to the preferred technology selection will be documented to enable the decision process to be documented.

A range of physical parameters have been identified in the solid waste technology options summarised below that will be used as a guide to finalising the most suitable technology for treating solid wastes.

The decision on which treatment technology will be suitable for each individual waste stream cannot be finalised as part of this document. However, for this document, a generic framework has been presented that will apply to the key solid waste and liquid waste treatment technologies. It is important that the anticipated waste stream is characterised chemically *prior* to delivery to the Site.

For each treatment technology, the physical and chemical criteria of most relevance are presented in Table 18 below. These will be used to determine the preliminary waste screening and bench scale testing.

Table 18: Summary of Physical & Chemical Test Parameter for Solid / Sludge Wastes

Technology	Physical	Chemical
Solids / Sludges		
Immobilisation	Geotechnical Properties (PSD) Clay content (% < 2µm) Soil Moisture Content Organic carbon content	Carbonates Phosphate sulfate / Sulphide Mineral oxides (metals) Fulvic / Humic Acids (sediments only) Volatile Organic Compounds (VOCs) Separate Phase Hydrocarbons Phenols Cyanides Acid sulfate Soils Acid Neutralisation Capacity
	Unconfined compressive strength test (UCS) to provide indication of pozzolanic reagent	

Technology	Physical	Chemical
	performance post immobilisation. TCLP and multi-extraction leach procedure (MEP) for quantifying the percentage reduction of the leachability.	
Chemical Oxidation	Fraction of organic carbon Soil oxidant demand Geotechnical Properties (PSD)	■ Carbonates, chlorides ■ Iron mineral species (ferrous / ferric) ■ NAPL / Sheens (based on visual inspection)
Bioremediation	Geotechnical Properties (PSD) Organic matter Permeability Plasticity Moisture Content	■ Presence of Recalcitrant Compounds ■ Bioavaiability[2] ■ Ammonia, nitrate, nitrite, phosphorous ■ pH ■ Redox ■ Dissolved Oxygen[3] (pore water) ■ Soil fraction of organic carbon (foc) ■ Concentration & Toxicity of Contaminant of Concern, Volatility ■ Contaminant distribution in the soil matrix
Liquids		
Adsorption		Chemical Suitability with range of COPCs present Effectiveness in removal and performance flow times through the adsorption vessels
Precipitation		Overall reduction in toxicity of COPC Presence of different metal valences and suitability in treating more toxic forms of metals
Chemical Oxidation		Organic carbon content Presence of sulphides post treatment

Notes:

1. *For bioremediation in windrows, the presence of recalcitrant compounds should be considered when assessing the suitability for bioremediation.*
2. *Bioavailability is likely to be a key analyte that requires analysis in the event materials are to be considered for re-use. Site specific requirement only.*
3. *The dissolved oxygen may indicate the need to add oxygen release compounds are aerate soils to improve biodegradation rates for key target petroleum hydrocarbon compounds.*

The preferable treatment technology may vary and will be subject to the results of the physical and chemical test criteria.

For liquid wastes, the presence of a wide range of COPCs at elevated concentrations may render the technologies as ineffective in meeting trade waste criteria.

7.5.2 Waste Acceptance Decision Process

7.5.2.1 General Batch Control Procedure

This section summarises the batch control procedures to be adopted for all four individual waste streams (CAT A, B, C, D). The processes will lead to a transparent control procedure where the wastes are being accepted, pre-screened, treated, validated and a final destination (material re-use, landfill disposal) being documented. It will enable Hi-Quality to identify where in the process train the waste materials are, enabling for fully documented validation to be completed in an effective manner.

The general batch control procedure will identify, record and control the individual treatment train for all the individual sub-batches that make up a single waste batch. The number of sub-batches will be dependent on the total tonnage of waste within the particular waste batch.

7.5.2.2 Parameter Specific Waste Screening

Prior to any waste material being considered for treatment or acceptance at the Site, a screening level assessment shall be undertaken to identify the materials suitability in being treated and identifying the primary treatment technology.

The preliminary waste screening will assess the following parameters:

Table 19: Summary of Solid Waste Screening Parameters

Parameter	Parameters
Acid Sulfate Soils	■ Classification parameters for PASS in accordance with the Acid sulfate Soils Manual, NSW Acid sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual, 1998 ■ Presence of other anthropogenic contaminants
Asbestos	■ Presence limits pre-treatment as per Section 7.5.10. Only wastes containing bonded ACM will be accepted to the facility. These materials will NOT be treated at the facility and will be transferred to another facility for management and disposal to a licenced facility.
PFAS[1]	■ Solid waste consignment <low level of reporting (LOR) limits for PFAS solid waste soils. As PFAS solid wastes are not being treated at the Waste Treatment Facility, demonstration of low levels of contamination will need to be demonstrated by the waste generator to ensure PFAS is not directed to landfill. All solid wastes will need to undertake a minimum level of classification in order to demonstrate acceptance at the facility. The LOR of 0.0002mg/kg will be adopted / stipulated as a requirement, which is below the human health and ecological investigation levels for soils. The frequency of testing will be 1 per 25m^3 and will be required to achieve a UCL95%ile <PFAS LOR. Where reportable PFAS (PFOS/PFOA/PFHxS) are greater than the NEMP criteria, then

Parameter	Parameters
	this will trigger PFAS analysis of TOPA[2] and TOF[3] to determine total fluorine mass and total PFAS mass.
pH	■ Health & Safety requirements (corrosivity, acidity) ■ Identification of pre-treatment for immobilisation
Moisture Content	■ To identify any specific handling requirements and liquid treatment requirements ■ Solids treated in batches of 50m^3, consistent with the sampling testing rate for the facility. ■ Sludges treated in purpose-built sludge treatment pits. ■ Liquids treated in batches of 50,000L (maximum) or less, subject to specific handling requirements.
Physical Parameters	Refer to Table 16 and Table 17 above for technology screening and technology specific parameters to be considered as part of the technology selection.
Chemical Parameters	

Note:

1. Principal PFAS compounds are the 28-30 principal PFAS compounds within the C4-C14 carbon chain length
2. Exceedance in the LOR will trigger the Total Oxidisable Precursor (TOP) Assay test to identify whether any hidden mass is present within the sample.
3. Total Organic Fluorine will only be stipulated where additional C4-C14 mass is present in the sample as determined by the TOPA

7.5.2.3 Batch & Bench Scale Testing

Solids / Sludge Wastes

Bench scale and bench scale testing will be undertaken prior to receipt of the waste at the Waste Treatment Facility to confirm the treatability of the material in meeting the criteria and design the treatment process to be adopted for the waste. Where a particular inventory of test knowledge has been accrued by the facility for a single waste stream, it is considered appropriate that wastes can be delivered to the facility before bench scale testing.

A broad range of contaminated waste streams have been proposed as being suitable for treatment at the Waste Treatment Facility. These are divided into four distinct categories; each waste has been assigned a category with the technology shortlisting appraised against the screening criteria described above. The solid wastes will need to be characterised in accordance with the following:

- Physical parameters to be assessed as part of the waste screening process;
- Chemical parameters to be assessed as part of the waste screening process;
- Performance criteria / targets to be met in meeting the requirements of full-scale treatability. This may include the completion of physical and chemical bench scale and batch testing to verify treatment performance for a range of performance indicators that represent ranges of values specific to the waste batch;

- Bench scale test results, including a summary of any deviations between previous results for the same waste stream; and
- Batch testing, to ensure that scale up to full scale does not affect the performance of the treatment process.

It is anticipated that the bench scale testing will provide preliminary indications of the mass destruction and / or immobilisation performance that will enable a full-scale batch scale test to be conducted to demonstrate the technology is performing at full scale. The batch testing will consider not only the primary contaminants of concern and dosing rates derived from the bench scale test but will identify any scale up requirements for treating the waste consignment. It is therefore necessary to appraise the range of contaminants that may affect the overall treatment performance.

Bench scale testing will be 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 to demonstrate performance criteria are met routinely through the individual batches. Leach tests effectively demonstrate the mass transfer of contaminants from solid to liquid phases. A range of standardised leach and physical tests will be used, 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 (ASLP);
- LEAF testing (USEPA Methods 1313, 1314, 1315 and 1316); and
- Unconfined compressive strength testing (immobilisation), where demonstration of curing is provided without any indication of demonstrated retardation during bench scale trials. UCS provides an indication of the final post cured immobilisation performance and provides some evidence of long-term performance.

The ASLP & TCLP test will be used as the primary test methods for determining leach and assessing treatment performance. The requirements of the TCLP test method shall be run under the following general approaches, as follows:

- For waste liquids with a low solids content (<0.5% solid), then 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.

However, it should be noted that more rigorous leachability testing may be required (e.g. USEPA MEP Testing, 1320), together with additional chemistry testing to demonstrate that precipitates and more stable forms of contaminants have been achieved before and after immobilisation.

The full TCLP will always be run for all new waste streams where previous analytical data are not available. The pre-selection of TCLP analytes of concern will only be permitted where preliminary waste screening test results are clearly demonstrating consistency with previous analytical data OR TCLP analysis for the primary contaminants of concern is resulting in reproduceable data. This is

considered an appropriate where the physical and chemical test data are showing a standard deviation of < 10%

Reagent Selection

A wide range of reagents have been proposed as being suitable. The preferred reagent and the establishment of dosing rates would occur during Bench Scale Testing. Reagents will be divided into the following categories:

- Chemical separation products (eg: surfactants that assist in improving bioremediation performance);
- Chemical oxidants; and
- Chemical stabilisation reagents.

Multiple reagents may be considered where pre-treatment to enhance destructive technologies are considered appropriate or will improve operational treatment times and result in improved performance in lowering contaminant mass throughout the batch of wastes.

For immobilisation and chemical oxidation, a wide range of reagents have been proposed for use. Many of these may have proprietary names or belong to families of traded products.

The Waste Treatment Facility will retain an inventory of all reagents used for each batch treated for each technology undertaken. The inventory will include a precise description of the product, which treatment technology it belongs to and maintain a register of the material safety data sheet (MSDS).

The Proponent will review the performance data obtained from validation testing for a select range of waste streams and reagents. The review will identify areas where improved performance have been achieved and will provide constant improvement of the use, dosing and methods of mixing reagents.

Optimisation may also involve demonstrating performance of combining treatment technologies that may cost effectively reduce both the contaminant mass and comply with landfill disposal criteria, whilst bringing benefits to the overall treatment performance. The practicality of combining technologies would be subject to the economic benefit in meeting a reduced landfill waste disposal cost or enabling materials to be reused / recycled.

Waste Receival

Upon receiving waste at the Waste Treatment Facility, a batch record number will be assigned to the waste batch. The following batch records will be assigned to the batch record number:

- Batch Number (UIN) – a six digit code;
- Waste tracking number;
- Quantity of waste in the batch;
- Total number of sub batches (based on volumes / tonnage estimates). Individual sub batch numbers will be assigned and any analytical data referenced accordingly;
- Packing / delivery requirements;
- Assignment of NATA accredited laboratory certificates from the preliminary waste screening (supplied by others) to the UIN (to include chain of custody records). Alternatively, if this is a regular waste type, a comparison with previous analytical waste analysis results will be undertaken and confirmation of similar analysis results will be made; and

- Selected treatment train reference.

Prior to waste receival being approved by the Waste Treatment Facility, documentary evidence of the following will be required to ensure that the optimum treatment technology or combinations of treatment technology are proposed:

- The preliminary waste screening assessment results are compliant with the approved wastes selected for treatment. This requires compliance with the physical and chemical test criteria or assessment against previous results for a similar waste batch;
- Analysis results from preliminary screening are available before the waste is delivered to the Site. Where similar wastes have previously been received and successfully treated, the results of previous analysis results may be accepted or a reduced frequency of sub batch analysis undertaken to demonstrate compliance with the waste batch control procedure and validation / reporting requirements; and
- A physical inspection of the material has been made for the waste stream to finalise the requirements for physical handling and / or management of odour issues.

It is anticipated that, for the waste streams where high volumes of material are being accepted to the Waste Treatment Facility from the same waste provider, or where there is sufficient treatment history from previous testing data to confirm that compliance is possible without conducting a full set of physical and chemical testing, then a reduction in the preliminary waste screening testing requirements and reduction in bench scale testing may be permitted. However, as a minimum, analytical chemistry data will be required at a minimum frequency of every 50m^3 for all sub batches to ensure that the materials from the same waste stream are consistent with previously treated materials, as this is considered to represent the treatment throughput capacity of a single sludge pit or a treatment bay area inside the treatment sheds.

Prior to waste receival at the Site, analytical test data will need to be provided by the waste generator, to confirm the most likely pre-treatment bench scale testing scope and to comply with the general screening requirements. The waste generator shall provide analytical test results to ensure that individual representation of the batch can be verified throughout the treatment train. This ensures that treatability and validation are fully documented against the waste suppliers' analytical inventory. Where the facility has developed a track record of meeting environmental / waste acceptance criteria for a particular waste stream, then pre-treatment bench scale testing can be by-passed, subject to receipt of appropriate chemical and physical analytical test data which demonstrates a clear consistency in the key parameters of the waste.

Where different treatment reagents are selected (chemical oxidation and immobilisation), a full set of bench scale testing will be required.

Validation & Reporting

For each sub batch and batch UIN number, it will be necessary to demonstrate consistent results are met with the waste treatment throughputs. The validation works will provide a check that the analysis frequencies are being met and ensures that compliance will be met for each batch by assessing the range of chemical and physical analysis results obtained.

It is anticipated that some variability in analysis test results will be reported between sub batches within a particular batch, particularly leachability. To demonstrate reliable compliance, it is proposed to use several lines of evidence when comparing chemical analytical results to target concentrations / criteria.

For variation in chemical test data, the 95th %ile concentration of all sub batch chemical analysis results will be calculated, together with the standard deviation against the relevant criteria. The criteria are likely to be a combination of leachability and total contaminant concentration or both, depending on whether the treated wastes are to be disposed of to landfill or re-used.

A full validation report will be prepared for each waste batch that passes through the Waste Treatment Facility. The report will include:

- Batch reference number;
- Material description;
- Batch volume;
- Waste originator and classification;
- Physical and chemical preliminary screening analytical results;
- A summary of total and leach results;
- Results of bench scale testing, including reference to previous analytical results and validation reports for similar waste streams;
- Sub batch statistical analytical results and comparison with relevant criteria; and
- Discussion on any variability and reasons for variation in analytical suites where deviations in results from the bench scale testing have occurred.

All laboratory testing will be conducted at a NATA approved analytical laboratory. Specific targeted immobilisation testing will be carried out to ASTM standards.

7.5.3 Soil / Sludge Treatment Decision Tree

An overall decision tree is presented as Figure 12 when determining the technology soil and sludge selection process. This provides a summary of the decisions to be made in terms of preliminary screening through to validation and reporting.

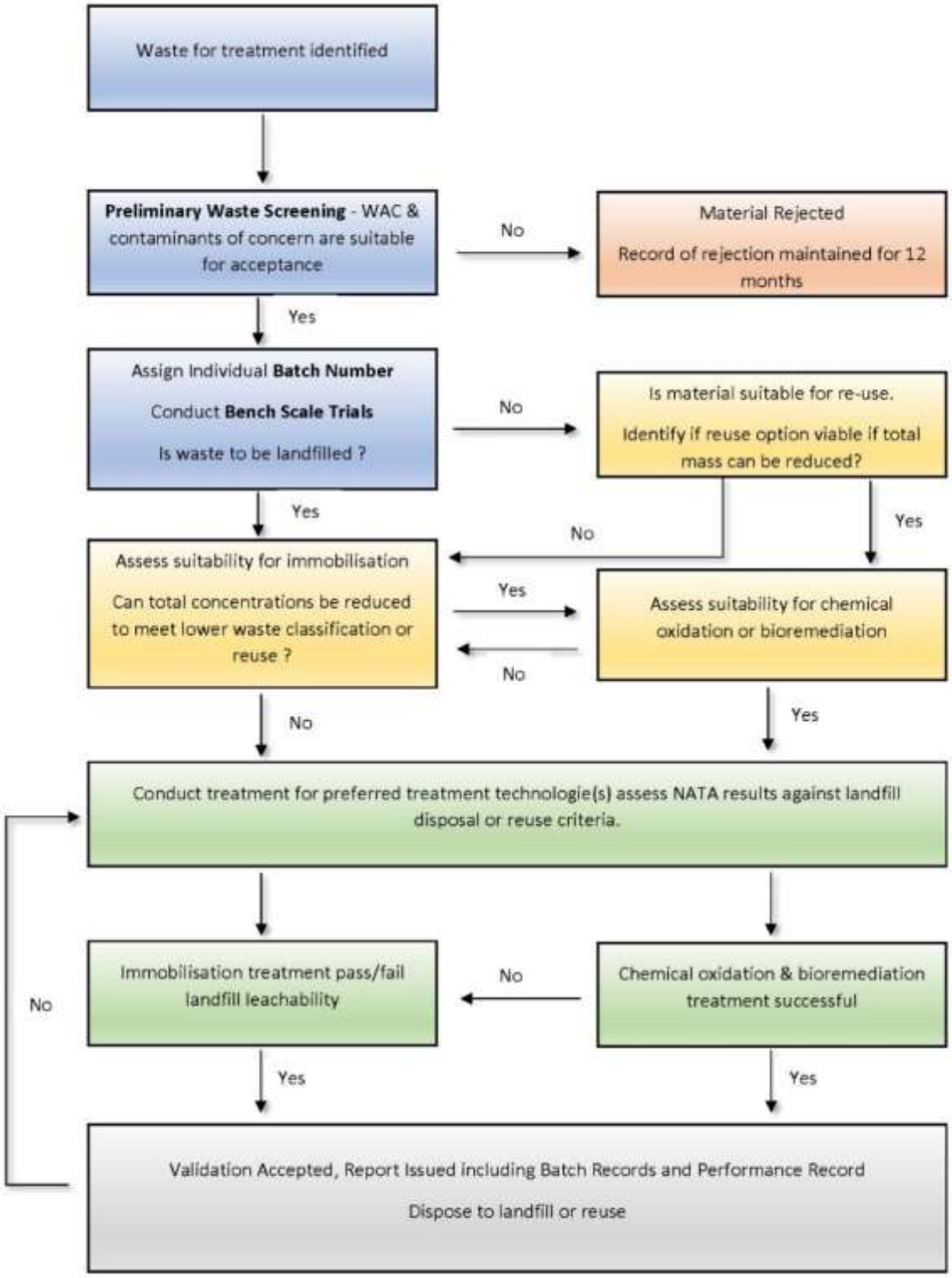


Figure 12: Soil and Sludge Waste Treatment Decision Tree

7.5.4 Combining Treatment Technologies

The range and combination of treatment technologies and reagents (stabilisation, chemical oxidation) that can be used will be tailored towards achieving material re-use or landfill disposal criteria. Combinations of treatment technology could also be proposed where multiple treatment objectives are identified that may practicable achieve material reuse requirements. Reference should be made to Section 7.1 for further detail on material reuse.

The decision to combine treatment technologies for a particular waste type will require a full set of preliminary assessment testing and bench scale testing to be performed for the contaminants of concern. Chemical oxidation is known to affect the mobility of metals for solids / sludges but normally these affects are limited as full mobility is not normally representative of a consistent release of dissolved phase metals (eg: soil mineralogy). Similarly, high concentrations of VOCs may impact on the effectiveness of immobilisation using cementitious binders. For this reason, the combined effects of applying more than one treatment technology will need to report the full effects of contaminant mobility, to include both metals and VOCs. A full set of bench scale testing will need to be conducted to include the physical and chemical test criteria stipulated for that particular treatment technology.

7.5.5 Treatment Overview

The following provides a more detailed summary of the treatment technologies for solids and sludges. In the majority of cases, the definition of a solid will be a natural soil or mineralised waste material with a moisture content of less than 40%. Alternatively, a sludge will generally comprise a waste product with a much higher moisture content that would generally take on a different physical form and would include an element of fluid flow and lack a physical stockpiling capability when compared with a contaminated soil.

The primary treatment technologies are summarised in Table 20, together with their primary target waste streams and contaminants of concern listed and their target performance objectives.

Table 20: Summary of Primary Remediation Technologies

Treatment Technology	Primary Performance Objective	Contaminants of Concern Targeted
Immobilisation	Reduction in contaminant leaching	Inorganics, organics, recalcitrant compounds with little biodegradation potential. Targeted to meet leach criteria for landfill disposal. Limited potential for reuse, but soil reuse may be considered under certain approvals.[1]
Bioremediation	Destruction of contaminants	Targets the destruction of petroleum hydrocarbons. Soils targeted to be suitable for re-use and will require post treatment validation.
Chemical Oxidation	Destruction of contaminants, modification of contaminant	Inorganics Heavier organics, eg: PAH compounds that will not bioremediate in a practicable timeframe. Chlorinated hydrocarbons where soil type and contaminant phasing are suitable.

1. *Refer to reuse considerations, immobilisation Section 7.5.8.*

It should be noted the individual treatment technologies may be used in series with each other where multiple treatment technologies are required. For example, where a particular waste stream contains contaminants of potential concern (COPC) that may require chemical oxidation, the chemical oxidation process may be used to develop conditions in the waste conducive to bioremediation or will enable a contaminant mass

(concentration) to be reached before immobilisation is undertaken to meet a certain landfill leach disposal criteria.

For each of the primary solid waste treatment technologies proposed for the Waste Treatment Facility, we have provided additional clarification on the following:

- Further details of the operational treatment train adopted at the facility;
- Potential emissions and the likely controls put in place;
- Potential for by-products, particularly for bioremediation and chemical oxidation;
- Chemical and physical changes that can be used to validate performance for the individual treatment technologies;
- Solid waste characterisation, including:
  - Physical characteristics of the contaminated matrix;
  - Chemical characteristics of the contaminated matrix;
- Validation / verification of treatment performance.

7.5.6 Bioremediation

7.5.6.1 Treatment Approach

Bioremediation is a well-established, sustainable approach to treating contaminated soils in Australia National Remediation Framework (August 2018) “CRC Care Technology Guide: Guideline on performing remediation options assessment.” The approach to bioremediation is to treat soils and render them suitable for reuse or to reduce Total Contaminant Mass (TCM) and reduce their long-term risk to human health and the environment.

7.5.6.2 Technology Overview

Bioremediation is a treatment technique that utilizes microorganisms or their metabolic products to degrade organic contaminants in soils. Soil bioremediation can be conducted under aerobic or anaerobic conditions, but aerobic (addition of oxygen) bioremediation is more popular as it is generally easy to manage in an exsitu application such as treating received materials at the Waste Treatment Facility in a purpose-built bioremediation treatment bay located in the southern part of the building.

The contaminants more suited to bioremediation include lighter and mid ranged petroleum hydrocarbons, including some mid-range hydrocarbons (<C35). Hydrocarbon destruction using bio-remediation results in the complete degradation (destruction) of petroleum hydrocarbons either by enhancements to naturally occurring bacteria or to the addition of bacteria to promote the relevant destruction of hydrocarbons. Two main processes are considered operationally suited to the Waste Treatment Facility, including:

- Biopiles where reagents are mixed into the contaminated soils, with the biopiles aerated by physical turning over with an excavator; and
- Composting, comprising of the biological decomposition of contaminants mixed with compost to optimise the microbial activity.

Key to the success of bioremediation is to demonstrate the destruction of contaminants of concern. To do this, a range of physical and chemical properties will need to be optimised within the solid wastes during treatment in order for bioremediation of contaminants to occur. It is important to ensure volatilisation is not the primary treatment technology, as this does not constitute contaminant destruction.

The decision to undertake bioremediation alone may be dependent upon the soil type (particle size, organic content), which will dictate the accessibility of the microbes to destroying contaminants on the finer grained materials. Some lower permeability soils, whilst treatable, may take several months to achieve reuse and / or landfill leachate disposal criteria. For this reason, aerobic bioremediation as a technology will be targeted towards hydrocarbon impacted soils where the soils lack cohesion and can be effectively aerated by physical means.

7.5.6.3 Process Description & Variations

The process adopted for the Project will be aerobic bioremediation, which is applicable to the timely destruction of hydrocarbons, including:

- Mono aromatic hydrocarbons (BTEX, phenols, cresols, catechols);
- Short chain mineral oils;
- Lighter range PAHs (<4 benzene rings);
- Some organic nitroaromatic explosives (eg: mono and dinitroaromatics, trinitrotoluenes);[7]
- Perchlorates;
- Anearobic degradation of chlorinated aromatic hydrocarbons (speciation required).

Some soils may require some form of pre-treatment to open the soil matrix up and create a more conducive matrix for the destruction of the contaminants of concern. This may include the addition of bulking agents such as sawdust which will also provide essential carbon sources but will also enhance the aeration capability.

7.5.6.4 Additives

Bacteria, nutrients (eg:urea, superphosphate, biodegradable surfactants) and traditional compost materials containing a carbon source will all form suitable additives to encourage biodegradation. In special cases, the addition of specific microorganisms can be implemented, but this is unlikely given the relatively small input rates expected to the Waste Treatment Facility.

Biodegradable surfactants are often seen as beneficial in finer grained materials where it is necessary to desorb treatable contaminants from solid phase into the pore space of soils, making them more accessible to bioremediation. Surfactants considered suitable for the operation include proprietary inert liquids that have detergent properties and can render bound contaminants free to be degraded in a shorter timeframe.

7.5.6.5 Bioremediation Screening Assessment

This section provides a summary of the physical and chemical characterisation screening assessment that will be undertaken in order to screen for bioremediation treatability of soils. Bioremediation will predominantly target the destruction of petroleum hydrocarbons, and therefore its treatability may be dependent on the range of hydrocarbons present and the practicality (timeframes) in achieving reuse criteria (remediation criteria).

Physical Characteristics of Waste

Material would require an initial evaluation of the following key parameters to determine the suitability for treatment and potential for re-use:

[7] The daughter products that result from the biodegradation of explosive contaminated soils may not have specific TCLP and SCC criteria developed in NSW. As such a further approval and assessment will be required. It is likely that these soils will more likely be treated at a source site rather than at the Waste Treatment Facility.

- Soil type, heterogeneity and fraction of natural organic carbon. Carbon dosing will form an important part of finalising the operational mix requirements for bioremediation;
- Receiving soil moisture content;
- Particle size distribution (including clay content). The proportion of fine-grained materials (<silt sized) will determine the retention times and enable an estimate of the porosity and initial degree of saturation;
- Fraction of Organic Carbon in soils (Foc). High Foc will generally indicate a contaminant is preferentially sorbed to a soils organic matter and will influence the mobility of a contaminant to be in solution and more accessible to biodegradation. Further, the presence of high organic matter in soils can result in depletion of oxygen for the sustaining of microorganisms, which would slow the biodegradation process significantly. It may also be necessary to add a carbon source to the soil matrix as part of the bioremediation process.

Chemical Characteristics

Engineered bacteria and / or nutrient loadings will be determined following the evaluation of the physical characteristics of the wastes as follows:

- Determine the contaminants of concern, to include BTEX, PAHs and speciated TPH including aliphatic and aromatic splits (TPHCWG (1997). A Risk-based Approach for the Management of Total Petroleum Hydrocarbons in Soil. In *A Technical Overview of the Petroleum Hydrocarbon Risk Assessment Approach of the TPH Criteria Working Group.*: Total Petroleum Hydrocarbon Criteria Working Group.)
- From the soil type, assess the likely distribution of contamination within the respective fractions.
- Identify potential recalcitrant hydrocarbon compounds that may not readily be degradable. These may result in poor risk reduction performance, which may lead to other solid waste treatment technologies being preferred.
- For fine grained soils, an assessment of bioavailability may be required. This will inform the decision making.
- Summarise the presence of any contaminants that will not bioremediate within practicable timeframes (e.g., recalcitrant contaminants such as chlorinated hydrocarbons), to include:
  - Presence of chlorinated aliphatic hydrocarbons (eg: TCE), which will not generally degrade aerobically with the proposed aerobic treatment process (with the exception of vinyl chloride) and are more likely to volatilise to atmosphere due to their high Henrys Law constant. Whilst it is acknowledged that bacteria methanotrophs can degrade VCHs aerobically, the metabolic pathways involved are incomplete and are not considered to be practicable for the Project;
  - The presence of some heavy metals, and their availability in the soils to be treated, can also influence the effectiveness of biodegradation. Some heavy metals have a toxic effect on microorganisms;
  - Presence of high molecular weight PAHs (>4 aromatic rings); and
  - Presence of aged petroleum products of low bioavailability.
- Check for the presence of inorganic nutrients in soils such as ammonia, nitrate, nitrite.
- Estimate the molar ratios of carbon, nitrogen and phosphorous.
- pH, which can affect contaminant solubility and bioavailability (preferred pH in the range 5.5 to 8.5).

- Redox potential.
- Estimate the required nutrient loadings to be added. Redox, inorganic nutrient loadings and proportions to optimise treatment process times (carbon, nitrogen, phosphorous).
- Dissolved oxygen in pore water to assist in determining the necessity of oxygen addition.

Process Description & Operational Testing

Bioremediation of solid wastes will largely be undertaken aerobically in controlled biopiles or covered windrows. The covered windrows would enable temperature, oxygen and moisture content to be controlled. 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 to soils and groundwater.

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.

The following validation testing will be undertaken both during and after completion of bioremediation:

- Summarise the moisture content before and after bioremediation. It is known that soil moisture content of 25-80% is optimum for the delivery of effective bioremediation. The moisture addition volumes should measured.
- Finalise any amendment materials to be added to the biopiles. Consideration should be given as 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.
- Confirmation chemical testing to demonstrate degradation products have been produced in the soils and the ratio of degradable compounds determined. Determine whether the material can be re-used, can be validated for direct landfill disposal or the materials will benefit from a secondary remediation process to qualify for landfill disposal (e.g., due to a combination of contaminants being present).

Other Considerations

Bioremediation can also be used to enhance a stabilisation program where heavily impacted hydrocarbon soils are present that are not initially fully treatable using bioremediation alone. In some circumstances the presence of high concentrations of volatile and semi volatile hydrocarbons may best be destroyed by bioremediation as a first step rather than attempted to be immobilised using binders and additives respectively. Similarly, heavier PAH impacted soils could be much more amenable to bioremediation after chemical oxidation has been undertaken. These considerations would be waste batch specific and subject to the completion of bench scale and batch scale testing prior to acceptance at the Waste Treatment Facility.

7.5.7 Chemical Oxidation

7.5.7.1 Technology Overview

Chemical oxidation has been demonstrated to perform well at the destruction of persistent organic pollutants (POPs) such as chlorinated and polycyclic aromatic hydrocarbons (PAHs). In particular, the chemical oxidation of soils impacted with PAHs have been the subject of large-scale trials in Australia (CRC CARE Technical Report 39: Risk-based remediation and management guidance for benzo(a)pyrene, 2017, Page 55 & 56). Some oxidants such as persulfate are known to target effectively the heavier, recalcitrant PAH compounds.

The treatability by chemical oxidation, whilst chemically well-defined for the range of oxidants commercially available, are often constrained by the fact the oxidants used are either not suited to the soil type or the

contaminants do not come into contact effectively with the oxidant during mixing due mainly to physical constraints of the natural soils or poor mixing. Oxidants to be considered for use at the Waste Treatment Facility include one or combinations of hydrogen peroxide (eg: Fentons Reagent), sodium persulfate and sodium / potassium permanganates, which are commercially available in liquid / powder forms.

Under the right conditions, oxidants yield reactive species than can destroy contaminants. For the Project, the following contaminant groups will be considered:

- Monoaromatics eg: BTEX) and TPHs where soils that have suffered fuel spills;
- PAHs;
- Chlorinated hydrocarbons; and
- Pesticides / herbicides.

It should be noted that chemical oxidation is considered to be a much more effective means of treating PAH impacted soils than bioremediation (Australia National Remediation Framework (2014) CRC CARE Technical Report 32: Development of guidance for contaminants of emerging concern). Aromatics (benzene rings) in TPH mixtures are often oxidised before aliphatic fractions. As PAHs are multiple benzene rings, then there is an affinity for these contaminants to be oxidised. Therefore, appraisal of the effect oxidation has on the more soluble PAHs is an important consideration when assessing performance of chemical oxidation. Mono aromatics (single benzene ring, (e.g.: benzene) will not oxidise as readily as PAHs, due to carbon-hydrogen bond structures and the affinity oxidants have to PAH bonding.

Chemical oxidation has been reported to be effective at the treatment of gasworks impacted soils (e.g.: creosotes, coal tars, PAHs, BTEX). As gasworks impacted soils often contain a wide range of organic and inorganic contaminants, the treatment via chemical oxidation using permanganates has been well researched and documented, with PAHs making up the larger constituent of concern (R.L. Siegrist, M. Crimi, and T.J. Simpkin (eds.). (2011) In Situ Chemical Oxidation for Groundwater Remediation Springer, New York. SERDP ESTCP Environmental Remediation Technology, Vol. 3, ISBN 978-1-4419-7825-7, 678 pp). BTEX oxidation is known to be less effective for some oxidants, but is known to be effective when using persulfates (Huang K. C. Zhao Z. Hoag G. E. Dahmani A. Block P. A. (2005) Degradation of volatile organic compounds with thermally activated persulfate oxidation. Chemosphere 61 (4), 551–560), (Crimi & Taylor, (2007) “Experimental Evaluation of Catalyzed Hydrogen Peroxide and Sodium Persulfate for Destruction of BTEX Contaminants” Soil and Sediment Contamination 16(1): 29-45).

7.5.7.2 Chemical Oxidation Screening & Suitability Testing

Physical Testing

The following physical testing will be conducted as part of the waste screening process for the Project:

- Determine the Fraction of Organic Matter (foc) in soils. The foc can affect the oxidation efficiency, particularly for PAHs and will influence dosing rates for permanganate;
- Soil particle size distribution, moisture content to determine the likely phasing of contaminants. Fine grained, cohesive soil may require some pretreatment as contaminant mass can often be diffused into any lower permeability fractions, and the effectiveness of chemical oxidation is largely attributed to achieving direct contact of the preferred oxidant with the contaminant of concern.
- Soil buffering capacity.
- Presence of iron minerals. Iron may act as a chelating agent and increase the activity and hence performance of some oxidants.

The choice of oxidant will therefore be based on some preliminary assessment of soil types.

Chemical Testing

The following chemical testing will be conducted as part of the waste screening process:

- Soil pH. Soil pH has a strong effect on the effectiveness of oxidants such as hydrogen peroxide and permanganate. Generally a lower pH is conducive to this technology.
- The presence of ferrous, ferric iron and manganese soil minerals which, if naturally present, may act as catalysts for hydrogen peroxide to improve oxidant performance naturally.
- The presence of oxidant consuming substances in soils, including carbonates, bicarbonates, natural organic matter, reduced minerals.
- Presence of humic and fulvic acids, which may impede chemical oxidation using peroxides.
- Assess the presence of heavy metals, particularly where soils contain natural organic matter. It is known that different metals may have differing oxidation states, which may render them more soluble and toxic when oxidised. In addition, peroxides and permanganates can often release metals that were previously bound onto soils natural organic matter.
- The presence of non-aqueous phase liquids (NAPL). Some NAPL are strongly hydrophobic and the presence of these NAPLs in the soil / waste matrix will determine the type of oxidant and the method of oxidant mixing.
- Concentrations of BTEX. BTEX are known not to oxidise effectively using permanganates, particularly in the presence of PAHs.

7.5.7.3 Process Description & Treatability Testing

Storage

Waste accepted at the Site for treatment will be deposited within a select treatment bay or directly to the Reterra high shear mixer, depending on the physical nature of the soils (granular vs cohesive). For soils treated in select treatment bays, an excavator with mixing attachment or a rilling bucket will be used to mix the soils within the treatment bay.

Treatment Methodology, Reagents and Equipment

Treatment oxidants (or blends of oxidants) are added at pre-determined rates following bench scale laboratory testing to ensure treated waste has demonstrated a reduction in the target contaminants of concern. Typically, it is estimated that dosage rates will be between 1-2% w/w of treatment reagent to enable effective oxidisation/treatment, subject to soil type and natural oxidant demand. The following plant and equipment (or similar) will be utilized.

- Chemical oxidant will be applied directly to the soils within a treatment bay or, for more cohesive solids, using the high shear mixer (Reterra) which will improve the oxidant contact time.
- The oxidizing reagents are added using a liquid dosing system from IBC's of liquid oxidisers. Alternatively, solid oxidizing reagents may be added manually from 20kg bags.
- The solid waste and treatment reagents are then mechanically mixed using an excavator to ensure there is optimum contact and uniform colour and consistency.
- After mixing, the treated solids are removed from the pit using the excavator and transferred to a dedicated curing area located in the soils/solids shed. Treated solids are cured for a period of 24-48 hours prior to sampling and analysis.

- Bulk. Chemical Oxidation can be affected on bulk soils and solids. In this case, treatment occurs on a sealed concrete bunded surface inside the bulk soil building. Reagents are added from bulk bags or sprayed onto the soil using a simple liquid dosage system. The waste and treatment reagents are then mechanically mixed using a loader to ensure there is optimum contact and uniform colour and consistency. After mixing, the treated solids are transferred to a dedicated curing area located in the Waste Treatment Facility. Treated solids are cured for a period of 24-48 hours prior to sampling and analysis.

Validation & Emissions

- As some oxidants may alter the ionic form of metals and amend their solubility, validation will need to test for metals leachability where these have been identified as a COPC as part of the waste characterisation.
- Determination of end products as a means of verifying oxidation has occurred. This should be carried out in parallel with determination of total concentrations of key contaminants of concern and calculation of percentage reductions in total contaminant mass within the waste consignment.
- Measure final soil organic content. The presence of natural organic matter may change during treatment.
- Measure temperature, which is an indicator of when oxidation reactions are finishing once temperature stabilises back to ambient.

7.5.8 Immobilisation

7.5.8.1 Technology Overview

Immobilisation is a treatment technique which contains contaminants by chemically binding or micro-encapsulating into a final mix. Immobilisation is a well-established and proven technology for treating a range of organic and inorganic contaminants. Both chemical immobilisation and / or micro-encapsulation of contaminants can be achieved using the most appropriately selected binders at a dosage rate determined by bench scale testing. Immobilisation often involves the use of cementitious or pozzolanic binder materials such as cement or ground granulated blast furnace slags (GGBFS). However, other reagents such as modified organo-clays can be used for the immobilisation of hydrocarbon impacted soils where volatile content may inhibit selection of more frequently used pozzolanic binders. Immobilisation has been successfully applied to projects in NSW, including the Hunter River Remediation program in Newcastle which used a combination of cement and ground granulated blast furnace slags to meet strict leachability criteria. More recently, insitu stabilisation has been successfully applied to sediment remediation in Kendall Bay, Sydney for the immobilisation of coal tar impacted sediments.

In accordance with NSW EPA Technical Note 1 & 2, immobilisation reagents will provide a means of converting the contaminants of concern to a more chemically stable form or micro encapsulating them within the host material matrix, thus rendering the contaminant less mobile and hence present a lower risk to huma health and the environment.

Australian Guidance on the use of stabilisation can be referenced in CRC Care Technology Guide: Chemical Immobilisation & Solidification, Appendix B, August 2018. Much published literature is also available for the physical and chemical performance of inorganic contaminants with cementitious binders, with reference to international experience gained for fixed treatment facilities in the USA and Europe (UK Environment Agency, Science Report SC980003/SR2, Review of Scientific Literature on the use of stabilisation / solidification for the treatment of contaminated soil, solid waste and sludges, Section 7). The Environment Agency technical review includes details of experiences in the USA and Europe in treating wastes with high concentrations by mass of metals.

Definitions

NSW EPA Waste Classification Guidelines Part 2 Immobilisation of Waste provides several definitions that relate to immobilisation, as follows:

- Natural immobilisation, where the contaminants are already present in an immobilised form and the waste is already suitable for landfill disposal without any further treatment.
- Chemical fixation where the contaminants are chemically converted to a more stable or less toxic form.
- Micro-encapsulation where the waste is physically locked up in the structure of the treated waste. Of note are the limitations of certain reagents in treating volatile and semi volatile hydrocarbons).
- Macro encapsulation where an enduring physical barrier isolates the materials from the environment.

For the purposes of immobilisation at the Waste Treatment Facility, chemical fixation and micro encapsulation are the two treatment goals that will be used to demonstrate the performance of the treatment technology.

Regulatory Requirements

Consistent with Part 2 of the NSW EPA Waste Classification Guidelines, immobilisation is not a preferred treatment technology as no destruction of contaminants occurs. This has been highlighted throughout this document. In addition, the NSW EPA has set out specific requirements in gaining specific immobilisation approvals (SIA) for specific waste streams, including:

- Demonstration that the materials cannot be reused, recycled or reprocessed;
- Check for existence of SIAs as published on the NSW EPA website;
- Characterise the waste;
- Explain the scientific justification for using immobilisation to reduce the risks to human health and the environment; and
- Explain the scientific basis for demonstrating the immobilisation of contaminants of concern.

It is not intended to apply for individual SIAs for each waste stream that may be considered suited to treatment by immobilisation. However, the importance of the SIA requirements listed above, together with the treatability references made in this document has led to an approach whereby SIAs will be developed for individual families / groups of contaminants, noting that immobilisation performance and technical considerations are incorporated into how the facility will select, treat and validate the technology at a performance level.

The facility will adopt the following SIA approach for groups of contaminants, with consideration of the following:

- Compliance with the above general SIA requirements with a focus on achieving chemical stabilisation.
- Demonstration how the most common families / groups of contaminants will be immobilised and where individual SIAs may be required. It is recommended that separate SIAs could apply to families of contaminants rather than obtaining individual SIAs for every waste stream.
- Development of bench scale and batch scale testing approaches to immobilisation for individual families / groups of contaminants (CAT A, B, C).
- Include a robust demonstration of the durability of immobilisation performance to incorporate Leach Environment Assessment Framework (LEAF, USEPA) and incorporation of multi-extraction procedure

(MEP) leach testing for validation purposes. These will need to be demonstrated before wastes are accepted to the facility for treatment.

- For micro-encapsulation, demonstrate that no other chemical stabilisation is possible. For micro encapsulation to be demonstrated, the use of unconfined compressive strength (UCS) testing will be included to demonstrate durability can be demonstrated. This is particularly relevant for Category A wastes which contain hydrocarbon impacted wastes where cementitious binders are preferred. Consideration of blending reagents may be required to achieve the necessary UCS over standard 7 day and 28 day curing times or selection of different binders for soils containing semi volatile hydrocarbons (eg:naphthalene).
- Demonstration of scaling up effects from bench to batch testing to demonstrate mix performance can be achieved at full scale.
- No reliance will be made on solidification as a means of reducing leachability of contaminants. Primary reliance is on chemical stabilisation followed by micro-encapsulation.

Immobilisation Technology Application

Immobilisation as a proposed treatment technology will largely focus on waste streams that contain toxic inorganics and some more recalcitrant organics. The range of contaminants considered appropriate for treatment by immobilisation include:

- Category C – Metals & Metalloids;
- Organics – including wastes containing heavier ring PAHs not amenable to biodegradation in reasonable timeframes (Category A & D),
- Pesticides. (Category A).

Types of Binders

The types of primary cementitious binders proposed for the Project include cement and other pozzolanic materials that produce a cementitious binding. Other primary binders often used in combination with cement include the use of ground granulated blast furnace slag (GGBFS, quartz), pulverised fuel ash (PFA) and cement kiln dust (CKD) that can provide secondary pozzolanic reactions to supplement cement reactions. The use of GGBFS, PFA and CKD in combination with cement as the primary binder are likely to be more suitable where soils / sludges containing high concentrations of hydrocarbons are visible in a soil matrix. GGBS is a fine powder, produced by grinding blast furnace slag. It is a latent hydraulic cement which, when mixed with water, develops strength much more slowly. This can provide advantages where heavily contaminated hydrocarbon soils are proposed for stabilisation prior to landfilling. PFA used on its own has little or no cementitious value, however in the presence of lime or cement will react to form cementitious properties capable of immobilising contaminants, particularly metals impacted soils.

Different types of cement are commercially available, some of which have been designed with quick curing properties which may be more appropriate when dealing with sludge wastes to produce a more handleable final immobilised product that can be both suitable for testing and transportable to landfill.

It is known that some organic compounds present in high concentrations (e.g.: soils with free phase hydrocarbons present, phenolic compounds) can interfere with the hydration / pozzolanic reactions and need additional consideration in terms of meeting durability of the final immobilised mix effectiveness.

Other additives (often referred to secondary stabilising agents) that are considered suitable to be blended with the primary cementitious binders include:

- Lime (eg: Acid Sulfate Soils);
- Sodium silicate;
- Powdered or Granular activated carbon (PAC / GAC);
- Organophilic clays (organics);
- Natural Pozzolans – eg: Zeolites; and
- Bentonites.

Lime, PAC/GAC and organophilic clays can be used as secondary stabilising agents to the primary cementitious binders (cement, PFA, CKD, GGBS) to enhance the cement stabilisation process for immobilising hydrocarbon / organic impacted soils (UK Environment Agency, Science Report SC980003/SR2, 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 a quarternary ammonium salt (QAS) to align and widen the interspatial distance between clay platelets in a parallel orientation to permit adsorption of larger organic hydrocarbons (e.g., PAH >4 benzene rings). It is generally acknowledged that PAC/GAC, zeolites and organophilic clays are best used as preconditioning agents prior to cement stabilisation binder addition and would require substantial primary mixing prior to being mixed with a primary binder to achieve an acceptable durable final mix. The combinations of such treatment processes would be subject to final design and dependent upon the contaminants of concern being treated. Lime, particularly quicklime mixed with clayey soils as a pre-treatment or as blends with PFA can be used to stabilise cationic metals species effectively (Dermatas & Meng, (2001) “Leaching of metals from soil contaminated by mining activities Journal of Hazardous Materials” 87(1-3):289-300).

Zeolites can be used to reduce the bioavailability of heavy metal impacted soils, which may be useful where marginally metal impacted soils have a reuse value, but due to the bioavailability of metals, are presenting an unacceptable risk to human health or the environment. It is known that zeolites can reduce the bioavailability of heavy metals effectively; this approach can form part a solution for a third-party site remediation project where soil modification is a viable approach.

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 organic 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 process. Cements can then be mixed and the normal process of cement hydration can be utilised to create a durable immobilised end product.

Immobilisation Screening & Suitability Testing

Treatability studies will form an integral part of the finalisation of binder selection and dosing rate to achieve specific target-based properties of a particular waste stream / batch. Both physical and chemical characterisation will form part of the validation of immobilisation.

7.5.8.2 Physical Characterisation

Immobilisation at the Waste Treatment Facility will prioritise the treatment of contaminated wastes to meet leachability criteria for landfill disposal. It is unlikely that material reuse will be an outcome for a waste treated by immobilisation. As immobilisation will not reduce total concentrations of contaminants, it is unlikely immobilisation used as primary remediation technology alone would enable materials to be recycled, unless under specific approvals for a risk based approach to remediating a contaminated site.

The following physical properties will be determined for the waste / contaminated soil as part of the validation process:

- Geotechnical properties of the incoming waste, including initial moisture content, plasticity, density, particle size distribution (including clay sized particles) and organic content (soil sources). The presence of clays with cementitious binders can cause the clays to form hydrous calcium alumino-silica gels resulting in contaminants becoming cemented into the crystalline matrix by sorption more effectively.
- Soil moisture content.
- Soil organic carbon content. Highly organic soils are unlikely to be amenable to stabilisation using cement, particular if hydrocarbon contamination is sorbed to the natural organic matter.

7.5.8.3 Chemical Characterisation

As the overall immobilisation chemistry for the range of binders and additives is complex, the determination of key geo-chemical characteristics of the soil waste is necessary. Below are some key chemical properties that will be determined when undertaking screening level assessments and developing binder / additive mixes:

- Contaminants of concern, their properties, phase and solubility. For hydrocarbons, this shall include speciation of key compounds of concern and the presence of volatile and semi volatile species;
- Contaminant mass and variability within the proposed waste;
- The presence of inorganics anions in soils, including carbonate, phosphate, sulfate and sulphides. These can enhance the soils ability to immobilise metals; they will form relatively insoluble complexes with metals and assist with the stabilisation process;
- For anionic species of metals (eg: Chromium VI, arsenic), assess the presence of natural mineral oxides (Fe, Al, Mn);
- The presence of fulvic / humic materials in soils, which may give rise to increased cationic metal mobility upon the creation of alkaline cementitious mixes. It is likely that chemical validation for a range of metals leachability would need to be incorporated into the validation where soils with high organic matter and cationic metals are the principal contaminants;
- pH of the soils and the possible dosing rate for additives such as lime that may be required to control the final pH of the immobilised mix. This is considered important when stabilising metals, to keep the primary metals of most concern in the range where they are least soluble. For metals a range of optimum pH for solubility will be documented;
- Presence of inhibitory compounds that may adversely affect the hydration process (e.g.: sulfate, cyanides, separate phase oils, phenols);
- Test for acid sulfate soils. Both sulfate and acidic conditions can adversely affect the immobilisation performance of certain binders. However, lime stabilisation is a well-known pre-treatment for acid sulfate soils and it is possible that material effects of acidification can be controlled by lime addition provided the controls for managing environmental impacts of acidification are undertaken. The use of lime stabilisation to neutralise acidity may be considered as an effective pre-treatment process prior to immobilisation that targets other anthropogenic contaminants.

The decision on which binders to use and their ratios when treating a particular waste / soil batch will vary depending on the outcomes of the physical and chemical bench scale and batch testing. The following process steps will be followed from acceptance of waste through to verification of performance:

- Outcomes of bench scale treatability trials;
- Removal of oversize materials;
- Pre-treatment (if required);
- Performance of immobilisation in terms of reducing leachability;
- Practicality of mixing of binders into the soil matrix.

Validation & Emissions

Validation

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 indicator for immobilisation to be demonstrated, with qualification required at the receiving landfill facility being the primary post immobilisation target. Final curing of the immobilised mix will be undertaken for 24-48hrs.
- The use of ASLP for assessment of a range of leachability at different pH buffers.
- The LEAF test for more robust analysis, including for the following contaminants:
  - PFAS.
  - Soils containing coal tars (see also UCS below).
- Unconfined compressive strength (UCS). UCS should only be used where volatile and / or free phase hydrocarbons were present within the waste batch and micro encapsulation is proposed. UCS will be used to determine whether any strength loss has occurred.

Much immobilisation using cementitious binders produce a high pH final mix. It is important to verify the pH of the final immobilised mix, as cationic and anionic metal species can behave differently at different pH ranges. The alkalinity of the final mix therefore needs to be maintained at its trial mix stage.

Emissions & Validation Reporting

The following emissions and validation testing and reporting will be conducted:

- Laboratory testing to meet immobilisation criteria set;
- Binder preference;
- Finalise and document binder and additive dosage rates, mixing times;
- Physical indicators of immobilisation including:
  - Observational testing of final mix;
  - Slump testing during batch monitoring, the use of pocket penetrometer to measure gains; and,
  - Consistency testing post curing, (strength gain).
- Chemical indictors of immobilisation (short term leachate testing, final compliance leachability testing);
- Validation testing results and reporting; and
- Emissions of volatiles to atmosphere (indoor), based on an estimate of pre and post immobilisation mass estimates for a particular batch.

7.5.9 Separation Technologies

Separation processes are used for removing less contaminated fractions from soil and enhancing material recovery opportunities whilst reducing the overall volumes of material to be treated.

7.5.9.1 Gravity Separation (Physical)

Physical separation can be applied to soils that are suited to the removal of oversize materials or removal of anthropogenic debris.

The suitability for screening solid wastes materials will be their physical grading and demonstrating the absence of asbestos in any form (fibre and bound ACM).

Physical screening would be undertaken first using an excavator with a rilling bucket attachment. It is likely oversize will be classified as an inert solid waste and subject to validation testing and disposal. There will be practical limitations on the types of materials that can be physically screened. Limitations include high clay, high plasticity and moisture content soils. It is considered materials can be visibly assessed as being suitable where physical screening is a practical pre-treatment process for solid wastes.

7.5.9.2 Chemical Separation

The application of surfactants should be considered where heavier tar / hydrocarbon fractions that are not conducive to bioremediation or chemical oxidation can be separated and / or used as a pre-treatment prior to bioremediation. Surfactants can render a soil type with heavy hydrocarbon impacts much more amenable to the primary treatment processes chemical oxidation.

7.5.10 Asbestos Wastes & Asbestos Contaminated Soils

Asbestos contaminated soils and wastes are classified as a special waste in accordance with the NSW EPA Waste Classification Guidelines Part 1 – Classifying Wastes and are regulated under the POEO Act and the Waste Regulations 2005.

Asbestos waste streams may comprise the following, consistent with the definitions of NEPM (2013):

- Asbestos that has already been bagged and subject to certification by an occupational hygienist. It is anticipated that these wastes will only be received and immediately transported from the facility to a licenced landfill disposal facility;
- A waste that has known to contain a bonded asbestos waste that would not generally emit asbestos fibres to the atmosphere. Bonded asbestos containing materials (ACM) is equivalent to a non-friable asbestos in accordance with Safework Australia and NEPM (2013) Schedule B1. The determination of what constitutes friable asbestos will need to be met; and
- Soils which have been derived from a contaminated land remediation / demolition program where friable asbestos (FA) and asbestos fibres (<7mm sieve size) (AF) are present.

For the above asbestos categories, in order to accept asbestos wastes, each of the three streams will need to meet a series of waste acceptance criteria, as follows:

- The bagged wastes will need to be certified by a registered occupational hygienist. These materials will then be transported to a licenced facility with the necessary transportation documentation. These wastes will be allocated a waste tracking registration number and documented as a special waste.
- For waste contaminated soils containing co-mingled ACM bonded fragments, these will not be treated in any way at the facility. Soils containing ACM will only be accepted to the facility and then transported

onto a suitably licenced facility for management and / or treatment prior to waste disposal to a licenced landfill facility.

Soils containing FA / AF will not be accepted at the facility for treatment. Where soils containing AF /FA are accepted for transfer, these will require classification by the waste generator prior to delivery per the facility waste acceptance criteria. These materials will then be transported onto a third party site for management / treatment and final disposal to a licenced landfill facility.

Safe transport and disposal of all the asbestos wastes will be undertaken by a licenced transport company, consistent with Chapter 4 of the NSW Government (2017) Asbestos Blueprint: A Guide to the Roles and Responsibilities of Government Agencies in NSW", to be compliant with the *Dangerous Goods (Road & Rail Transport) Regulations 2009*. Asbestos is categorised by the Dangerous Goods Code as a Class 9 Dangerous Goods Code. For bonded ACM, no dangerous goods code is required for transportation. However, the facility will track the materials as a special waste and include the destination facility where materials are treated and disposed of.

7.5.11 PFAS Contaminated Soils

PFAS solid wastes are not proposed to be treated at the Waste Treatment Facility, consistent with NSW EPA advice on not accepting treated PFAS wastes to landfill. Whilst treatment technologies for immobilising PFAS contaminated soils have become much more developed since 2019 and some reagents are specifically designed to provide immobilisation a are demonstrated to be durable, this facility is not proposing to treat PFAS solid wastes.

It is acknowledged that PFAS represents a diffuse contaminant of concern in the environment I.e.: low level impacts are noted in soils even where potential PFAS sources have not been historically identified. Therefore, the presence of PFAS will be a requirement of the solid waste characterisation process when accepting non PFAS wastes to the Waste Treatment Facility. Low levels of PFAS contamination might be expected, and it is likely that their presence may result in a contaminated soil waste stream being rejected. It is also noted that dedicated infrastructure would be required in order to treat contaminated soil waste streams impacted with PFAS.

For wastes to be accepted, a reliable data set will first have to be presented to the Waste Treatment Facility that indicates that a minimum sampling density has reported PFAS in soils below the laboratory level of reporting (LOR) of 0.0002mg/kg for the principal regulated PFAS compounds PFOS, PFOA and PFHxS, consistent with the National Environmental Management Plant (NEMP v2).

PFAS will be accepted at the Waste Treatment Facility only to be redirected to an EPA approved treatment facility.

7.5.12 Sludges

All sludges will be accepted to either the solid or liquid waste treatment areas at the Site. Depending on the water content of the sludges, the following will be undertaken:

- For dry sludges, these will be sent to plate filter pressing area for further dewatering;
- For intermediate moisture content sludges, these may require thickening by the addition of bentonite in the sludge pits; and
- For wetter sludges, suspended solids will be removed by filtration or pre-treatment to flocculate suspended solids including dissolved air flotation (DAF) techniques.

The separated fractions will then be treated in accordance with the solid and liquid waste treatment.

For low moisture content sludge wastes, these will first be passed through a plate filter press to reduce the moisture content to less than 20%. Following reduction of moisture content, the solid fraction will then be sent to solid waste treatment. The liquid fractions will then be treated as per liquids steps described in this chapter, with pre-treatment to be undertaken to remove suspended solids further if required.

For high water content sludges, these will be handled in the WWTP. A first step of clarification to reduce suspended solids content will be undertaken as this will ensure reagent usage is optimised. This will be achieved by primary clarification to separate solids from liquids using gravity separation comprising of a conical base vessel to allow solids to be collected. A lamella clarifier (a clarifier with plates) may also be used to separate liquid and solid fractions. Where practicable, the resulting solid fractions may be dewatered further by using the plate filter press.

Intermediate moisture content sludges may require thickening to increase their shear strength. Additives such as bentonite will be mixed in the pits.

7.5.13 Landfill Disposal & Reuse Considerations

7.5.13.1 Disposal to Landfill

It is considered that the majority of soils / sludges to be accepted at the Waste Treatment Facility following treatment will be sent to landfill for final disposal. The requirements of the landfill in terms of meeting leach criteria being the primary performance criteria to be met. Some contaminants, such as PAH, will also be required to meet regulatory criteria for total PAH concentrations of total PAH and their individual compounds of most concern.

For large volumes of treated wastes where total concentrations remain (e.g.: immobilisation) disposed of to landfill, the landfill operator may need to assess and quantify the long-term risks to the environment and ensure their lining systems and leachate collection, control and management protocols are fit for purpose.

7.5.13.2 Soil Reuse

In some circumstances, there may be instances where a soil has been identified as being suitable for re-use as a natural resource. This is likely to be soils where more than a single contaminant of concern is present and a combination of treatment technologies may be required to:

- Reduce or destroy a contaminant of concern to below a site-specific remediation criteria; and
- Reduce the leachability of metals to protect groundwater and surface water receptors, whilst at the same time reporting total concentrations that are protective of site-specific remediation criteria protective of human health and environmental receptors.

Where soils that contain low total concentrations of highly mobile inorganics that have successfully passed through the treatment train, these could only be re-used at the source site under the following conditions:

- Reuse shall only consider soils from a particular source site being returned to the site in question where total concentrations fall below acceptable site-specific remediation criteria protective of both human health and environmental receptors. The site-specific remediation criteria would have to be approved by the regulator and auditor respectively.
- Written approval should be sought from the regulator in the event a potential reuse of the material has been identified.
- The risks to human health and the environment (ecosystems, surface waters and groundwaters) have been successfully quantified for a particular end use and have been approved by an auditor / regulator prior to acceptance of this material to the Waste Treatment Facility. This will be the responsibility of the

source site to ascertain and not the Proponent. Any proposal to reuse immobilised materials in this manner would also be subject to auditor / regulatory approval.

- For reuse to be demonstrated to be acceptable, consideration will need to be given to the completion of more robust leachability testing. For immobilisation, with calibration of the stabilisation and solidification dosing rate would need to consider the use of more robust leachate and durability testing. The Leaching Environmental Assessment Framework (LEAF) when linked to UCS is known to provide an evidence-based assessment of the contaminant flux from an immobilised soil mass. LEAF protocols would require specific laboratory testing to be undertaken prior to receipt of materials to the Waste Treatment Facility in order to ensure that performance requirements for reuse can be achieved and overall risks to human health and the environment are met. The leachability will also require calibration with the UCS of the materials post stabilisation. The greater level of rigour will be required for stabilised soil reuse, involving the documentation of the Performance Specification and the validation of individual soil batches.
- Consideration of geotechnical requirements for final immobilised materials in meeting site specific requirements (if applicable).
- Sludges should not be considered for re-use. Only soils sourced from a particular redevelopment site shall be returned to their destination site provided their environmental conditions satisfy 1 and 2 above.

7.6 Liquid Waste Treatment

7.6.1 Introduction

It is estimated the Waste Treatment Facility would treat up to 70 ML per annum of liquid wastes.

Treatment processes for liquid waste would comprise treatment of:

- Internally Generated Liquid Waste from:
  - Leachate from potentially contaminated soils.
  - Decanted water from settled and dewatered sludges.
  - Potentially contaminated water from internal wheel wash and truck wash.
- Externally Generated Liquid Waste from:
  - Industrial wastewater from third party industrial and commercial organisations.

Liquid wastes will be provided with an individual consignment number and divided into equal batches of 50kL. The batch size of 50kL represents the size of each validated batch that passes through the treatment plant. Individual analysis reports will be made available for each batch within a particular consignment.

7.6.2 Technology Adopted

7.6.2.1 General

Wastewater generated from the above sources will be treated in a custom designed and built wastewater treatment plant located as shown in Figure 1 with further detail provided in Appendix N. The wastewater will inherently be variable in composition. The proposed wastewater treatment plant will have the capability of treating waste waters contaminated with:

- Hydrocarbons (including TPH and PAH);
- Organics;
- Suspended Solids;

- Acidity and Alkalinity;
- Heavy Metals;
- Nutrients; and
- PFAS.

The main process steps of the wastewater treatment plant comprise:

- Acid/caustic, coagulant and polymer dosing to prepare wastewater for gravity separation;
- Gravity separation via clarifier;
- Dissolved air floatation (DAF). The DAF will provide both physical separation of suspended and coagulated solids removal and can either be physically skimmed or removed;
- Sand media filtration for particulate removal;
- Granular activated carbon filtration for hydrocarbon and PFAS adsorption;
- Ion exchange filtration for PFAS adsorption and final polishing;
- pH correction;
- Sludge thickening to treat sludge from the clarifiers and those derived from the DAF units; and
- Sludge dewatering via screw press.

7.6.2.2 Pre-Treatment Equipment & Details

The proposed Waste Water Treatment Plant will be custom designed and may comprise the following pre-treatment equipment:

- Holdingtanks comprising of bulk tanker deliveries.
- Mixing tanks.
- Oil water separation and chemical dosing.
- Dissolved Air Flotation (DAF).

. The holding tanks would act as equalisation tanks to reduce peaks and troughs in terms of influent contaminant concentrations. Details including tank locations and fixed plant on the Site are shown in Appendix N.

A coalescing plate oil separator (CPOS) will be used to treat oily water and remove separate phase hydrocarbons. The CPOS will have a 1.5kL (100l/min) capacity and will only be used where oily water separation was required. The oil accumulating at the top of the separation unit will be removed / transferred to a waste oil tank. For smaller oil particles that are emulsified and or high dissolved phase concentrations are present within the liquid waste, these may require chemical dosing prior to separation. Chemical dosing will comprise either acidification and coagulation to remove the emulsions to further enhance physical separation by CPOS. The chemical reagents will be pumped from 1000L IBCs into an oil-water reaction tank prior to passage through a dedicated oily water reaction tank prior to passage through the CPOS. The use of chemical dosing to enhance physical separation will be determined based on the level of emulsified oils present.

The DAF, in combination with coagulant separation, can also be used to remove emulsified oils from liquid waste streams where physical separation is not effective or dosing rates will become cost and chemically prohibitive.

7.6.2.3 Main Treatment Equipment & Technology Options

The treated wastewater would be analysed in accordance with the Sydney Water Trade Waste Acceptance Criteria. Approximately 70 ML per annum of the treated wastewater would then be disposed to sewer as liquid trade waste in accordance with a Sydney Water Trade Waste Agreement.

The principal technology to remove heavy metals from dissolved phase waste streams is by chemical precipitation. Chemical precipitation includes two secondary removal mechanisms, co-precipitation and adsorption. Precipitation processes are characterised by the solubility of the metal to be removed. Metals treatment will include pH optimisation, temperature, chemical dosing rates and mixing / contact times. Both bench scale and batch testing will be undertaken to demonstrate performance can be achieved at full scale. Chemical reagents to be used in the wastewater treatment plant include:

- Hydrochloric Acid (metals precipitation);
- Caustic (metals precipitation);
- Aluminium Sulfate Coagulation, phosphate precipitation);
- Polymer (coagulating agents);
- Activated Carbon (adsorption of organics, part PFAS treatment);
- Magnesium Oxide (precipitation of metals / neutralising acidity); and
- Ferrous Sulfate (valency / reducing agent for metals).

All chemical dosing reagents will be stored in powdered form and only so much will be mixed to treat a particular batch.

Treatment reagents will be pumped into a mixing tank where they are mechanically mixed with the wastewater using a mechanical mixer. The primary purpose of the mixing tank is to keep solids and precipitates in suspension whilst the chemical reactions take place and improve contact.

Primary Clarification by carbon filtration is widely used in the water treatment industry and is considered a well-established technology. Carbon filtration will be used to remove VOCs, colour, chlorinate, organics, odour. PFAS will only be treated in a separate activated carbon vessel that will operate solely in series with an ion exchange resin vessel (refer to PFAS treatment in 7.6.4). Once carbon adsorption efficiency is lost, the materials are sampled and disposed of to landfill. If it does not meet landfill disposal criteria, the spend activated carbon will be treated and retested prior to disposal.

A final stage of sand filtration will be undertaken as a final polish to the treated effluent, prior to being sent to the treated water storage tanks before batch disposal is undertaken under a trade waste agreement. Sand filtration will be periodically backwashed with the solids removed being fed back into the storage and equalisation tanks at the front of the treatment train.

Solids produced from the primary clarification will be high in moisture content and require dewatering prior to solid waste treatment. This will be accomplished through the plate filter press. The filter press will take high moisture solids and dewater to less than 20% moisture content and produce a filter cake. The filter cake will be classified in accordance with the NSW EPA Part 1 Waste Classification Guidelines - Classifying Wastes.

It is estimated approximately 4,000 tonnes per annum of filter cake from the treatment process would be disposed of at an appropriately licenced landfill. If filter cake does not meet the landfill acceptance criteria the filter cake will be treated by the Bulk Soils Process.

7.6.3 General Approach to Liquid Treatment & Validation

The treatment steps summarised below will be adopted for the Waste Treatment Facility. Liquid wastes will already have been characterised both chemically and physically (e.g.: suspended solids) prior to acceptance to the facility. A series of treatment steps will be developed, the framework of which is presented below. The treatment steps outlined in Table 21 will enable treatment to be optimised and any pre-treatment requirements identified PRIOR to full scale (Step 3) operations are commenced.

Table 21: Liquid Waste - Summary of Treatment Steps

Step	Description	Trials / Testing Scope
1	Waste Characterisation	Includes Bench Scale Laboratory Testing
2	Pilot Trials	Includes further characterisation & vessel testing
3	Waste Treatment	Full Scale liquid waste treatment test program Evaluate the mass removal rates
4	Validation	Sample analysis prior to discharge

The following further summarises the steps outlined in Table 21:

- **STEP 1** – Waste characterisation step, including:
  - Characterisation of the liquid waste source and interpretation of chemical test data provided by waste generator;
  - Presence of algae, dissolved / particulate organic matter and suspended solids; and
  - Completion of a bench scale trial. Propose the treatment process.
- **STEP 2** – Pilot testing, to include:
  - Finalise pre-treatment requirements (suspended solids removal, flocculation, clarification, filtration); and
  - Finalise the full-scale treatment.
- **STEP 3** – Full scale treatment, including:
  - Evaluation of the mass removal before and after treatment; and
  - Final filtration.
- **STEP 4** - Final validation sampling and analysis prior to disposal to trade waste sewer. The overall mass removal rates will be summarised and the UCL95%ile discharge concentration will be derived that will meet the trade waste criteria.

7.6.4 PFAS Liquid Waste Treatment

PFAS contaminated waste liquids will be treated using a combination of granular or powdered activated carbon (GAC/PAC) and ion exchange resins (IEX) in series with each other. This is predominantly an

adsorption technology, with GAC/PAC providing the largest mass removal reagent and IEX complimenting this by removing the shorter chain PFAS compounds that invariably have poorer removal performance when compared with PAC/GAC alone.

7.6.4.1 Granular / Powdered Activated Carbon

GAC / PAC is well established technology at removing PFOS down to trace µg/L concentrations at removal efficiencies of up to 90%. Key to the success of PAC/GAC performance is the contact bed performance monitoring and treatment vessel retention times and monitoring of the breakthrough of shorter chain PFCAs, which are noted to be less efficiently adsorbed than other principal C8 (equivalent) chain PFAAs (eg PFOS, PFHxS, PFOA). GAC derived from either wood or bamboo, which are noted to perform better than coal derived GACs and will be selected as a preferred product of choice. PACs, whilst performing better in adsorption efficiencies due to greater porosity and contact surfaces, PACs are more difficult to reclaim. It is therefore proposed to utilise GAC as the first step in the adsorption treatment step. However, where liquid characterisation results indicate a low suspended solids content, the efficiency of PAC as an option to treat will still be considered further.

Whilst GAC is an effective adsorption media for PFAS, especially for long chain PFAS compounds >C7, it is also effective at removal of other co-contaminants such as organics, which may result in the reduction of adsorption efficiencies and potential breakthrough of PFAS. GAC adsorption capacity can vary significantly by the media type and the co-contaminant loads / characteristics that might be present in a consignment of liquid waste. At saturation point the GAC can start to desorb compounds in preference for compounds of higher adsorption potential. This means that co-contaminants can “displace” PFAS compounds that may have already adsorbed to GAC media. Therefore, PFAS contaminated liquids will require co-contaminant chemical analysis.

7.6.4.2 Ion Exchange Resins (IEX)

IEX Resins have been selected as a secondary adsorption treatment process in series with GAC/PAC. All liquid wastes will therefore pass through both GAC and IEX resins respectively. IEX resins are noted to perform better than GAC in adsorption of shorter chain PFASs and precursor compounds (eg fluorotelomers), but not exclusively so. The anionic (negative) charged PFAS molecules displace the negatively charged exchangeable chloride ion and attach the positively charged fixed ion. The hydrophobic tail of the PFAS also preferentially adsorbs to the uncharged sites on the plastic resin beads of the IEX resins themselves, thus providing increased removal from dissolved phase. This dual mechanism, ion exchange plus hydrophobic adsorption can result in significantly higher PFAS removal efficiencies. A strong anion IEX will be selected for the removal of PFAS from a vessel connected downstream of the GAC unit. It is therefore expected that IEX resins will remove the key principal regulated anionic PFAAs (PFOS/PFHxS/PFOA) and also the shorter chain PFAS compounds within the C4-C14 carbon range.

Optimisation of treatment process can be undertaken as part of an “in series” approach where GAC/PAC are in line with the IEX resin vessels. The optimisation of the system to prevent breakthrough will be achieved by the following:

- Measurement of breakthrough concentrations can be undertaken at the back end of the activated carbon (GAC/PAC) vessel. Having the IEX resins in series with activated carbon will enable continued throughput and surety that adsorptive capacity is being maintained during activated carbon change out. This is particularly important for shorter chain PFAS which are known to breakthrough earlier (eg: PFBA, PFPeA, PFHxA, PFBS), and breakthrough monitoring will be included.
- Prevent fouling of the media. It is proposed to clarify the liquid waste influent as part of pre-treatment to remove suspended solids.

- Selection of appropriate IEX media and the monitoring of breakthrough. The range of IEX resins commercially available to treat PFAS has increased, and optimisation may be waste stream specific.

7.6.4.3 Pre-Treatment

Pre-treatment is an important step to removing co-contaminants and suspended solids prior to passage through the GAC/IEX vessels. This is because of the inherent risks in losing adsorption performance when the GAC / IEX media become blocked and contact surfaces are reduced. The presence of co-contaminants such as hydrocarbons and other anions may adversely affect the performance of the GAC / IEX media in removing PFAS from the liquid waste streams. For this reason, a series of pre-treatment technologies are proposed with the aim of reducing co-contaminant levels to ensure PFAS treatment is optimised:

- Raw water equalisation / precipitation tanks (neutralise pH, adsorb organics);
- Removal of suspended solids and algae by using a combination of dissolved air filtration (DAF) in combination with flocculation, noting the following:
  - The DAF will be combined with a physical skimming unit to remove a high proportion of suspended solids.
  - Flocculants may be added to remove finer particulate matter.
  - Solids collected from the clarification step will be directed to solid waste treatment.
- Liquid wastes with non-aqueous phase liquids (LNAPL) will be removed by passing through the on-site coalescing plate oil separation unit. A dedicated plate separation unit will be supplied to the WWTP for the task of treating PFAS wastes only. Where practicable, primary clarification to remove suspended solids may be selected by plate separation depending on the suspended solids content.

It is considered likely that suspended solids removal by primary clarification and sand filtration will also significantly reduce fouling of the GAC/IEX media. Therefore, a robust clarification step will be proposed for all liquid wastes, to include both multi-media filtration and cartridge filtration to provide high suspended solids removal efficiencies. This will be followed by final sand filtration to “polish” the waters prior to final discharge.

Final filtration will then be undertaken prior to discharge to sewer under trade waste agreement.

No chlorination of liquid wastes will be proposed as part of PFAS liquid waste treatment. Algae, if present, will be remove by physical separation comprising DAF and mechanical skimming.

7.6.4.4 Dedicated PFAS Treatment Vessels

Due to the risks of cross contamination with other wastewater treatment feeds, it is expected that dedicated storage, mixing and final storage will be undertaken using PFAS dedicated storage tanks. The storage tanks will be clearly marked as PFAS tanks to avoid cross contamination and PFAS mass loss.

In the event PFAS liquid wastes contain suspended solids that require removal, then dedicated DAF / plate separation unit will be required for clarification (pre-treatment) prior to GAC / IEX treatment. This minimises the risk of breakthrough of PFAS compounds and optimises the performance of GAC / IEX resins.

7.6.4.5 PFAS Analysis

PFAS mass removal will be tracked through each batch treated. Removal rates will be calculated on a percent mass removal basis. The total mass of PFAS within a liquid waste consignment will consider the following:

- The 30 principal PFAS compounds analysed within the C4-C14 carbon range;
- The presence of precursor compounds, noting these are within the C4-C14 carbon range;

- The total organic fluorine and the percentage of mass within and outside the C4-C14 carbon range.

An SAQP will be prepared for the Waste Water Treatment Plant. This will include the PFAS analytical sampling and validation criteria to demonstrate a batch by batch validation process.

When GAC is exhausted, the spent resin will be forwarded to an EPA licenced thermal destruction facility.

When the IEX resin is spent or exhausted, it will be forwarded for regeneration. If the IEX resin does not meet landfill disposal requirements (due to total mass in mg/kg) and cannot be regenerated, the material will be sent to a thermal treatment facility and disposed under licence.

7.6.5 Batch Validation

An added level of protection for PFAS liquid treatment is the selection of a 50kL batch based pass and fail criteria. Liquid wastes will be stored, treated and validated on a per batch basis of 50KL. This will ensure that any failed batches will not be allowed to be diluted within the entire consignment batch. Rather, the individual batches will be validated and the final treated concentrations compared with the acceptable discharge consents. Any batches failing the criteria will be passed through the treatment process again.

7.6.6 Sampling, Analysis & Quality Plan

An SAQP will be developed fully for the liquid waste characterisation, waste acceptance, bench scale, batch scale and validation process.

7.6.7 Trade Waste Discharge

A trade waste discharge application will be submitted to Sydney Water for approval. As a result, the Waste Treatment Facility will make provisions for flow monitoring and sampling of the relevant batch sizes. The discharge criteria will form of the basis of the bench scale and batch scale test requirements.

7.7 Staffing & Training

Management of training would incorporate 4 elements:

- Position competency – Pre-requisite qualification and Task based training will be provided and include a competency assessment process with personnel not being permitted to work unsupervised until deemed competent.
- General induction – all Hi-Quality Staff undergo formal induction training relating to their position
- Site specific induction - training in all applicable operating procedures
- Ongoing training – reviewed on an annual or as needs basis

The facility will have combined safety, environmental and quality certifications that are certified by third parties.

All procedures related to wastewater treatment operation and monitoring will be contained within the OEMP this would include :

- weighbridge waste acceptance procedure;
- non – confirming waste procedure;
- waste screening procedure;
- batch control procedure;

- material handling procedures – unloading and loading;
- maintenance procedures;
- verify licenses and permits for the handling, transportation, and disposal of waste;
- inspection, monitoring, review and auditing; and
- site induction and training.

7.8 Operational Contingencies

The potential for oversupply of waste is controlled by the waste acceptance procedure at the Site. Waste is not delivered to the Site until the Facility can accept the waste.

Should treatment be unsuccessful the batch would be re-treated.

Should any operations at the Site be temporarily shut down, materials would be diverted directly to a licensed facility.

7.9 Management and Mitigation Measures

Mitigation and management measures to address waste management include:

General Waste Management

- Prepare and maintain a Waste Management Plan to be included in the CEMP.
- Prepare and maintain a Waste Management Plan to be included in the OEMP.
- Waste Management to be included in the Site Induction.
- Signs erected around the Site providing direction for waste management and adopting the waste management hierarchy.
- Waste storage area to be located within the building and as per Liverpool City Council DCP Requirements.
- Planning to efficiently manage delivery and storage of materials, reduce waste and spoilage.
- Agreements with suppliers for ‘take back’ to be arranged where possible.
- General Waste and recycling skips made available and emptied regularly so as not to overflow.
- All wastes to be managed and properly disposed of in accordance with an appropriately licensed contractor.

The mitigation measures proposed to be in place to prevent waste spreading from the Site include:

- Loads covered until inside the building and before leaving the building.
- A truck and wheel wash would 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 within the building.

Waste Treatment

- Prepare and Maintain a OEMP for the Site Operations.

- Prepare and maintain a SAQP for Soils Treatment.
- Prepare and maintain a SAQP for waste water.
- The OEMP and SAQP will be reviewed annually or more frequently on an as need basis should there be a change in risk, legislative requirements, or non-compliance.
- Prepare and maintain key procedures for Waste Treatment Operations including:
  - weighbridge waste acceptance procedure;
  - non – confirming waste procedure;
  - waste screening procedure;
  - batch control procedure;
  - material handling procedures – unloading and loading;
  - maintenance procedures;
  - verify licenses and permits for the handling, transportation, and disposal of waste;
  - inspection, monitoring, review and auditing; and
  - site induction and training.

8.0 TRAFFIC AND TRANSPORT

The Secretary's Environmental Assessment Requirements:	Addressed
Key Issues - Traffic and Transport – including: ■ *details of all traffic types and volumes likely to be generated during construction and operation, including daily and peak traffic movements, and a description of key access / haul routes* ■ *an assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model* ■ *plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network* ■ *details and plans of any, loading dock servicing and provisions, on-site parking provisions, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards* ■ *details of the largest vehicle anticipated to access and move within the site, and swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site* ■ *details of road upgrades, infrastructure works or new roads or access points required for the development if necessary.*	Chapter 8: Traffic and Transport Appendix D: Transport Impact Assessment

This chapter addresses the traffic and transport impacts of the Project and is based upon the PeopleTrans (2021) "9-13 Whyalla Place, Prestons: Prestons Waste Treatment Facility Transport Impact Assessment" (Transport Impact Assessment – Appendix D).

The Transport Impact Assessment examines existing traffic conditions surrounding the Site, the traffic generating characteristics of the Project during construction and operation, suitability of access arrangements and the transport impact of the Project on the surrounding network.

8.1 Existing Environment

A review of the existing traffic conditions was undertaken to characterise the existing road traffic volumes, public transport access, pedestrian and cycle access. Complete analysis of the existing traffic conditions is provided in Appendix D.

Local area travel characteristics

According to the 2016 Census, the majority of people that work in Prestons travel by vehicle (car or truck) to work, accounting for 86.3% of modes. Approximately 3.5% of Prestons employees use public transport while less than 1 per cent travel to work by cycling or walking.

Road Network

Sitting within an IN3 heavy industrial zoning, the surrounding properties of the Site include a mixture of heavy industrial uses / warehouse uses. The Site is located on Whyalla Road, designated as a local Road with

access via alternate routes on local roads prior to regional and state roads including the M7 Motorway approximately 500 metres to the South and South West.

Vehicle Movements

Vehicle movement counts were carried out at key intersections identified in Figure 13 to establish a baseline for existing typical vehicle movements in the area. Vehicle movement counts on the existing northern and southern driveways at the Site (refer to Figure 14) were also completed during AM and PM peak hour. In addition, to understand whether COVID-19 was impacting the traffic volumes on the survey day, the vehicle counts were compared to traffic counts undertaken in 2019 identifying that while outcomes were similar at peak times, intersection data from 2020 was lower and as such, for the purpose of the modelling assessment, intersection counts were proportionally increased to conservatively account for reduced traffic numbers that may have been a result of Covid 19 restrictions. Refer to Appendix D for further information.

Intersection operation was evaluated using computer based modelling indicating all intersections operate with a satisfactory level of service (D or better). It was also identified there is some queuing at the Hoxton Park Road / Joadja Road intersection, the Hoxton Park Road / Ash Road intersection and the Joadja Road / Jedda Road northbound right turn queue during the AM peak hour. Refer to Appendix D for further details.

Public Transport

There are no train stations located within the immediate vicinity of the site.

A number of bus routes serve Prestons and are operated by Interline and Transit Systems. These buses are accessible from bus stops located along Hoxton Park Road, Cartwright Avenue, Cabramatta Avenue, Hill Road, Wonga Road and Kurrajong Road. The Liverpool-Parramatta Transitway also operates adjacent to the western side of Banks Road and along the centre of Hoxton Park Road.

Cycle and Pedestrian Facilities

The Traffic Impact Assessment (refer Appendix D) provides a description of the cycle and pedestrian facilities available nearby the Site.

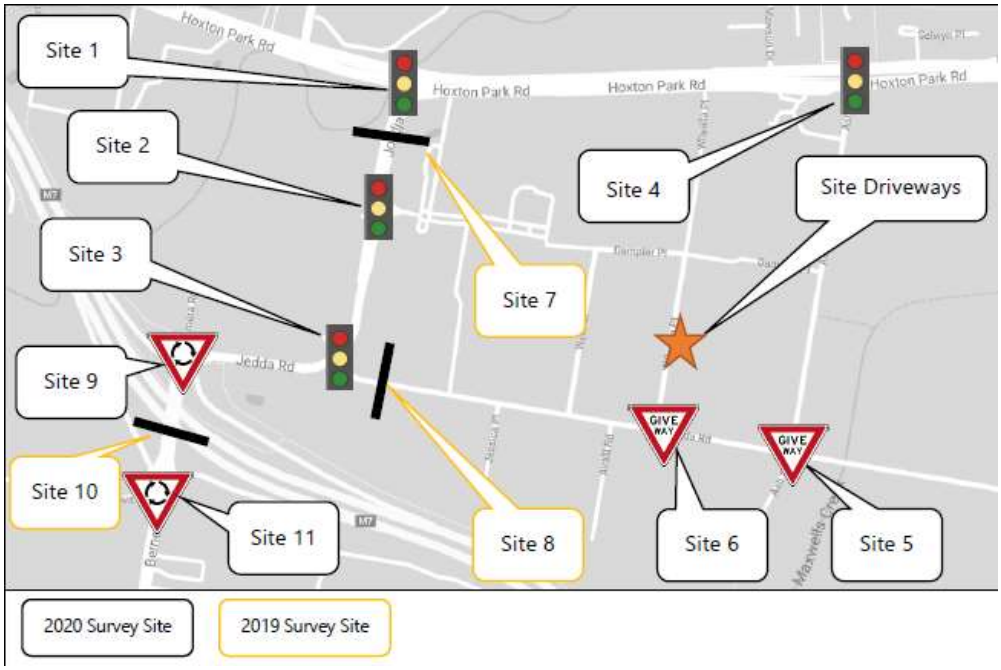


Figure 13: Existing Intersections within the vicinity of the Site

Figure 14: Existing Site Access to / from Site

8.2 Investigations

A Traffic Impact Assessment was prepared to evaluate the impact during construction and operation of the Project (Appendix D). This assessment addresses the relevant SEARs including:

- details of all traffic types and volumes likely to be generated during construction and operation, including daily and peak traffic movements, and a description of key access / haul routes;
- an assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model;
- demonstration how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network;
- details and plans of any, loading dock servicing and provisions, on-site parking provisions, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards; and
- details of the largest vehicle anticipated to access and move within the site, and swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site.

As considered in Appendix D and discussed in the following section, the Traffic Impact Assessment confirms the suitability of the Site for the Project. While a new entrance for staff parking is proposed by the Project, no further road upgrades, roads or infrastructure works related to traffic and transport are required as a result of the Project.

8.3 Potential Impacts

8.3.1 Operational Impacts

On-site Parking

As discussed in Chapter 2 (Project Description), separate access points are proposed for trucks and light vehicles. Trucks would enter the Site via the existing northern driveway and exit the site via the existing southern driveway. Employees would access the site via a new driveway between the truck entry and exit driveways, which would access the parking area for employees only via a secure gate (refer to Figure 15).

A total of 40 car parking spaces are proposed, which includes 1 disabled parking space. This can be further broken down into 26 spaces for office employees on the Site (in accordance with “Liverpool Development Control Plan 2008” (DCP) requirements) in addition to 14 car parking spaces for staff operating the Waste Treatment Facility. As identified in Chapter 2, 14 is the maximum number of staff that would be on the Site at any one time for the Waste Treatment Facility as it includes 10 employees during the day shift in addition to the shift changeover of 4 employees. As such, the proposed off-street car parking spaces for the Project are considered satisfactory and with available alternative on-street parking on Whyalla Place and other streets nearby, overall impacts on parking are considered to be negligible.

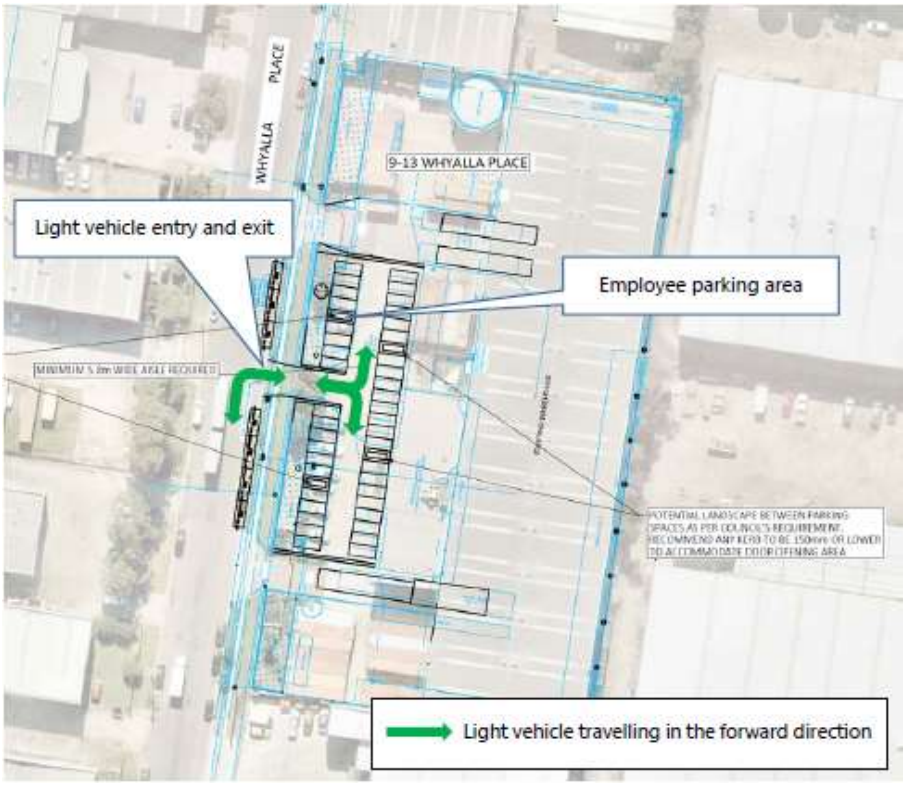


Figure 15: Light Vehicle Site Access

Pedestrian, Cycle Facilities and Public Transport

Based upon the local area travel characteristics, pedestrian and cycling movements to and from the Site are expected to be low at 1% equating to 1 person cycling and 1 person walking to and from the Site. The potential impacts on the pedestrian network are also anticipated to be minimal given the low number of vehicles generated by the Site and the low number of pedestrians travelling along Whyalla Place.

In accordance with DCP requirements, 5 bicycle parking spaces will be provided with associated amenities including a shower and lockers. While there are cycle routes in the vicinity of the Site, no changes are

proposed to the existing cycling network and negligible impacts are anticipated on the cycle network due to the Project. Nor is there any change proposed to the existing public transport network as part of the Project with the closest bus stop being located approximately 650 metres from the Site.

Site Access and Vehicle Circulation

The largest vehicles to access and move within the Site will be 22 m as identified and assessed within the TIA (Appendix D). However, as shown in Figure 16, Whyalla Place is an approved B-Double road (up to 26m in length) with trucks for the Project able to access the Site on the following B-Double roads:

- To and from the M7 Motorway via Bernera Road, Jedda Road and Joadja Road;
- To and from the west via Hoxton Park Road, Joadja Road and Jedda Road;
- To and from the east via Hoxton Park Road, Ash Road and Jedda Road; and
- To and from the south via Kurrajong Road, Bernera Road and Jedda Road or via Beech Road, Lyn Parade and Jedda Road.

Figure 16: Approved B-Double Roads in proximity to the Site (shown in green)

As shown in Figure 17 and Figure 18, trucks accessing the Waste Treatment Facility would perform a right-in to enter the Site at the northern driveway and proceed to one of two entry weighbridges. These vehicles would reverse into loading and unloading areas. Upon completion, trucks would proceed in a clockwise direction to the exit weighbridge and perform a left-out at the southern driveway to exit the Site.

Light vehicles will enter the Site via the middle driveway, which provides access to the car parking area.

Swept path assessments for all truck and light vehicle manoeuvres are provided in Appendix C of the Traffic Impact Assessment (Appendix D of the EIS).

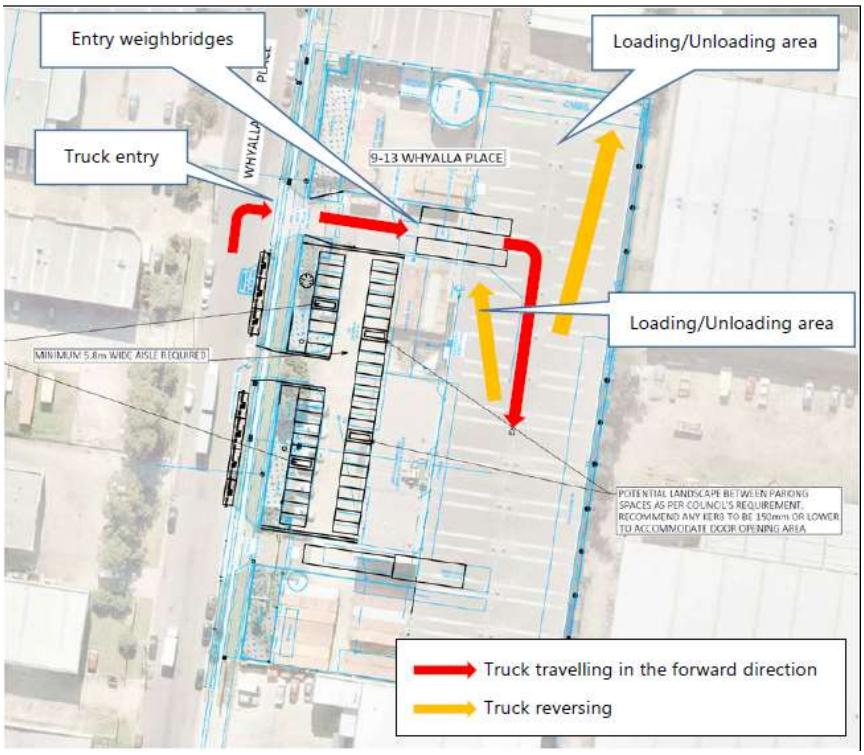


Figure 17: Truck Circulation - Incoming

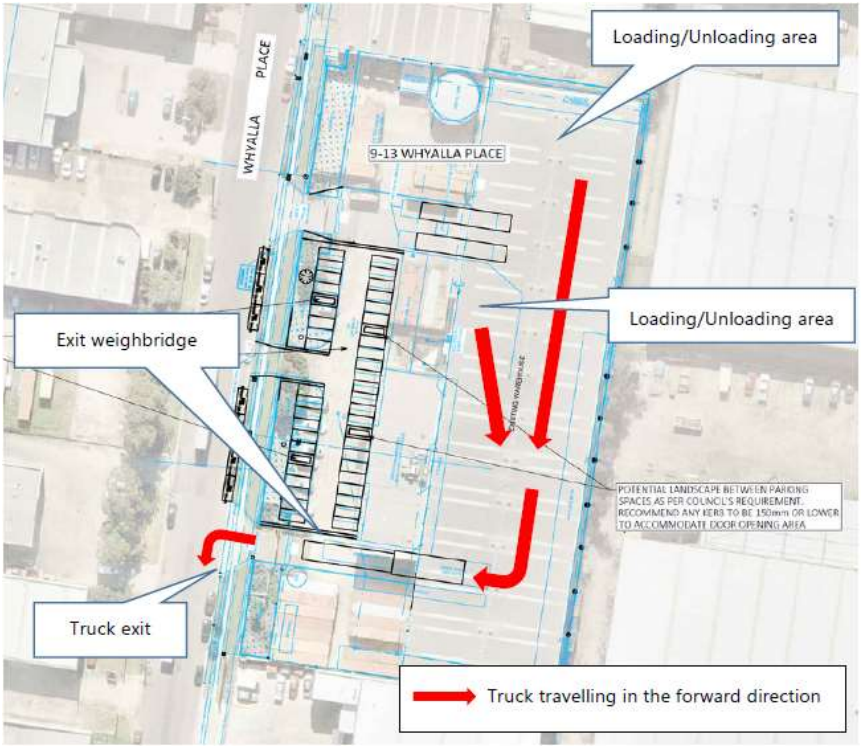


Figure 18: Truck Circulation – Outgoing

Weighbridge Queuing Assessment

All trucks accessing the Site would be required to pass over one of two entry weighbridges prior to being allowed access to the Waste Treatment Facility. Similarly, all trucks leaving the Site would be required to pass over the exit weighbridge prior to exiting.

Based upon a calculated average weighbridge entry service of 60 seconds per vehicle and the Project generating up to 26 truck movements (13 movements incoming and 13 movements outgoing) during the busiest hours of operations at the Site (refer to Traffic Generation discussion below), the Traffic Impact Assessment calculates the 98th percentile queue length at the entry weighbridge is 1.7 vehicles (rounded up to 2 vehicles this would be one on each entry weighbridge). The acceptance of waste at the Site is through a booking system, which further addresses the potential for traffic arrivals and weighbridge queuing (refer to Chapter 7 procedure for screening and acceptance of waste).

As identified within the Traffic Impact Assessment (Appendix D), the Project would be able to accommodate a queue length of 4 trucks at the Site and therefore the impact of queuing at the weighbridge on the street network would be negligible.

Traffic Generation

Traffic generated by the Project is dependent on the amount of material to be processed at the Site and the number of employees.

The Traffic Impact Assessment (Appendix D) calculates that the Project would generate up to 8 truck movements (4 trips in and 4 trips out) per hour during road network peak hours (8am to 9am and 3pm to 4pm), whilst during the busiest operational hours of the day (11am to 12pm and 1pm to 2pm), the Project would generate a maximum of 26 truck movements (13 movements incoming and 13 movements outgoing). This assessment is based upon the maximum amount of material proposed to be transported and processed at the Site, truck size and the traffic profile for similar waste treatment facilities (including hours of operation and preferred/busiest times for material transport utilizing weighbridge data from similar facilities) to calculate hourly variation of vehicle volumes. Refer to Appendix D for further details on this calculation and assessment.

A further source of traffic generation at the Site would be employees. As identified in Section 8.3.1, 40 car parking spaces are proposed, which are anticipated to accommodate the maximum number of employees that would be at the Site at one time. For the purposes of calculating the Project's impact upon traffic distribution and intersection performance it has been conservatively assumed that all office employees would arrive and depart during the AM and PM road network peak hours 8am to 9am and 3pm to 4pm.

Traffic Distribution and Assignment

Utilising the above calculations in relation to traffic generation of the Project and the existing environment (including local area travel characteristics, road network, vehicle movements and operation of intersections in the vicinity of the Site, Section 8.1), the cumulative traffic impacts of the Project upon the capacity of the existing road network were modelled and assessed.

The Traffic Impact Assessment (Appendix D) identifies that all intersections would continue to operate at a satisfactory level of service (D or better) with minimal changes to the level of service as a result of the Project. Based on this assessment, the additional traffic generated by the Project will not compromise the safety or function of the surrounding road network and as such no road network upgrades are considered necessary.

8.3.2 Construction Impacts

Construction would be undertaken during standard construction hours of 7:00am to 6:00pm Monday to Friday and 8:00am to 1:00pm on Saturdays with no work on Sundays or public holidays for approximately 4 months and would be undertaken in accordance with a Construction Environmental Management Plan (CEMP) with construction methods determined in accordance with the project approval conditions. While the construction workforce would vary it would typically be up to 10 persons. As such, the construction traffic volume would be lower than the volume of vehicles that would access the Site once operational.

Therefore, the impact of the Project on the surrounding road network during construction is expected to be less than when the Site is operational. Since the facility has been modelled assuming operational capacity and has been shown to not have a substantial impact on the performance of the surrounding road network, the construction traffic would also be expected to have no substantial impact. This includes potential impacts upon public transport and further transport networks.

8.4 Proposed Mitigation Measures

The road network surrounding the Site is considered to have satisfactory capacity to cater for additional traffic generated by the Project during construction and operation. Proposed on-site parking supply, site access and vehicle circulation are considered sufficient for the Project and therefore no mitigation measures outside of standard conditions (such as the requirement for a CEMP with inclusion of a construction traffic management plan) are proposed.

Refer to Appendix D for further information on the Traffic Impact Assessment for the Project

9.0 NOISE AND VIBRATION

The Secretary's Environmental Assessment Requirements:	
Key Issues - Noise and Vibration – including: ■ *a quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers* ■ *cumulative impacts of other developments and* ■ *details and justification of the proposed noise mitigation, management and monitoring measures*.	Chapter 9: Noise and Vibration Appendix E: Noise Impact Assessment

A quantitative noise impact assessment has been completed for the Project and is provided in Appendix E. The noise impact assessment was completed in accordance with relevant guidelines including the NSW EPA (2017) "Noise Policy for Industry". The assessment of potential noise impacts of the Project was completed by determining existing noise levels at nearby noise-sensitive receptors and conducting noise attenuation calculations to predict noise impacts from the Project operations at the Site.

9.1 Existing Environment

Identified noise-sensitive receptors for the Site that were utilised for noise monitoring of existing ambient noise levels were:

- Residences at 301 Hoxton Park Road (approximately 500 metres from the Site); and
- the Mercure Sydney Liverpool Hotel (approximately 350 metres to the Site).

These receiver locations cannot be viewed from/to the Site with numerous buildings within the existing IN3 Heavy Industrial zoned area obscuring the line of sight.

In addition to the noise-sensitive receiver locations, we note there are further potential noise-sensitive receptors in the area. This includes a Church located within an industrial building approximately 350 m to the North of the Site in proximity to Hoxton Park Road. Since Church hours are listed as 9:30 am to 8:30 pm, potential noise impacts are expected to occur during the Day and Evening noise assessment periods. The noise monitoring completed at the 301 Hoxton Park Road property is considered representative of potential noise at the Church and includes existing noise sources. i.e., traffic on Hoxton Park Rd.

Results of the noise monitoring for day, evening and night periods are presented in Table 22

Table 22: Noise Monitoring Results

Description	Period	Sound pressure level (dB(A))	
		L90	Leq
Mercure Hotel	Day	50	56
	Evening	51	55
	Night	48	53
301 Hoxton Park Road	Day	57	67

Description	Period	Sound pressure level (dB(A))	
		L90	Leq
	Evening	55	66
	Night	49	62
9 Whyalla Place (the Site)	Day	50	60
	Evening	49	56
	Night	50	58

9.2 Investigations

Noise attenuation calculations are used to determine the noise levels received at sensitive receptors within the vicinity of the Project and utilise inputs of the distance of the sensitive receptors from the potential noise source (the Site) and the sound power levels of the noise generating site plant and equipment of the Project. The noise attenuation calculations assume external noise sources are the contributing factor when assessing impacts upon the noise-sensitive receivers.

These calculations are considered conservative as the noise attenuation calculation does not take into consideration the suppression and mitigation effect of the environment surrounding the source such as buildings and/or vegetation and assume a worst-case scenario of noise generated being continuous and combined and the results are the maximum predicted sound levels at each receptor, regardless of the specific local conditions.

9.2.1 Noise Assessment

In accordance with the NSW EPA (2017) “Noise Policy for Industry”, the Project Noise Trigger Level (PNTL) provides a benchmark or objective for assessing a proposal. The PNTL is a level that, if exceeded, would indicate a potential noise impact on the community, and potentially ‘trigger’ further investigation/adoption of mitigation measures.

The PNTL is calculated based upon either the noise level above background levels (that is intrusiveness), or the absolute level of noise that seeks to protect against cumulative noise impacts and maintain amenity for specific noise-sensitive receivers. The PNTL is the lower (that is, the more stringent) value of the project intrusiveness noise level and project amenity noise level.[8]

Based on this methodology and in accordance with the NSW EPA (2017) “Noise Policy for Industry”, the project amenity noise levels have been calculated based upon the noise monitoring results (Table 22) and are identified as the more stringent and therefore have been adopted as the PNTL for assessment of the Project. These are provided in Table 23. Refer to Appendix E: Noise Impact Assessment for the calculations and comparison of intrusiveness and amenity criteria for the Project.

Table 23: Adopted Project Noise Trigger Levels of the Project

Criteria	Urban residential	Hotel
Day	58 dB(A)	63 dB(A)

[8] In accordance with Section 2.1 of the NSW EPA Noise Policy for Industry, 2017, “Intrusive noise levels are only applied to residential receivers (residences). For other receiver types identified… only the amenity levels apply”. Therefore, project amenity noise levels apply to the hotel noise-sensitive receivers.

Criteria	Urban residential	Hotel
Evening	48 dB(A)	53 dB(A)
Night	43 dB(A)	48 dB(A)

Noise Sources

The noise modelling takes into consideration the sound power level of the proposed site operations, activities and equipment and applies adjustments for attenuation from meteorological effects such as the potential for noise-enhancing conditions (refer to Appendix E for the specifics of these considerations associated with the modelling).

As identified within Chapter 2 Project Description and Appendix E, most of the proposed operations at the Site will be within the Waste Treatment Facility building and as such, are considered to make a negligible contribution to noise emissions of the Project as they will occur within the confines of this building. This includes noise generated during the proposed treatment and transfer processes and use of mobile plant such as excavators, trucks, front-end loaders and a high sheer mixer within the Waste Treatment Facility. This noise will be managed in accordance with the NSW Government Code of Practice: “Managing Noise and Perverting Hearing Loss at Work, 2019”.

Whilst fugitive noise emissions from within the Waste Treatment Facility will have a negligible noise impact, external noise sources would contribute to the background noise environment and include:

- Building ventilation exhaust fans (3 strobic fans); and
- Waste delivery trucks.

The Project proposes waste treatment operations to occur between 7:00 am and 6:00 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays. However, movement of waste delivery trucks and operation of the strobic ventilation fans has been modelled as occurring simultaneous for 24 hours per day, seven days per week, with all 3 ventilation fans operating continuously at full capacity. This is conservative as during operation, the three strobic fans will be dynamically controlled as part of the HVAC system, operating 3 fans continuously during daytime treatment activities, whilst operating at a reduced capacity during evenings and overnight when waste treatment activities are not proposed to occur. The noise attenuation calculations for truck contribution are also considered conservative as they have assumed the continuous presence of a truck at the entry or exit of the Waste Treatment Facility, operating at the vehicles maximum sound pressure level 24 hours per day, seven days per week.

Refer to Appendix E for sound power levels of the noise sources.

9.3 Potential Impacts

9.3.1 Operation

The Sound Pressure Levels (SPLs) of the noise attenuation assessment at identified noise-sensitive receptors are presented in Table 24 and Table 25. The noise assessment has been conducted for a complete 24-hour period allowing Day, Evening and Night periods to be assessed for extended operating periods and includes the calculations for potential noise-enhancing meteorological conditions. The predicted SPLs are also compared to the calculated PNTLs of the Project to identify if further mitigation and management measures are required.

Table 24: Sound Pressure Levels (SPL) at noise-sensitive Receptor 1 - Mercure Hotel

Meteorological Conditions	Predicted SPL [dB(A)]			Project noise trigger levels		
	Day Mon-Sat 7am–6pm Sun 8am-6pm	Evening Mon-Sun 6pm-10pm	Night	Day 63 dB(A)	Evening 53 dB(A)	Night 48 dB(A)
Standard	44	44	44	✓	✓	✓
Noise-enhancing	45	45	45	✓	✓	✓

Table 25: Sound Pressure Levels (SPL) at noise-sensitive Receptor 2 - 301 Hoxton Park Road

Meteorological Conditions	Predicted SPL [dB(A)]			Project noise trigger levels		
	Day Mon-Sat 7am–6pm Sun 8am-6pm	Evening Mon-Sun 6pm-10pm	Night	Day 58 dB(A)	Evening 48 dB(A)	Night 43 dB(A)
Standard	42	42	42	✓	✓	✓
Noise-enhancing	43	43	43	✓	✓	✓

The predicted SPLs at Receptors 1 and 2 are compliant with the PNTLs for the day, evening and night periods and under noise-enhancing meteorological conditions.

9.3.2 Road Noise Policy

The NSW Road Noise Policy outlines noise assessment criteria, applied to particular types of projects including, noise impacts for existing residences affected by additional traffic on existing arterial roads generated by land use development.

The noise assessment (Appendix E) has included assessment of truck movements generated by the Project, identifying the average of 565 trucks per week or 81 trucks per day (assuming even year-round operation, 7 days of the week), results in less than a 1% increase in heavy vehicle traffic to the surrounding road network. It is considered unlikely that the addition of vehicles generated by the Project will have a perceivable effect on existing noise sensitive receivers given the calculated SPLs are well below the PNTLs. Potential noise impacts from this marginal increase in road traffic noise are therefore considered very low to negligible.

9.3.3 Vibration

Construction activities for the Waste Treatment Facility include minor demolition and building additions but do not require activities that produce impulse-type vibrations (e.g., pile driving). Trucks delivering waste and the operation of equipment including the front-end loaders and the Reterra unit also have the potential to produce vibrations during operation. However, these sources are either located inside the building and/or are intermittent and will occur mostly during the day with noise-sensitive receivers more than 350 m from the Site. Consequently, predicted offsite vibration impacts are considered very low to negligible.

9.3.4 Construction

In accordance with the Department of Environment and Climate Change NSW (DECC) (2009) “Interim Construction Noise Guidelines” (Guidelines) and NSW Environment Protection Authority Draft Construction Noise Guideline, 2020. Construction noise has been assessed through a qualitative process.

Construction associated with the modification of the existing facility will be undertaken in two stages. The duration of Stage 1 is estimated at 1-2 months and Stage 2 approximately 4 months. While the construction period is longer than 3-weeks, individual construction/modification activities will be shorter in duration (weeks) and not occur continuously. Construction/modification activities will predominantly occur indoors in the existing building on the Site with minimal external construction, thus limiting potential noise impacts.

External works associated with construction include:

- Installation of weighbridges.
- A new driveway.
- An extension at the north west and south west of the buildings for the Waste Water Treatment and Soil Treatment facilities.
- Installing the HVAC System.

The potential noise generating activities associated with external construction works of the Project include minor demolition to remove part of the existing slab and portion of the existing warehouse wall, minor earthworks for footing and drainage. The extension is to be achieved through installation of prefabricated concrete panels and the external component of the HVAC system will be erected by crane.

The other work required to construct the Waste Treatment Facility will be internal fit outs and installations and therefore have less potential for noise impacts. These works include:

- Fire management system installation.
- Internal HVAC systems.
- Installing tanks, silos, pumping and dosing systems.
- Building a laboratory.
- Installing a truck and wheel wash; and
- Internal bays and facility areas.

The construction will take place within Standard Construction Hours of 07:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays with no work on Sundays and public holidays.

Given the type, duration and location (predominantly indoors on the Site) of construction, the distance from noise-sensitive receivers and that construction activity will be during standard construction hours, it is considered that the noise impacts of construction will be low. To further manage this issue a Noise Management Plan will be completed prior to construction and included in the Construction Environmental Management Plan.

9.4 Project Mitigation Measures

While the Project would be well below the calculated Project Noise Trigger Level (PNTL) and relevant noise criteria requirements, the following standard measures are proposed to further mitigate noise associated with the Project.

- Proposed plant and equipment will be selected and maintained to achieve the sound power levels outlined in the Noise Assessment (Appendix E).
- Plant and equipment will be maintained and not generate excessive noise.
- Broadband reversing alarms will be utilised in place of traditional beeper reversing alarms.
- Machinery will be operated in a manner that reduces maximum noise level events.
- Site awareness training / environmental inductions will include a section on noise mitigation techniques / measures to be implemented when on the Site.
- While vibration from construction and operation are not predicted to cause offsite impacts. If necessary, monitoring can be undertaken during the construction phase to assess potential impacts.

A Noise Management Plan will be completed for construction and operation and include:

- Identification of the surrounding noise-sensitive land use.
- A description of working hours and practices to minimise noise.
- A list of high noise equipment or processes along with mitigation/minimising measures where possible.
- A complaint register and written process for handling complaints.
- Contractor involvement. A description of noise generating activities will be discussed in the morning toolbox with workers to be involved in reducing the effects where possible.

10.0 AIR QUALITY AND ODOUR

The Secretary's Environmental Assessment Requirements:	
Key Issues - Air Quality and Odour – including: ■ *a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant Environment Protection Authority guidelines* ■ *the details of buildings and air handling systems and strong justification for any material handling, processing or stockpiling external to buildings* ■ *a greenhouse gas assessment* ■ *details of proposed mitigation, management and monitoring measures.*	Chapter 10: Air Quality and Odour Appendix F: Air Quality Impact Assessment Appendix O: Greenhouse Gas Emissions Assessment

An Air Quality Impact Assessment (AQIA) has been completed for the Project and is provided within Appendix F. The AQIA has been completed in accordance with relevant guidelines including the EPA (2016) "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales" (Approved Methods).

A Greenhouse Gas Emissions Assessment for the Project has been completed and is provided in Appendix O.

10.1 Existing Environment

10.1.1 Air Quality

Baseline air quality data was obtained from the NSW Environmental Protection Authority's ambient air quality monitoring station (AAQMS) located at Liverpool, NSW. This data includes hourly $PM_{2.5}$ and PM_{10} observations for the period of 2017, 2018 and 2019, which were used for the air quality modelling assessment of the AQIA with raw data statistics for this period provided in Table 26. This period was chosen for the AQIA due to:

- A consecutive 3-year period of data broadens the time frame of the assessment and provides information on inter-annual variability.
- Year 2015 was excluded because it is the oldest and has the lowest percent completeness for both $PM_{2.5}$ and PM_{10}.
- Year 2016 was excluded due to data issues incompatible with the MET software.
- Year 2020 was excluded due to atypically large influence of bush fire smoke in background PM concentrations in that year.

Table 26: Raw 1-hr Liverpool particulate matter data statistics

Year	Size	N	Mean	Median	Stdev	Min	Max	Percent Complete	24-hr PM Exceedances
		#	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	%	#
2017	PM2.5	8009	8.9	7.3	8.5	-2.5	205	91%	5
	PM10	8664	21	18	14	-10	257	99%	2
2018	PM2.5	8369	10	8.3	8.8	-2.5	160	96%	8
	PM10	8634	24	20	19	-9	481	99%	13
2019	PM2.5	8313	13	8.5	22	-2.5	437	95%	32
	PM10	8667	28	21	34	-8.5	730	99%	29

10.1.2 Existing Climate

Given that the closest Bureau of Meteorology (BOM) automatic weather station is located approximately 9 km from the Site at Holsworthy, the prognostic meteorological model The Air Pollution Model (TAPM) developed at CSIRO Marine and Atmospheric Research was used to generate site-specific meteorological data. The TAPM datasets were used as inputs to AERMET to generate meteorological files covering the three year period of 1 January 2017 to 31 December 2019.

Refer to Appendix F for further detail of the TAPM model set-up and configuration parameters.

10.1.3 Sensitive Receivers

Sensitive receptors are defined within EPA (2016) “Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales” (Approved Methods) as including “…where people are likely to work…”. Therefore, while the Site is situated within a heavy industrial park zoned as IN3 Heavy Industrial, the closest sensitive receivers for the purpose of the AQIA are the neighbouring businesses and adjacent premises.

10.2 Impact Assessment Criteria

10.2.1 Air Quality Impact Assessment Criteria

The Approved Methods provides the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW. In accordance with the Approved Methods the assessment criteria used for the AQIA is provided in Table 27.

It should be noted there are no NSW or Australian ambient air quality criteria for PFAS compounds. Therefore, based upon the Air Quality Division of Michigan’s (USA) Department of Environment, Great Lakes and Energy, a health-based screening level for PFAS of 0.07 mg/m³ for a 24-hour averaging period[9] has been adopted for assessment.

Table 27: Assessment Criteria

Pollutant	Averaging Period	Concentration	Percentile required	Units
PM2.5a	24 hour	25	100th	µg/m3

[9] https://www.michigan.gov/documents/pfasresponse/Frequently_Asked_Questions_on_Air_Quality_Related_Issues_-_Air_Quality_Workgroup_MPART_663729_7.pdf

Pollutant	Averaging Period	Concentration	Percentile required	Units
PM2.5	Annual	8.0	100th	µg/m3
PM10b	24 hour	50	100th	µg/m3
PM10	Annual	25	100th	µg/m3
Total suspended particulates (TSP)	Annual	90	100th	µg/m3
Arsenic and compounds (As)	1 hour	0.090	99.9th	µg/m3
Chromium VI compounds (Cr)	1 hour	0.090	99.9th	µg/m3
Lead (Pb)	Annual	0.5	100th	µg/m3
Benzene	1 hour	29	99.9th	µg/m3
Trichloroethylene (TCE)	1 hour	500	99.9th	µg/m3
PFAS	24 hour	0.07	100th	µg/m3

Notes:
[a] Particulate matter smaller than 2.5 micrometres in aerodynamic diameter ($PM_{2.5}$)
[b] Particulate matter smaller than 10.0 micrometres in aerodynamic diameter (PM_{10})

10.3 Air Quality Impact Assessment

10.3.1 Emissions Inventory and Modelling

A detailed emissions inventory based on waste types and their handling and treatment processes was completed to support the AQIA for the Project. The details of emissions factors and methods used to estimate emissions of particulate matter, VOC's and PFAS from the Waste Treatment Facility ventilation stacks are included in the AQIA in Appendix F.

Based on the assessment within the AQIA, four types of emissions were prioritized for assessment. These are:

- Particulate matter (dust) generated from the handling and treatment of bulk soils including:
  - Particulate matter smaller than 2.5 micrometres in aerodynamic diameter ($PM_{2.5}$);
  - Particulate matter smaller than 10.0 micrometres in aerodynamic diameter (PM_{10}); and
  - Total suspended particulate matter (TSP).
- Metals in dust. These are parameterized by assuming up to 5 wt% of metals in PM_{10} focusing on the toxic metals arsenic (As), chromium (Cr) and lead (Pb).
- Volatile organic compounds, including halogenated hydrocarbons. Since presence of these compounds, nor their emissions can be estimated reliably, these emissions are parameterized assuming they comprised entirely of either:
  - Benzene; or
  - Trichloroethylene.
- PFAS compounds in bulk soils or liquids. For the purposes of this assessment, 100% of the PFAS are assumed to be particulate bound, and they are assumed to occur at the National Environmental Management Plan Version 2 (January 2020) (NEMP) maximum permissible PFAS content of 50 mg/kg in solids.

10.3.2 Air Emissions Control

Particulate matter, VOC and odour emissions from the Project will be mitigated using both engineering controls and proposed management controls, which were developed collaboratively between the Proponent, the authors of the AQIA (Golder) and HVAC Alliance, a qualified HVAC technical consultant.

Engineering Controls:

- Compartment 1 (as shown in Appendix N: Preliminary Design Drawings) 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;
- Three-sided fabric curtains will be installed in relevant working areas to reduce the escape of fugitive dust and vapours during material handling and processing and to improve the collection efficiency of contaminated air by the HVAC system;
- VOC and odour emissions are potentially generated by the Waste Water Treatment Plant (WWTP) in Compartment 2 (as shown in Appendix N: Preliminary Design Drawings) while treating hydrocarbon or solvent contaminated liquids. The WWTP is a sealed vessel so VOC and odour capture efficiency is predicted to be high. VOC and odour emissions captured in this area are routed directly to the common outlet plenum for the air emissions control system;
- Raw water tanks are to be fitted with screw lock (or similar) inlet fittings to reduce spillage. Tank relief vents will include vapour recovery systems ducted to the HVAC system during product loading/unloading;
- Potentially large volumes of fugitive dust may be generated when using the Reterra unit to treat bulk soils and sludge in Compartment 3. All emissions from Compartment 3 are routed directly to a dedicated filter-cartridge based dust collector (Camfil Model GSX48). The dust collector has a manufacturer-stated PM removal efficiency of 99.99% for particles down to 0.5 micrometers in geometric diameter. The dust collector is located in Compartment 1 and will vent treated exhaust air directly into Compartment 1;
- Emissions collected in Compartments 1 and 2 are routed to a common inlet plenum for the building's air emissions control system. This system includes the following components, listed in order of exhaust flow:
  - Common inlet plenum serving Compartments 1 and 2;
  - PM filter box;
  - VOC and odour filter box; and
  - Common outlet plenum;
  - Three (3) strobic exhaust fans operating in parallel.
- Fresh air is provided to each of the compartments by motorised dampers fitted behind weatherproof louvres located along the western wall of compartment 1 & 2 and the northern wall of Compartment 3.

Refer to the AQIA Appendix F for detailed additional information on the HVAC system and engineering controls.

10.3.3 Air Emissions Summary

A summary of the total emission rates, and the rates per stack for each priority pollutant is presented in Table 28.

Table 28: Emission rate

Pollutant	Total emission (g/day)	Emission rate per stack (g/s)
PM2.5	1,260	4.9 x 10-3
PM10	1,670	6.5 x 10-3
TSP	1,790	6.9 x 10-3
As	46	1.8 x 10-4
Cr	46	1.8 x 10-4
Pb	46	1.8 x 10-4
Benzene	8.0	3.7 x 10-4
TCE	9.7	4.5 x 10-4
PFAS	0.022	1.7 x 10-7

In accordance with Approved Methods the potential impacts of the Project upon air quality was calculated utilising the AERMOD model, which utilises meteorological data (Section 10.1.2) and the terrain of the Site and surrounding area (including modelling buildings, receptor locations and ventilation stack parameters) and the emission rates to produce a dispersion model for assessment of the Project.

Refer to Appendix F for further discussion of the model assumptions and calculations including building downwash and ventilation stack parameters.

10.4 Air Quality Potential Impacts

10.4.1 Operation

The maximum predicted ground level concentration of pollutants and individual toxic pollutants generated by the Project outside the Site boundary at gridded sensitive receptors for each modelled pollutant is shown in Table 29 while the cumulative impact assessment that includes baseline concentrations is provided in Table 30

Table 29: Air Quality Project-only results

Pollutant	Averaging period	Criteria	Units	2017	2018	2019
PM2.5a	24 hours	25	µg/m3	0.76	0.91	0.82
PM2.5a	Annual	8.0	µg/m3	0.16	0.18	0.15
PM10a	24 hours	50	µg/m3	1.0	1.2	1.1
PM10a	Annual	25	µg/m3	0.22	0.24	0.19
TSP a	Annual	90	µg/m3	0.23	0.26	0.21
Asb	1 hour	0.090	µg/m3	**0.130**	**0.140**	**0.100**
Crb	1 hour	0.090	µg/m3	**0.130**	**0.140**	**0.100**
Pba	Annual	0.5	µg/m3	0.006	0.006	0.005
Benzene b	1 hour	29	µg/m3	0.27	0.29	0.22
TCE b	1 hour	500	µg/m3	0.32	0.35	0.26
PFAS	24 hour	0.070	mg/m3	0.0002	0.0002	0.0005

Notes:

[a] 100th percentile (highest value) as required for assessment against the criterion

[b] 99.9th percentile (9th highest value) as required for assessment against the criterion

Table 30: Air Quality Project results including baseline

Pollutant	Averaging period	Criteria	Units	2017	2018	2019
PM2.5	24 hours	25	µg/m3	6.4	3.2	4.4
PM2.5	Annual	8.0	µg/m3	**9.1**	**10**	**13**[1]
PM10	24 hours	50	µg/m3	9.4	9.0	13
PM10	Annual	25	µg/m3	21	24	**28**[2]
Total suspended particulates (TSP)[3]	Annual	90	µg/m3	0.23	0.26	0.25

Notes:

[1,2] Exceedance resulting from baseline as shown in Table 29.

[3] does not include baseline as no baseline data is available.

The results presented in Table 29 show that the magnitude of change to criteria for 24-hr and annual $PM_{2.5}$, PM_{10} and TSP concentrations are low to negligible (<5%, <3% and <1% respectively). Adding the background PM concentrations (Table 30) 24-hour criteria. Exceedances of the annual $PM_{2.5}$ and PM_{10} criteria (identified in bold (Table 30) are a result of exceedances in the baseline PM data with negligible contribution from emissions from the Project.

Model results for benzene, TCE and PFAS (1-hr average compliance criteria for benzene and TCE are the 99.9th percentile prediction by the model, whereas the PFAS criteria is the 100th percentile) are all below the predicted 1-hour Ground Level Concentrations (GLCs) at the grided receptors outside the Site boundary for all years modelled (2017 to 2019).

The 1-hr average compliance criteria for metals (arsenic, chromium VI) GLCs at the grided receptors outside the Site for all years modelled (2017 to 2019) are above the criteria. As identified within Appendix F, the results of the potential for an exceedance of the 1-hr criteria for metals As and Cr (VI) are primarily the results of conservatism in the assessment and numerical artifacts. Examples of conservatism in the assessment of metals include the following:

- The emissions inventory conservatively assumes:
  - The annual maximum metal-contaminated waste throughput of 20,000 t/year;
  - The hourly maximum metal-contaminated waste throughputs of 150 t/hr; and
  - The maximum permissible metals content (5 wt%) for each of the 150 t/hr that are handled.
- The air quality model conservatively assumes:
  - Emissions of metals-contaminated PM for each hour of every year in the simulation; and
  - No deposition of the metal-contaminated PM being emitted.

The exceedances are also considered the result of conservative modelling for every hour of the year, even though these emissions would only occur hourly for about 12 days per year. Since the ranked 1-hr As and Cr concentrations drop below the criteria at the 44th ranked occurrence, this further indicates that the probability of an exceedances actually occurring as very low to negligible. i.e., less than 2-hours in any year under unfavourable meteorological conditions.

Refer to Appendix F: AQIA for further discussion of the metal results and the conservative assumptions of the modelling completed for the assessment. To confirm model conservatism, a post-commissioning stack test for particulate matter and metals found in PM will be adopted as further discussed in Section 10.5.

10.4.2 Construction

The construction of the Project is proposed to be undertaken in two stages, the duration of Stage 1 is estimate at 1-2 months and Stage 2 approximately 4 months. The majority of construction works of the Project involves the existing onsite building with minimal external construction. This would include internal fit outs and installations and have a lower potential for air quality impacts due to less invasive activity, minimal earthworks and the mitigation effects of the existing building structure. The potential for impacting air quality is greater during external earthworks or demolition work, with the potential air quality impacts predominately fugitive dust and PM. The following list details the external construction work:

- Installation of weighbridges;
- A new driveway;
- An extension at the north west and south west of the buildings for the Wastewater Treatment and Soil Treatment facilities; and
- Installing the HVAC System.

Potential air quality impacts during external construction activities include minor demolition to remove part of the existing slab and portion of the existing warehouse wall, minor earthworks for footings and drainage. The building extension is to be constructed using prefabricated concrete panels and the HVAC system will be erected and installed by crane.

Due to a significant portion of the construction activities taking place inside an established building and minimal invasive or demolition work occurring externally, development of and adherence to a Construction Air Quality Management Plan (CAQMP) is deemed appropriate for managing air quality impacts during the construction phase of the Project.

10.4.3 Odour

As identified in the AQIA (Appendix F), the ventilation stacks serve as an air emissions control device that include filters to reduce particulate matter emissions and activated carbon to reduce emissions of VOCs and odour.

As modelled within Appendix F and indicated in Table 29, the two odorous VOCs (benzene and TCE) are three orders of magnitude (1000X) below the applicable criteria, indicating very low to negligible risks to loss of amenity due to odour emissions.

10.5 Air Quality Mitigation Measures

Particulate matter, VOC and odour emissions from the Project will be mitigated using both engineering controls and management controls. The engineering controls are part of the design of the Project and thus have been considered and included as part of the AQIA as identified and discussed in Section 10.3.2. In addition to these, management controls include policies and procedures designed to reduce the generation of PM and VOC emissions are proposed to be adopted during operation and construction of the Project. These would include:

- No idling of mobile plant and haul trucks when not in use;
- Material loading/unloading and handling procedures designed to reduce fugitive dust emissions; e.g., high-speed roller-doors required to be closed during material loading/unloading and handling;

- Operation of emissions control devices according to their manufacturer's specifications;
- Regular preventive maintenance of emissions control devices according to their manufacturer's specifications;
- Truck and wheel wash at the Facility exit to reduce soil track-out and generation of fugitive dust outside the building envelope;
- The need for fogging suppression systems where deemed necessary will be determined during detailed design. This potentially includes Compartment 3 and other areas as needed;
- Compartment 3 on/off switches to focus air collection in the active 1 of 5 Treatment Bays being used for stockpiling treated waste discharged from the Reterra unit. These HVAC controls system will allow a single stockpile bay hood to collect, and send for treatment, approximately 95% of the total air flow through the space;
- Fabric side curtains front drop curtain to 4 m on the Bioremediation Bays are designed to contain minor contaminant generation from handling and turning process; and
- Overall the building compartments will be maintained at > -5 Pascals (Pa) while in 'daily treatment mode'. When in 'after hours mode', the building can exhaust air system from each compartment shall be reduced and associated outside air inlet dampers closed off to maintain > -5 Pa whilst saving energy.

In addition to these, as identified within Section 10.4.1, the AQIA identifies that air emissions from the Project are compliant with the relevant NSW criteria at the property boundary with the exception being emissions of metals As and Cr, for which the model conservatively predicts the potential for up to 2 hrs per year when an exceedance is possible under unfavourable meteorological conditions.

To validate the model predictions from the AQIA (Appendix F), it is proposed that post-commissioning stack testing be undertaken during operation. This post-commissioning testing will include:

- Stack testing upstream and downstream of the air emissions control system to validate the manufacturer-stated PM and VOC removal efficiencies;
- Stack testing for size resolved PM ($PM_{2.5}$ and PM_{10}) and a metals in PM assay while treating bulk soils or wastes containing heavy metals; and
- Stack testing for VOCs or odour while treating wastes containing hydrocarbons, industrial solvents and/or odorous wastes.

If post-commissioning stack testing indicates the model predictions are conservative, then stack testing will be repeated on a once-in-three years basis.

If post-commissioning testing indicates that there is the potential for air impacts, then fenceline or local air quality monitoring is proposed to be undertaken. This air quality monitoring could include, but may not be limited to, the following:

- Size resolved fenceline particulate matter monitoring ($PM_{2.5}$ or PM_{10});
- Dust deposition gauge monitoring;
- Hydrocarbon or VOC monitoring; or
- Total reduced sulfur compound or odour monitoring.

Project mitigation measures during construction will include development of and adherence to a Construction Air Quality Management Plan (CAQMP) to be included in the Project Construction Environmental Management Plan (CEMP), which will include:

- Identification of the surrounding land use and local stakeholders;
- Displaying the name and contact details of person(s) responsible for air quality at the site boundary;
- Recording all air quality complaints, identify causes and incorporating measures to reduce emissions in a timely manner;
- Include all site staff at the morning toolbox in a discussion for planning the work day around dust suppression and minimisation;
- Structure high dust generating activities (earthworks and demolition) around days with low windspeed and stop or pause these activities during dry and windy conditions;
- Loads shall be covered on trucks transporting material to and from the construction site;
- Spray the site regularly to supress dust and use a water-assisted sweeper along the access road to reduce the potential for material to be tracked off site; and
- Cover and weight stockpiles to prevent wind erosion when they are inactive.

10.6 Greenhouse Gas Assessment

10.6.1 Greenhouse Gas Assessment Criteria

The following regulatory guidance was used in preparing the Greenhouse Gas (GHG) emissions assessment to calculate emissions for construction and operation of the Project.

- National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008;
- NGER (Measurement) Amendment (2019 update) Determination 2019; and
- NGER Emissions and Energy Threshold Calculator 2019-20.

Scope 1 emissions are generated directly from sources within the assessment boundary such as emissions from fuel combustion and waste whilst Scope 2 emissions are generated indirectly from sources outside the assessment boundary and include emissions from the consumption of grid electricity.

The assessment boundary is confined to emissions resulting from the Project including emissions from:

- Fuel usage from vehicles and equipment; and
- Electricity usage from site office and all treatment processes of the Waste Treatment Facility.

Emissions excluded from the assessment include Scope 3 emissions associated with the delivery of the waste to the Project. These emissions are excluded because the delivery tucks are not owned, nor operated, by the Proponent. In addition, emissions from the construction of the Project have not been quantified as the scale of construction is considered insignificant, comprises minor demolition, minor earthworks and minor building modifications completed over a duration of less than 4 months.

10.6.2 Greenhouse Gas Emissions Inventory

The Project plant and equipment utilised for calculating GHG Scope 1 emissions are as follows:

- 1 x12 tonne excavator
- 1 x front end loader

- 1 x 6-8 tonne dump truck
- 1 x high sheer mixer (Reterra or similar)
- 1 x mobile screen
- 1 x forklift

Scope 2 emissions include the following electric machines, equipment and staff:

- Bioremediation - pumping system and aeration equipment;
- 1 x mobile shredder;
- Wastewater treatment plant;
- Drill mud plant/dewatering plant;
- 4 x ventilation fans;
- 1 x compressor; and
- 30 x operational staff.

10.6.3 Project Greenhouse Gas Emissions

Emissions factors used in the calculations for assessment of the Project are sourced from Schedule 1, Part 3 of the NGER (Measurement) Determination 2008 (diesel fuel) and Part 6 of the NGER (Measurement) Amendment (2019 update) Determination 2019.

Refer to Appendix O for the individual calculations of emission factors for fuel and electricity for the Project including the calculations associated with activity levels and emissions of the Project plant and equipment identified within Section 10.1.1.

Table 31 summarizes the Scope 1 and 2 emissions and their total for the Project, which have been calculated utilizing the NGER Emissions and Energy Threshold Calculator 2019-20.

Table 31: Estimated annual GHG emissions by NGER Energy Threshold Calculator 2019-20

Type	GHG emissions (t CO2-e)
Scope 1 (diesel combustion)	772
Scope 2 (NSW electricity consumption)	2,867
Total	**3,639**

Total annual GHG emissions for the proposed Project are less than 25,000 t CO_2e/hr and therefore do not meet the NGER facility-level reporting threshold. i.e., annual GHG reporting for the Project is not required.

10.7 Greenhouse Gas Mitigation Measures

Estimated Scope 1 and Scope 2 emissions of the Project are from operational machinery, plant and staff. Energy consumption can be limited by the following mitigation measures, which are consistent with mitigation measures identified for Air Quality (Section 10.5)

- Use of fuel-efficient machinery, equipment and plant.
- Consider energy rating when purchasing new machinery and equipment.
- Implementing a maintenance plan for fuel and electricity powered machinery and equipment.

- Training to and implementing energy conservation practices by all staff.
- Use of solar energy.

11.0 SOILS AND WATER

The Secretary's Environmental Assessment Requirements:	
Key Issues - Soils and Water – including: ■ *an assessment of potential surface and groundwater impacts associated with the development, including potential impacts on watercourses, riparian areas, groundwater, and groundwater-dependent communities nearby* ■ *a detailed site water balance including a description of the water demands and breakdown of water supplies, and any water licensing requirements* ■ *details of stormwater/wastewater management system including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water* ■ *description of the measures to minimise water use* ■ *detailed flooding assessment* ■ *description of the proposed erosion and sediment controls during construction* ■ *characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters and monitoring activities and methodologies) and* ■ *Characterisation of the nature and extent of any contamination on the site and surrounding area*.	Chapter 11: Soils and Water Appendix G: Preliminary Site Investigation and Limited Detailed Site Investigation Appendix H: Flooding and Stormwater Management Study

This chapter addresses the soil and water impacts of the Project and is based upon :

- Flooding and Stormwater Management Study, Golder Associates, June 2020 (Appendix H)
- Preliminary Site Investigation and Limited Detailed Site Investigation, August 2020 (Appendix G)

The Soil and Water Impact Assessment examines existing soil and water conditions, impacts of the development on flooding, surface water management and surface and groundwater quality. This chapter also provides a reviews the water demand of the project and site water balance and reviews the likelihood of contamination at the site.

11.1 Flooding

11.1.1 Existing Environment

The Site is located within the Liverpool Local Government Area (LGA), approximately 5 km west of Liverpool Central Business District and is within the established industrial area of the suburb of Prestons. Whyalla Place adjoins the Site along the western boundary of the Site. The Site is located approximately 500 m to the north of the M7 and approximately 500 m south of the nearest residents across Hoxton Park Road. The majority of land located between Hoxton Park Road to the north and the M7 to the east, south and west has been developed for commercial/industrial uses.

The Site is at an elevation of approximately 23.5 mAHD, with the area gently sloping to the north east and east. The existing warehouse finished floor level (FFL) is at 23.6 mAHD. The Site is an existing industrial facility with a warehouse, office, carpark and other infrastructure resulting in the majority of the land being paved (impervious), except the small landscaped area fronting Whyalla Place.

The nearest watercourse to the Site is Maxwells Creek, which flows in a northerly direction approximately 300 m to the east before confluences with Cabramatta Creek approximately 2.2 km northeast of the Site. Cabramatta Creek, being the largest watercourse in the vicinity of the Site, flows in an easterly direction approximately 680 m north of the Site and confluences with Georges River at Warwick Farm.

The existing stormwater drainage network connects to Liverpool City Council (Council) drainage network that runs along the eastern boundary of the Site.

The regional flood study that is relevant to the Site is the Cabramatta Creek Floodplain Management Study & Plan prepared by Bewsher Consulting Pty Ltd in October 2004 (Bewsher 2004). Council utilised results of the Bewsher 2004 flood study to inform the LEP. The LEP mapping identifies the Site is located outside the 'flood planning area' (refer to Figure 19).

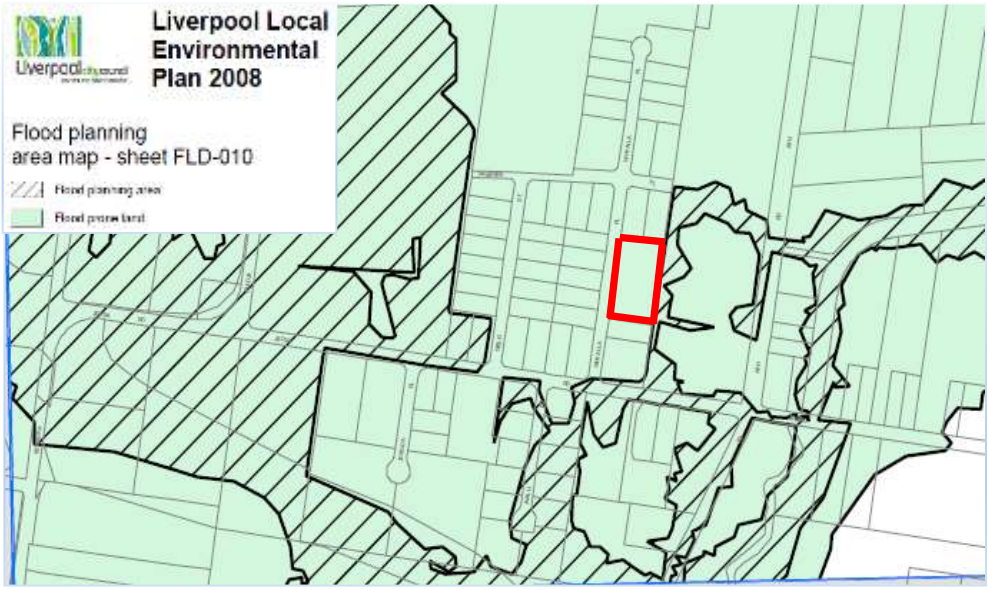


Figure 19: Flood Planning Area Map with the Site identified in red (as adapted from Liverpool Local Environment Plan 2008)

Based on Figure 19, fluvial flooding impacts upon the Site only for a probable maximum flood (PMF) event. However, as identified within "Liverpool Development Control Plan 2008", flood mapping identifies the western portion of the Site as located within the 'flood planning area' (area below the 1% annual exceedance probability (AEP) maximum flood level plus 0.5 m freeboard) (Figure 20). Correspondence provided by Council dated 14 July 2020 (City of Liverpool, 2020) advises the flood mapping provided in "Liverpool Development Control Plan 2008" is to be utilised in assessment of the Project, nevertheless the whole site is categorised as a 'low flood risk' area.

Based on advice from Council, the minimum finished floor level for new buildings at the Site is estimated at 23.6 mAHD (i.e. the maximum 1% AEP flood level at the Site of 23.1 mAHD plus 0.5 m freeboard). This level is consistent with the exiting finished floor level at the Site.

Figure 20: Site and the extent of flood planning area (Council's flood mapping)

Rainfall intensity-frequency-duration (IFD) data for the Site (location 33.932 S, 150.879 E) was sourced from the Bureau of Meteorology's (BoM) computerised design IFD rainfall system (CDIRS), which allows automatic determination of a full set of IFD curves and associated data for any location in Australia (BoM 2020). Figure 21 and Table 32 summarises the rainfall depths associated with design storms for durations up to 72 hours and AEP events down to 1% for the Site.

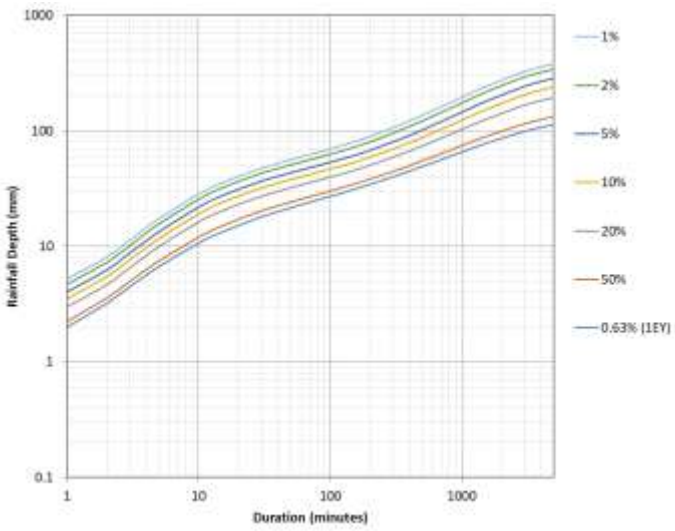


Figure 21: Rainfall depth versus rainfall duration for selected annual exceedance probabilities (AEPs)

Table 32: Rainfall depths (mm) for selected duration for selected durations and annual exceedance probabilities (AEPs)

Duration (min)	0.63% (1EY*)	50%	20%	10%	5%	2%	1%
5	6.71	7.5	10	11.7	13.4	15.7	17.5
10	10.7	12	16.3	19.1	21.9	25.6	28.5
15	13.3	15	20.3	23.9	27.4	32.1	35.6
30	18	20.3	27.2	32	36.7	42.9	47.7
60	23	25.6	34.1	40	45.8	53.6	59.8
120	28.8	32	42.2	49.4	56.7	66.7	74.6
180	33.2	36.8	48.5	56.9	65.3	77.1	86.5
360	43.1	48	64	75.4	87.2	104	117
720	57.5	64.7	88.3	105	123	147	166
1440	76.6	87.5	123	149	176	211	238
2880	98.2	114	165	202	240	288	324
4320	110	128	187	231	275	328	369

Notes: * Exceedance per Year

11.1.2 Impact Assessment

A detailed flood assessment for the Project was undertaken by Golder and is presented in Appendix H.

The TUFLOW flood model associated with the Bewsher (2004) flood study was sourced from the Council for use on the detailed flood assessment. The detailed flood assessment utilised the Council flood model, only replacing the buildings within the Site based on the proposed development plan of the Site and generated the post-development flood inundation maps for the 1%, 0.5%, and 0.2% (similar to the 100-year, 200-year, and 500-year average recurrence interval (ARI) events, respectively) and the PMP event storm events. Mapping is provided in Appendix H. Modelling shows the development has no impact on flooding within the Site and on the downstream area given that the Site does not inundate for storm events including and up to 0.2% AEP. Based on the flood modelling results, the fluvial flooding only impacts the Site for the PMF event. i.e. post-development flood inundation is identical to that of baseline scenario for the rest of the storm events.

A comparison between the baseline and the post-development flooding for the PMF event is presented in Figure 22.

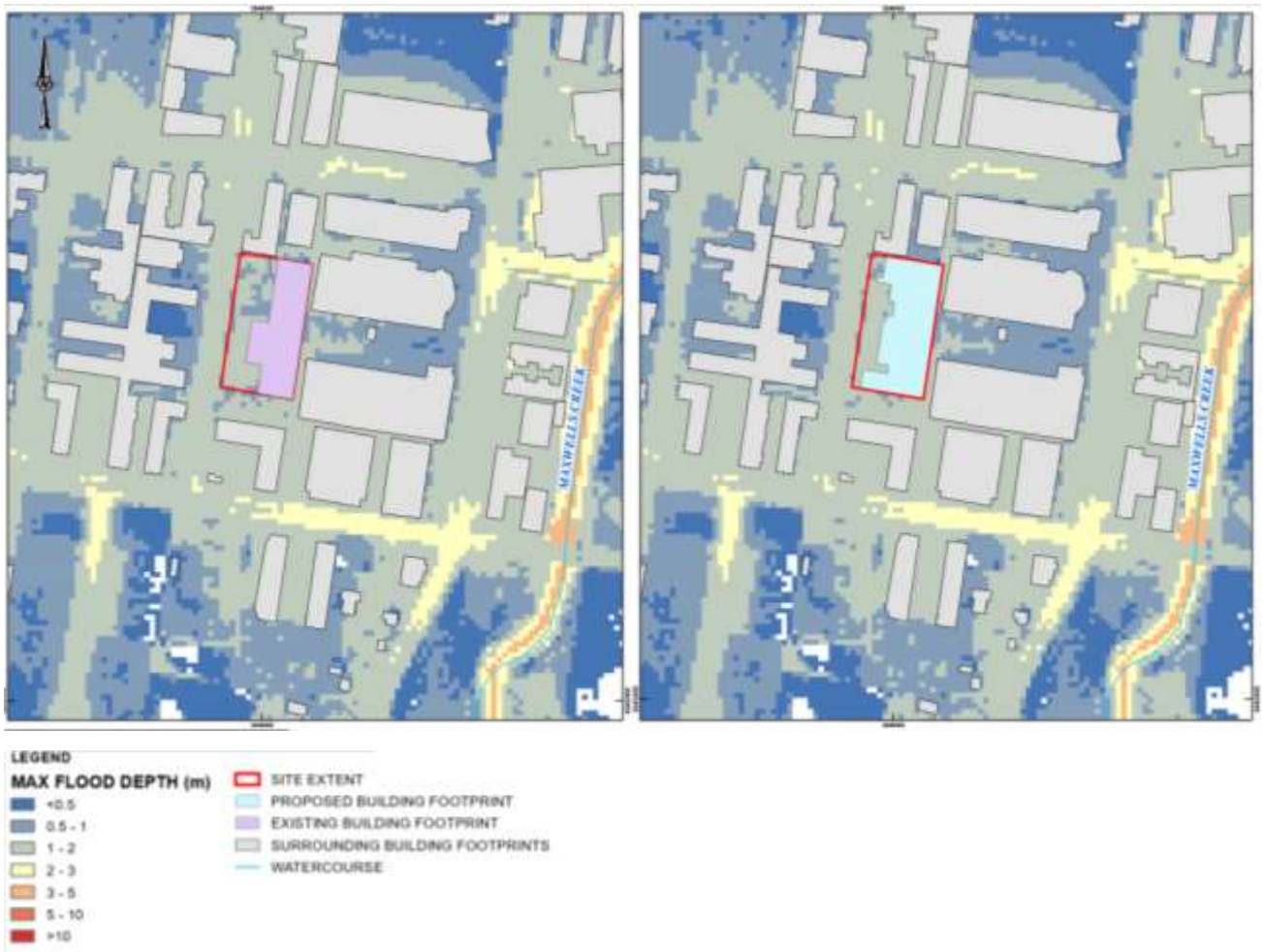


Figure 22: Probable Maximum Flood (PMF) 2H Storm Event Maximum Flood Depths Pre and Post Development

Based on the flood modelling results, the Site would inundate for the PMF event, but the development does not impact the flooding within and downstream from the Site even for the PMF event. The flood modelling results for the PMF event indicate both the baseline and post-development maximum flood level within the Site's carpark area is about 1 to 2 m. The flood modelling results for the PMF event also indicate that the increased post-development building footprint partially impedes the flood flow across the Site and causes slightly less flooding at the immediate downstream of the Site's northern boundary for the post-development scenario compared to the baseline scenario.

Therefore, it is assessed that the Project will not increase flood risks to the Site and the adjacent areas under the modelled scenarios. Given this assessment, and with recommended flood management and mitigation measures in place, the Project will have negligible impact on flooding within and downstream of the Site.

11.2 Surface Water Management

11.2.1 Existing Environment

As identified within Section 11.1.1, the two major nearby surface water receptors are identified as Maxwells Creek and Cabramatta Creek.

The existing drainage system at the Site manages runoff from the carpark and roof areas and discharges into the Council's drainage network. A series of existing down pipes convey runoff from the warehouse and office roof into the existing 150 mm diameter drains. Then the existing 150 mm diameter drain conveys part of this

runoff and runoff from the carpark area that is captured by grated stormwater pits, into the 375 mm diameter Council drain that runs along the eastern boundary of the Site. The rest of the warehouse runoff (from the eastern portion of the roof) is conveyed directly into the same Council drain. The Site's lot connection pit to the Council drain is located at the northeastern corner of the Site at invert level of 22.65 mAHD. In addition to the above, a minor portion of the Site's rainfall runoff generates from the existing driveways (only the portion beyond the Site's front concrete wall) draining towards Whyalla Place.

A figure of existing site drainage is presented in Appendix H.

11.2.2 Impact Assessment

Construction

Proposed construction of the Project is limited to installation of the Waste Treatment Facility extension, modifications to the existing carpark, installation of a new driveway, modifications to the stormwater management network and installation of above-ground infrastructure. Therefore, a minimal amount of erosion and sediments as a result of stormwater runoff is anticipated during construction activities.

During the constructions phase, the Proponent will implement an erosion and sediment control plan in general accordance with the Blue Book (Landcom 2004) (refer Figure 23) with control measures of:

- Cover grates of all the Site's drainage pits with a geotextile cloth to remove fine sediment and debris in runoff;
- apply gravel filled bags around the Site's drainage pits to temporarily pond runoff locally and remove medium to coarse sediments from runoff;
- apply gravel filled bags across the existing and proposed entry driveway at the Site boundary to temporarily pond runoff locally and remove sediments from runoff; and
- spill kits to be made available to construction vehicles.

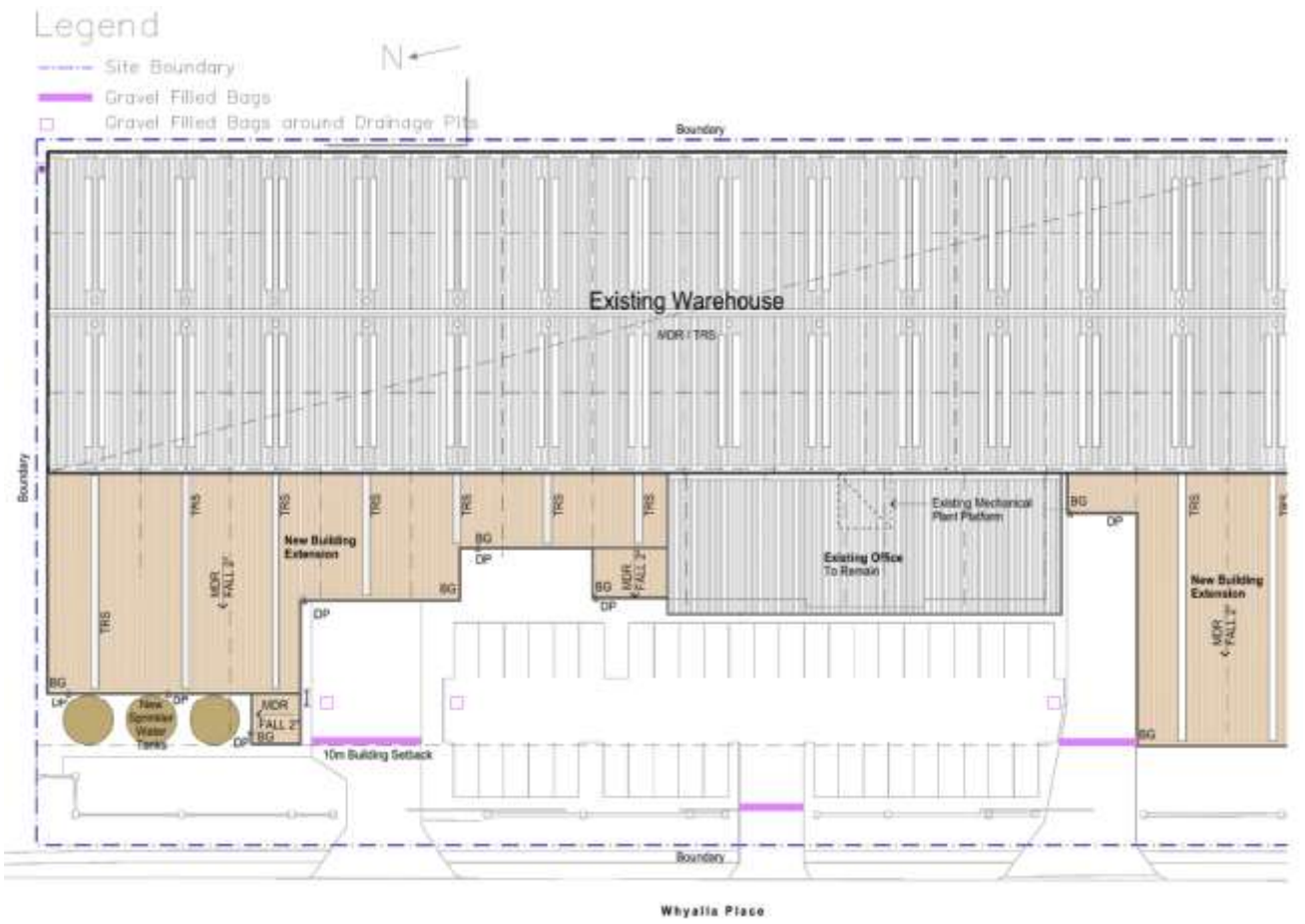


Figure 23: Erosion and sediment control plan (construction phase)

Operation

Table 33 summarises a comparison of landuse between the baseline and the post-development scenarios.

Whilst the post-development combined roof area is increased, the combined areas of carpark and other paved are is decreased resulting in no change to impervious areas. In addition, with no change to garden and further pervious areas, the total impervious and pervious areas are unchanged as a result of the Project.

Table 33: Baseline and post-development landuse comparison (m^2)

Area	Baseline	Post-development	Change
Roof	4560	6080	1520
Carpark & Other Paved	3550	2030	-1520
Imppervious (Beyond the Concrete Wall fronting Whyalla Place)	10	16	6
Total Impervious	8120	8126	6
Garden	580	580	0
Pervious (Beyond the Concrete Wall fronting Whyalla Place)	370	376	0
Total Pervious	950	956	0
Total Lot	9060	9066	0

Based on the Council's on-site stormwater detention (OSD) policy, OSD shall apply should the development (LCC, 2004):

- Where there is an existing stormwater system that is unable to cater for the increase in discharge due to development;
- When the development will involve an increase in impervious area on the site; and
- Where it is intended to connect stormwater directly to the street kerb and gutter only and the discharge for the 10-year ARI (similar to 10% AEP) exceeds 20 L/s.

Given that there is no existing OSD at the Site, Golder assumes that the existing drainage system at the Site connecting to Council's drainage network provides enough capacity to manage the Site's baseline runoff up to and including the 1% AEP event. There is no increase in discharge to Council's drainage network, therefore, the Proponent does not propose to change management of OSD at the Site in accordance with Council's OSD policy.

The conceptual post-development Stormwater Management Plan (SWMP) is presented in Figure 24. The post-development SWMP integrates into the existing drainage system with minimal alterations where practicable. The post-development stormwater management strategy will manage runoff from different areas of the Site, up to and including the 1% AEP event, as:

- Warehouse roof: The existing and new downpipes will convey runoff from the roof, including the extension into 150 mm drains. Part of this runoff will be detained within onsite rainwater storage tank to be used for site activities and any excess during large storm events will be discharged into the existing Council's drainage network.
- Carpark and other paved areas: The existing drainage network will capture and convey this runoff plus the excess runoff from the garden area into the Council's drainage network.
- Garden area: part of runoff will infiltrate into the ground and the excess will flow into the Site's drainage network (see above dot point).

Pervious and impervious (beyond the concrete wall adjacent to Whyalla Place): There is no considerable post-development landuse change in this area except the new driveway, which will have increase of a total impervious area by approximately 6 m^2, thus no OSD is required. Part of this runoff will infiltrate into the ground and the excess will flow into Whyalla Place.

Figure 24: Post-development stormwater management plan (conceptual)

The Project does not increase the impervious area of the Site and thus does not increase the runoff discharge. Furthermore, the proposed rainwater harvesting system will likely decrease the runoff discharge from the Site as a result of the Project. The surface runoff discharge point that connects the site's drainage network to the Council drainage network will also remain unchanged.

11.3 Surface Water and Ground Water Quality

11.3.1 Existing Environment

Under existing conditions clean stormwater is captured from the carpark and roof and discharged at Council's drainage point. There are no stormwater treatment devices at the Site.

The site is not located within a Groundwater Management Zone managed by the NSW Government.

A search of on-line records held by the NSW Department of Primary Industry Office of Water was performed by Lotsearch (refer to Appendix G). A summary of the groundwater bores within 500 m of the Site is presented in Table 34. This bore is upgradient.

Table 34: Groundwater bores summary

GW ID	Approximate distance from the Site	SWL (mbgl)	Salinity (mg/L)	Total Depth (mbgl)
GW102015	200 m south	3.00	Brackish	9.00

mbgl - metres below ground level
mg/L - milligrams per litre

A groundwater assessment was undertaken by Golder as part of the Phase 1 and Phase 2 assessment (refer Appendix G) and identified:

- Soil sampling undertaken from six sampling locations (BH01-BH03 and MW01-MW03) indicated that all soil results were below the laboratory LOR and/or below adopted site criteria. Although fill at the Site contained limited amounts of anthropogenic material, the fill met the adopted site criteria and was not considered to pose an aesthetic issue for ongoing commercial/industrial land use;
- Groundwater was encountered within silty clay. The water strike depth (i.e. water bearing zone encountered) during drilling was greater than approximately 3.5 mbgl;
- Groundwater flow direction was inferred to be towards the east and northeast; and
- Laboratory results for groundwater samples were generally below the respective laboratory LORs and adopted site criteria. One exceedance of the adopted nickel criterion was reported at MW02. However, as this exceedance was reported at an upgradient location, it is considered that the exceedance is not related to site activities and that further assessment of the nickel exceedance is not warranted.

11.3.2 Impact Assessment

Construction

Proposed construction of the Project is limited to installation of the Waste Treatment Facility extension, modifications to the existing carpark, installation of a new driveway, modifications to the stormwater management network and installation of above-ground infrastructure. Therefore, stormwater runoff is anticipated to be minimal during construction activities of the Project.

A Surface Water Management Plan is proposed to be developed as part of the CEMP for the Project, in general accordance with the following control principles:

- Bund fuels, oils, paints, and other chemicals onsite in accordance with relevant guidelines.
- Remove accidental spills of soil or other materials.
- An inspection program shall be conducted during construction to monitor compliance with the CEMP.

Erosion and sedimentation during construction would be managed in accordance with Section 11.2.2

Ground excavations for the Project include footings and all are expected to be less than 1.5 m in depth. These excavations are expected to be shallower than the depth to groundwater, which was recorded as 3.5 mbgl during the Limited Phase 2 Site Investigation.

Operation

Potential impacts of the Project on surface or groundwater water quality include:

- Wastewater contamination of surface water; and
- Spillage or uncontrolled releases of pollutants.

The following key principals have been adopted as part of the design of the Project to protect water quality:

- Segregation of clean stormwater from potentially contaminated materials and wastewater;
- Protection of the groundwater through bunding, containment and barrier systems; and
- Collect and reuse clean roof water during operations at the Site.

Adopting the key principles, the proposed design of the Project provides a high level of impact mitigation including the following:

- Carpark and roof runoff will be clean stormwater. Golder notes this assumption is also aligned with the current stormwater management practices at the Site.
- The Proponent will manage the materials and process water wholly within the bunded building and separate from stormwater (as a closed system) and recycle and reuse where possible, thus the natural environment or the Council drainage network will not receive leachate/process water from the Site.
- A wheel and truck wash is located on exit from the Waste Treatment Facility.
- The storage and handling of materials always be undertaken inside the Waste Treatment Facility.
- The doorways of the Waste Treatment Facility would be bunded with drive-over bunding and of sufficient capacity to contain one tanker load of liquid.
- Leachate collection within the Waste Treatment Facility: The floor of the Waste Treatment Facility building is concrete with centrally located collection pits so that all spills and contamination are contained within the building. Water collected would be directed to the waste water treatment plant. Water treatment is discussed further in Chapter 2 and Chapter 7.
- Waster water treatment plant tanks equipped with high level alarms etc to prevent overflow.
- Bunding of the Wastewater Treatment Plant and chemicals and dangerous goods in accordance with Australian Standards.
- Overflow protection and alarms on all tanks.
- The application of treatment chemicals will be via enclosed automated dosing systems minimising the potential for spill.
- The above-ground Pre-Treatment Pits will be lined and regularly inspected and epoxy liner and concrete repair implemented as needed with procedures documented in the OEMP.
- Post-development runoff from the existing driveways and the pervious grass area beyond the concrete fence adjacent to Whyalla Place will remain predominantly the same except for the proposed driveway accounting for approximately 6 m^2 of impervious area that is considered to have a negligible impact on stormwater quality.

There is no actual or potential discharge to waters of contaminants that may cause an adverse effect on surface water and/or groundwater due the following key operational parameters:

- Trucks would pass over a truck and wheel wash inside the Waste Treatment Facility prior to exit preventing tracking of waste. Water collected would be directed to the waste water treatment plant. Water treatment is discussed in Chapter 2 and Chapter 7.
- No facility wash down would be undertaken inside the Waste Treatment Facility generating waste water.
- All bunding will be inspected on a regular basis and repair implement as needed and procedures documented in the OEMP.
- Bunds will be water-proof tested on a regular basis and procedures documented in the OEMP.
- Material Safety data sheets would be maintained on site for all chemicals.

- Spill kits would be located adjacent to potentially contaminating activities and procedures would be in place for spill management and documented in the OEMP.
- Fire water would be contained within the Waste Treatment Facility and captured by the leachate collection system refer Appendix K.

The Project is not expected to have any impact on nearby watercourses, riparian areas, groundwater, and groundwater-dependent communities due to the following:

- The Site runoff discharge point will continue to operate as per existing operation at the Site, connecting to the Council drainage system, with runoff collected from the same area type as existing (I.e. carpark and roof) and therefore is clean and similar to the baseline conditions.
- Segregation between site generated wastewater and surface water/groundwater would be maintained through the Project Design and Mitigation and Management measures (refer to Section 11.7).
- For wastes where dissolved phase contaminants will be handled, these will be in lined and contained areas. These lined areas will not permanently store mobile (dissolved phase) contaminants and therefore the risks for direct discharge through the structure and into the natural geological materials below, is considered to be low.
- The Site does not use groundwater and does not allow infiltration into the groundwater. Only the garden area would allow some infiltration of incidental rainfall, which is similar to the existing baseline conditions.
- The natural geology beneath the site comprises of low permeability silt and sandy clays. This will restrict the fate and transport of dissolved phase contaminants from moving quickly or long distances towards identified receptors, which are noted to be 500m from site. Whilst groundwater is shallow (3.5-5mbgl), the areas within the facility where mobile contaminants will be handled will be in engineered containment areas.

Procedures to minimise the risk of a pollution incident and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident will be included in a Pollution Incident Response Management Plan (PIRMP).

To monitor the performance of the Waste Treatment Facility, sampling will be undertaken by a suitably qualified person in accordance with the SAQP with ongoing biannual water monitoring undertaken at the Site in the following locations:

- Groundwater sampling from existing MW01, MW02, MW03 monitoring wells; and
- Surface water monitoring from site discharge point S01.

Monitoring locations are shown in Appendix G.

The proposed analytical plan for surface water and groundwater are based on the potential contaminants of concern from the operation of the Project including:

- Petroleum hydrocarbons (TRH, BTEXN, PAHs);
- Dissolved heavy metals;
- Phenols;
- Broad suite of additional parameters including cyanide, PCBs, solvents (VOCs and SVOCs), PFAS and OC pesticides; and

Water levels for groundwater will also be recorded each monitoring round.

Surface water and groundwater is proposed to be monitored and background concentrations would be established for all analytes as part of the Site sampling. If a significant change in concentration for any of the indicator parameters is detected over two consecutive monitoring periods, then the affected monitoring points would be resampled and assessed and EPA notified (if required) in accordance with procedures to be outlined within the OEMP. Following this a groundwater assessment plan may be developed.

The need to develop a Contamination Remediation Plan would flow from the Assessment Program. Should monitoring indicate contamination, the extent of such contamination would be delineated and contingency remediation measures would be put in place. The Assessment Program would define the nature and general extent of contamination. The Contamination Remediation Plan would utilise the information obtained in the Assessment Program with the steps on developing the Contamination Remediation Plan to be outlined further within the OEMP.

11.4 Water Demand

11.4.1 Existing Environment

The Site is currently supplied by potable water and does not harvest rainwater for reuse, nor does it have any onsite water storage or utilise groundwater.

11.4.2 Impact Assessment

A water balance assessment for the Site post-development is presented in Appendix H.

The water demand of the Project is estimated as follows:

Table 35: Water Usage

Source	Usage	kL/yr
Staff Amenities		
Potable Water	Toilet	63
	Urinal	5
	Wash Basins and Kitchen Sinks	49
	Dishwasher	9
	Shower	0.12
	Total Water Usage for Staff Amenities	**126.12**
Process Applications and Dust Suppression		
Rainwater Re-use and Potable Water	Dust Suppression and Moisture Conditioning (all activities)	1,000
	Wheel Wash and Truck Wash	2,500
	Bioremediation	500
	Total Process Applications and Dust Suppression	**4,000**

Based on the site water balance, the Project would reduce the potable water usage at the Site through the following methods:

- Rainwater that falls on the roof of the Waste Treatment Facility would be collected in rainwater tank(s) and used for process applications, dust suppression and wheel and truck wash;

- Rainwater would be available for top up of the fire fighting water storage tanks above minimum level per regulations. Potable water would provide the minimum level requirement; and

Staff amenities would continue to be supplied by potable water.

The proposed rainwater storage tank would be constructed under the garden area, with details to be provided in the detailed design stage. Golder (Appendix H) estimates the required capacity of the underground rainwater storage tank at approximately 50 kL by analysing potential rainfall runoff and required rainwater volume for a long period of time (more than 40 years).

The selected 50 kL tank capacity would allow an average of approximately 2,000 kL/annum rainwater supply. This equals to 50% of the annually required volume for process applications and dust suppression. The deficit will then be supplied from potable water available at the Site.

11.5 Soils

11.5.1 Existing Environment

A summary of the geology at the Site is presented in Chapter 4.

The Site is located on the soil landscape type ‘Disturbed Terrain’, as shown on the Penrith 1:100 000 soil landscape sheet (refer to Appendix G). The Disturbed Terrain soil landscape is where the original soil has been removed, greatly disturbed or buried due to industrial activities. Residual soils at the Site are of the *kurosol* soil order. The dominant soils are typically “hard acidic red soils” with “hard neutral acidic yellow mottled soils”. This soil landscape indicates the potential for fill material at the Site (as confirmed by the Site investigation summarised in Appendix G).

Acid sulfate soils (ASS) information, as presented in Appendix G, was sourced from CSIRO and from DPIE. The potential for ASS at the Site was described as “extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.”

11.5.2 Impact Assessment

Construction

Ground excavations for the Project include footings with all expected to be less than 1.5 m in depth.

The CEMP would contain a range of appropriate erosion and sediment control measures that would be required for implementation, monitoring and maintenance during construction of the Project. Erosion and sedimentation during construction would be managed in general accordance with Section 11.2.2.

As the Site is located in an area that has an extremely low probability of occurrence of ASS (with 1-5% chance of occurrence in small localised areas), the Project is unlikely to result in potential ASS impacts. However, in the event of discovery of ASS, procedures would be developed and documented within the CEMP to mitigate potential impacts on the environment.

In the event of discovery of potential soil contamination, procedures would developed to mitigate potential impacts on the environment. These procedures would be documented in the CEMP.

Operation

Potential for contamination of soils would be through the same potential mechanisms as surface water and groundwater and are summarised in Section 11.2.2 and managed through the same design, management and mitigation measures.

11.6 Site Contamination Assessment

11.6.1 Existing Environment

The existing environment of the Project is described in Chapter 4 including the topography, surface water, geology and hydrogeology. In addition, a Phase 1 Site investigation was undertaken for the Project and is presented in Appendix G. A summary is provided following:

- Based on a review of historical site titles, historical aerial photographs and online records, presented in Appendix G, the Site appeared to be part of a larger undeveloped rural property until the 1970s. Aerial imagery shows an increase in the clearing of bushland in the surrounding area clearing during the 1970s, with the Site cleared of trees by 1978, and further developed by 2000. It is noted that there is no evidence of market gardens or sheds on the aerial imagery after the Site was cleared in the 1970s and prior to the industrial development (2000).
- Land titles indicate that the Site was owned by Girotto Properties Pty Ltd in 1997. Girotto Properties currently manufacture pre-fabricated wooden buildings at off-site locations. Between 2005 and 2014 the Site was leased to companies which manufactured pre-cast concrete slabs for the construction industry. Between 2014 and 2020 the Site was leased to an audio & video equipment manufacturing and warehousing company.
- The surrounding area is primarily heavy industrial and commercial. Two concrete plants and an asphalt plant are located within 150m of the Site. Activities at concrete and bitumen batching plants typically involve the storage of fuels (including USTs) and the use of fuels (such as diesel). These sites were shown to be within close proximity and up-gradient from the Site and therefore there is a potential for contamination from these surrounding activities.
- Sydney Galvanising Pty (steel galvanising) and Jalco Australia Pty (manufacturing/packaging) are subject to current EPLs and located approximately 200 m south east and 200 m east, respectively, of the Site. These companies are licenced for the scheduled activities of chemical production and waste generation. These sites are down-gradient of site.
- The Site has not been notified under Section 60 of the *CLM Act*. The nearest premises to the Site, which has been notified to the EPA as being potentially contaminated is Endeavour Energy Park, located 920 m approximately north west. This site does not require regulation under the *CLM Act* and is considered to have a low potential to impact upon the Site.
- The nearest site subject to a penalty notice under the *POEO Act* is located 1.4km from the Site. These premises present a low risk to the Site due to distance.
- A search of SafeWork NSW records did not identify the storage of hazardous chemicals at the Site.
- The result of the search, limited to premises within 500 m of the Site, does not identify sites assessed as part of the Defence EPA PFAS Program, the Defence PFAS Investigation Program and Airservices Australia National PFAS Management Program.
- The Site is located in an area of the Disturbed Terrain landscape, indicating the presence of fill material, which was confirmed by fieldwork.

A Section 10.7 (2) & (5) planning certificate for the Site, issued on 4 June 2020, included the following information relating to potential contamination issues:

- Council is not aware that the land is not affected by any matter listed in Clause 59(2) of the *Contaminated Land Management Act 1997*, i.e. the land is not significantly contaminated, is not the

subject to a management order, is not the subject of an approved voluntary management proposal, is not subject to an ongoing maintenance order and Council has not received a Site Audit Statement for the Site;

- The land is affected by the Council's Development Control Plan (DCP) for Potentially Contaminated Land, which would require Preliminary Contamination Investigation and would potentially require subsequent Detailed Contamination Investigation and Remedial Action Plan. This DCP applies to all land in the Liverpool local government area;
- The Site is not located in a conservation area and does not contain an item of environmental heritage; and
- The Site is located within a flood planning area and is subject to flood planning controls.

11.6.2 Impact Assessment

Based on the Phase 1 assessment (Appendix G), the identified historical and current land use activities that may have contributed to potential contamination sources at the Site include:

- Historical agricultural site use, including the potential use of herbicides and pesticides;
- Potential storage of chemicals on site from historical and current industrial operations on the Site;
- Historical operational activities as a precast concrete facility, with the potential use of hydrocarbon based oils on the Site; and
- Historical off-site commercial/industrial activities.

Based on the Site history, contaminants of potential concern (CoPC) typically associated with uncontrolled filling, agricultural and industrial activities include:

- Asbestos;
- Hydrocarbons (analysed as total recoverable hydrocarbons (TRH) and benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN);
- Metals (arsenic, cadmium, copper, chromium, lead, mercury, nickel and zinc);
- Polycyclic aromatic hydrocarbons (PAH);
- Organochlorine pesticides (OCP);
- Organophosphate pesticides (OPP);
- Polychlorinated biphenyls (PCB);
- Phenols (analysed as speciated phenols); and
- Volatile organic compounds (VOC).

As identified in Section 11.5.1, ASS are not considered to be a CoPC as the Site is located in an area classified as having an extremely low probability for the occurrence of ASS. Per- and polyfluoroalkyl substances (PFAS) are not considered to be a CoPC based on the result of the desktop searches and the Site inspection interview as completed in Appendix G.

Based on the findings of the Phase 1 Site Investigation, a limited intrusive Phase 2 investigation was performed to provide information on soil and groundwater quality at the Site (refer to Appendix G). This included mobilising a drill rig to drill six boreholes across the Site to depths of up to 3.0 m below ground level

(mbgl) (or prior refusal) and collect soil samples for analysis. Three of the boreholes were converted to groundwater monitoring wells with a maximum depth of 8 mbgl.

Adopted assessment criteria are presented in Appendix G.

Soil sampling undertaken from six sampling locations (BH01-BH03 and MW01-MW03) indicated that all soil results were below the laboratory LOR and/or below adopted site criteria. Although fill at the Site contained limited amounts of anthropogenic material, the fill met the adopted site criteria and was not considered to pose an aesthetic issue for ongoing commercial/industrial land use.

Groundwater flow direction was inferred to be towards the east and northeast, and laboratory results for groundwater samples were generally below the respective laboratory LORs and adopted site criteria. One exceedance of the adopted nickel criterion was reported at MW02. However, as exceedance was reported at an upgradient location, it is considered that the exceedance is not related to site activities and that further assessment of the nickel exceedance is not warranted.

The results of the Phase 1 Site Investigation and the Limited Phase 2 Site Investigation (Appendix G), indicate the overall potential for widespread significant soil or groundwater contamination at the Site as low. Based on the investigations performed, the Site currently presents a low risk to on-site and off-site receptors and is considered to be suitable for ongoing commercial/industrial land use.

11.7 Project Mitigation and Management Measures

11.7.1 Construction

The following management and mitigation measures are proposed to minimise potential impact of the proposed development on the water related aspects of the adjacent receiving environment:

- A CEMP outlining environmental procedures during construction would be prepared prior to construction and implemented during construction.
- Implement the proposed stormwater erosion and sediment control strategy and plan during the construction phase (see Section 11.2.2).

11.7.2 Operation

The following design, management and mitigation measures are proposed to minimise potential operational impacts of the Project on the water related aspects of the adjacent receiving environment:

- The minimum finished floor level for the Project be 23.6 mAHD, which is identified by Council as the maximum 1% AEP flood level at the site of 23.1 mAHD plus 0.5 m freeboard allowance.
- An OEMP outlining environmental procedures during operation would be prepared and implemented.
- Procedures to minimise the risk of a pollution incident and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident will be included in the PIRMP.
- Implement the proposed post-development stormwater management strategy and the plan (see Section 11.2.2)
- Recycle and reuse the rainwater for the Site's activities to reduce the portable water use (see Section 11.2.2)
- Allow no process water mix into the Site's stormwater system through:
  - All storage and handling of materials undertaken inside the Waste Treatment Facility.

- Bunding the doorways of the Waste Treatment Facility with drive over bunding.
- Undertake wheel and truck wash down inside the build prior to exit with water collected and directed to the waste water treatment plant.
- Leachate collection within the Waste Treatment Facility.
- Overflow protection and alarms on all tanks.
- The application of treatment chemicals will be via enclosed automated dosing systems minimising the potential for spill.
- Bunding of the Waste water Treatment Plant in accordance with Australian Standards.
- Storage of chemicals and dangerous goods in accordance with Australian Standards.
- No facility wash down inside the Waste Treatment Facility.
- Material Safety data sheets maintained on site for all chemicals.
- Bunds water-proof tested on a regular basis and procedures documented in the OEMP.
- All bunding inspected on a regular basis and repair implement as needed and procedures documented in the OEMP.
- Appropriately lined Pre Treatment Pits and regularly inspected and epoxy liner and concrete repair implement as needed and procedures documented in the OEMP.
- Spill kits located adjacent to potentially contaminating activities and procedures would be in place for Spill Management and documented in the OEMP.

- Installation of water efficient fixtures to conform to Council requirements.
- No use of groundwater.

Quarterly monitoring of the groundwater and surface water quality.

12.0 HAZARDS AND RISK

The Secretary's Environmental Assessment Requirements:	Environmental Impact Statement
Key Issues - Hazards and Risk including: ■ *a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011).*	Chapter 12: Hazards and Risk Appendix I: SEPP 33 Preliminary Risk Screening

A preliminary risk screening has been completed for the Project and is provided in Appendix I. This report identifies that based upon the the class, quantity, transportation and location of dangerous goods associated with the development, the Project does not trigger the requirement for a PHA and is not considered to be potentially hazardous in accordance with "Applying SEPP 33: Hazardous and Offensive Development Application Guidelines" (DoP, 2011).

12.1 Existing Environment

The Site seeks to accept and treat waste to a level suitable for reuse, disposal to landfill or disposal to sewer. The Project would process up to 270,000 tonnes of waste per annum primarily generated from industrial processes and contaminated sites and include treatment of:

- Contaminated Soils;
- Contaminated sludges; and
- Liquid Wastes.

As shown in Figure 1, the Project would include:

- Bulk Soil Waste Treatment and Bioremediation Facility;
- Water Treatment Facility;
- Storage and consolidation of materials; and
- Ancillary infrastructure and activities including weighbridge and access.

The Site is located within a well utilised, existing industrial area zoned as IN3 Heavy Industrial within Liverpool LGA. Located approximately 470 m from the nearest residential receiver, the Site does not have existing terrestrial biodiversity, heritage or bushfire constraints.

A detailed site description is provided in Chapter 4 of the EIS.

12.2 Potential Impacts

12.2.1 Risk Screening

The Preliminary Risk Screening Report (Appendix I) has been prepared to address relevant regulatory and SEARs requirements in relation to the key issue of risk and hazards in accordance with SEPP 33.

As defined by the National Transport Commission (2018), "Australian Code for Transportation of Dangerous Goods by Road and Rail" Edition 7.6, 2018, the classes of dangerous goods identified to be stored at the Site for the Project are within Table 36.

Table 36: Dangerous Goods to be stored at the Site

Material	Classification	Max Estimated Quantity	Threshold for PHA (based on Applying SEPP 33).	Notes
Hydrogen Peroxide	DG Class 5.1 (PG I)	2 tonnes	5 tonnes	Reagent
Potassium Permanganate	DG Class 5.1 (PG II)	1 tonnes		Reagent
Sodium Persulphate	DG Class 5.1 (PG III)	1 tonnes		Reagent
Hydrochloric Acid (37% w/w)	DG Class 8 (PG II)	5 tonnes	25 tonnes (packing group II)	Reagent
Caustic soda (30% w/w)	DG Class 8 (PG II)	5 tonnes		Reagent

All dangerous goods would be bunded and stored within the Waste Treatment Facility building. The materials identified within Table 36 will be delivered to the Waste Treatment Facility within intermediate bulk containers (IBCs), which will be placed into dedicated bunds inside the building. The application of these treatment chemicals will be via enclosed automated dosing systems. The storage areas of the Waste Treatment Facility will allow for suitable separation distance between material and DG classes and are to be designed in accordance with:

- Oxidising substances (Class 5.1), AS 4326-2008, *The storage and handling of oxidizing agents*.
- Corrosive substances (Class 8), AS 3780-2008, *The storage and handling of corrosive substances*.

In accordance with "Applying SEPP 33" (Department of Planning, 2011) the threshold quantities identified in Table 36 do not trigger the requirement for a PHA for both DG Class 5.1 and Class 8, nor would the traffic movements transporting these materials be above identified annual or weekly cumulative vehicle movements that trigger the requirement for a PHA. Therefore, based upon the class, quantity, location and transport of dangerous goods associated with the development, the Project does not trigger the requirement for a PHA and would not be considered as potentially hazardous under SEPP 33.

12.3 Mitigation and Management Measures

As the Project does not trigger the requirement for a PHA and is not considered to be potentially hazardous, no further assessment of hazards within this report is required. However, as identified throughout the EIS and further technical reports, the Project will implement a number of mitigation and management measures to reduce the risk of potentially hazardous scenarios of the Project. Refer to respective chapters of the EIS for details on these mitigation and management measures. In addition to these, the storage and handling of dangerous goods would be as per relevant Australian Standards such as:

- Corrosive substances (Class 8) to be stored and handled by following the methods outlined in AS 3780-2008, The storage and handling of corrosive substances.

Storage and handling of Class 5.1 oxidizing substances to be undertaken in accordance with AS 4326-2008, The storage and handling of oxidizing agents.

13.0 HUMAN HEALTH

The Secretary's Environmental Assessment Requirements:	
Key Issues – Human Health – an assessment of the potential impacts to employees at the facility and any off-site impacts including: ■ *details of measures to manage the exposure of employees to contaminants including the use of appropriate personal protective equipment and engineering controls at the facility to reduce exposure* ■ *details of health monitoring of employees and awareness and education measures* ■ *preventative measures for community exposure from the off-site transfer of contaminants* ■ *details of work health and safety system consistent with the requirements of the Work Health and Safety Regulation 2011*.	Chapter 13: Human Health Appendix J: Health Impact Assessment

A Health Impact Assessment has been undertaken for the Project and is provided in Appendix J to assess the potential for community exposure to contaminants from the Site. This assessment includes identifying the Project's potential contaminants, pathways to exposure, assessment of risks and management measures.

13.1 Existing Environment

The Site is located within land zoned IN3 Heavy Industrial within an existing industrial area that has good transport networks to the wider region. No heritage areas or items are within the vicinity of the Site and the nearest sensitive receiver is the Mercure Hotel located approximately 350 m to the north west, Potters House Church is approximately 350 m north of the Site and residential sensitive receivers approximately 500 metres from the Site. All of these receivers are separated from the Site by a number of existing industrial buildings and activities in addition to the arterial road of Hoxton Park Road for the closest residential receivers to the North in addition to the M7 to the South. The nearest schools and childcare are located over 1 kilometre from the Site.

13.2 Approach and Methodology

As detailed in Appendix J, the assessment of potential contaminant impacts from the construction and operation of the Project has been conducted as follows:

- Identify potential contaminant sources at the Site, the consequence and pathways of exposure of these contaminants to the community;
- Assessment of complete pathways from source to receptor; and
- Where potential contaminant migration off-site and community exposure has been assessed as presenting a potential risk to health (as measured by likelihood and consequence) proposed management and mitigation measures are identified for adoption during operation of the Project.

13.3 Potential Impacts

Contaminants

As identified in Chapter 2, source material would be primarily generated from industrial processes and contaminated sites with treatment technologies for soils and sludges will generally focus on the destruction of contaminants (eg: chemical oxidation, bioremediation) or the separation of contaminants (eg: screening, chemical separation) from recoverable or more inert constituents. Waste streams include organics,

halogenated hydrocarbons metals and metalloids and other specific waste streams, further details or which are provided in Chapter 7.

Chemical contaminants in soils and sludges of the Project may include:

- Heavy hydrocarbon impacted soils or soils containing Non Aqueous Phase Liquids (NAPLs)
- Monoaromatics (eg: benzene, toluene, ethyl benzene and xylenes - BTEX) and total petroleum hydrocarbons (TPHs) where soils that have suffered fuel spills;
- Polycyclic aromatic hydrocarbons (PAHs)
- Phenols
- Chlorinated hydrocarbons
- Pesticides and herbicides
- Acid sulphate soils (iron sulfides or sulfidic materials)
- Bonded Asbestos Containing Materials (ACM)

The wastewater treatment plant will have the capability of treating waste waters contaminated with:

- Hydrocarbons (including TPH and PAH)
- Organics
- Suspended Solids
- Acidity and Alkalinity
- Heavy Metals
- Nutrient
- PFAS

Reagents to be stored on the Site include:

- Cement
- Activated carbon
- crushed limestone or “aglime”.
- Cementious stabilising agents (OPC, GGBFS, Pulverised Fuel Ash, Cement Kiln Dust);
- Secondary stabilising agents (Lime, Sodium Silicate, Carbons, Organophilic clays, natural pozzolans, bentonites)
- hydrogen peroxide
- potassium permanganate
- sodium persulphate
- ferrous sulphate
- bacteria

- urea
- super phosphate
- biodegradable surfactant
- polymer
- aluminium sulphate
- hydrochloric acid
- caustic soda
- magnesium oxide

Other potential health hazards and potential impacts to human health include dust, noise and odour generated during construction and operation of the Project.

Consequence of Exposure

The health consequence of exposure to the various contaminants and hazards listed above depends upon:

- dose of contaminant or level of hazard;
- toxicity or health effect of the contaminant or hazard;
- duration of exposure; and
- sensitivity of the population exposed.

These factors are variable depending upon the individual characteristics of the contaminants or hazard, the exposure pathway.

In general, consequence is considered as a possible heath effect due to exposure without management controls at the facility, and if a sensitive community (i.e. young children) were exposed to contaminants. For the Project, the dose or level of exposure is assessed as relatively low, as exposures would be via environmental media such as mobilised in stormwater, rather than a direct exposure to the waste or reagent. The health effects of the chemicals and compounds of interest are wide ranging. For example, they may include skin irritation for acute (short-term) exposures or carcinogenic effects for chronic (long-term) exposures. In the absence of quantitative estimate of exposure dose, with the exception of air quality (refer to Chapter 10), and given the broad range of potential health effects from the contaminants identified, the consequence of exposure has been conservatively assessed as ‘high’ for all contaminants and hazards for the purposes of the qualitative assessment of risk.

Pathways to Exposure

The exposure routes where people in the community (off-site) may be exposed to contamination derived from the Site include:

- Generation of contaminated dust during operations such as bulk soils delivery, pre-treatment of sediments, separation of bulk soil and storage
- Generation of contaminated dusts during construction
- Impacts to air quality due to treatment processes

- Odour that extends beyond the site boundary during site operations from waste handling and treatment processes
- Noise that extends beyond the site boundary during site operations from exhaust fans and truck movements
- Mobilisation of contaminants from waste into stormwater system or local waterways from stormwater runoff or adverse flooding of the facility
- Loss of containment of leachate or reagents stored on site into stormwater system or local waterways or infiltration to groundwater

13.4 Assessment of Risk

As identified within the Screening level Health Impact Assessment (Appendix J), taking into consideration the contaminants and the potential consequence and pathways of transfer of contaminants offsite, the risk of community exposure to contaminants from the Project is assessed as low. This assessment of risk is based upon the assessments of technical studies conducted as part of the EIS for the Project (studies include air quality and odour, noise, surface water (including stormwater, process water flood potential) and groundwater), and where available the results of these technical studies have been compared to health-based standards or guidelines.

The offsite health assessment assumes the adoption of mitigation and management measures proposed in the respective technical studies of the EIS and as such, the mitigation and management measures of these technical studies will be adopted for construction and operation of the Project. Refer to Chapter 16 Compilation of Environmental Management and Mitigation Measures for a consolidated list of all measures. Also refer to the Health Impact Assessment (Appendix J), which summarises the relevant technical studies and mitigation and management measures that relate to the health impact assessment.

In addition to the design and infrastructure control measures identified in the relevant technical studies, the potential migration of contaminants off-site will also be managed under a Construction Environmental Management Plan (CEMP) and Operations Environmental Management Plan (OEMP) outlining environmental procedures and control measure to be implemented during construction and operational phases respectively.

Procedures to minimise the risk of a pollution incident and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident will be included in the PIRMP for the Project.

13.5 Employee Work Health and Safety

As outlined in Chapter 2 and described above, the Waste Treatment Facility will be handling soils and liquid waste and using reagents as part of the waste treatment processes of the Project. Accordingly, worker exposure may arise from the waste materials and/or the reagents used in the treatment processes.

Occupational exposure has been considered in the Waste Treatment Facility design process with the hierarchy of controls considered consistent with the requirements of the *Work Health and Safety Regulation 2011.* The following sections outline the control measures, health monitoring and the health & safety system proposed to be applied for the Project.

13.5.1 Measures to manage the exposure of employees to contaminants

Various contaminants may be present and are inherent in the waste streams to be accepted at the Site, so the approach to management is to control the pathways of exposure. Based upon the design and proposed operation of the Waste Treatment Facility, of the three primary exposure pathways (inhalation, ingestion, dermal contact), inhalation is considered the most likely potential exposure pathway of the Project. Soil

presents potential exposure from particulates, fibres and vapours and liquid waste presents potential exposure from vapours and aerosols.

The following summarises the key measures to manage potential exposures to workers:

- The office areas are physically separate from the waste handling area with separate HVAC system and the air intake is located away from the exhaust stacks to prevent contamination;
- A site-specific HVAC system has been designed for the Waste Treatment Facility based on the proposed layout and divides the facility into 3 compartments to improve the collection and mitigation of fugitive emissions in individual work areas.
- The building compartments will be maintained at negative pressure (> -5Pascals (Pa)) to prevent movement of contaminants between areas of the Waste Treatment Facility.
- The emissions within the waste handling areas will be collected by overhead vents and routed from their point of origin to emission control devices and then to three strobic fans serving as exhaust stacks to external air. Emission control equipment includes the following equipment in order of exhaust flow:
  - Common inlet plenum serving Compartments 1 and 2;
  - PM filter box;
  - VOC and odour filter box;
  - Common outlet plenum; and
  - Three (3) strobic exhaust fans operating in parallel.
- Three-sided fabric curtains will be installed in relevant working areas to reduce the escape of fugitive dust and vapours during material handling and processing and to improve the collection efficiency of contaminated air by the HVAC system.
- The Reterra unit used to treat bulk soils and sludge in Compartment 3 is identified as a key potential source of fugitive dust. Therefore emissions from Compartment 3 will be routed directly to a dedicated filter cartridge based dust collector (Camfil Model GSX48; the dust collector has a manufacturer-stated PM removal efficiency of 99.99% for particles down to 0.5 micrometers in geometric diameter).
- The contribution of PM and VOC emissions from diesel combustion by mobile plant and trucks have been considered in the HVAC system design.
- Fresh air is provided to each of the compartments by motorised dampers fitted behind weatherproof louvers located along the western wall of Compartment 1 & 2 and the northern wall of Compartment 3.
- Safe minimum ventilation rates will be determined through design development and reviewed during detailed design and commissioning.

The following management controls will be implemented to minimise inhalation risks to workers:

- No idling of mobile plant and haul trucks when not in use.
- Material loading/unloading and handling procedures designed to reduce fugitive dust emissions. E.g. high-speed roller-doors will be required to be closed during material loading/unloading and handling.
- Operation of emissions control devices according to their manufacturer's specifications.

- Regular preventive maintenance of emissions control devices according to their manufacturer's specifications.
- Truck and wheel wash at the Waste Treatment Facility exit to reduce soil track-out and generation of fugitive dust outside the building envelope.
- Fogging suppression systems where deemed necessary in Compartment 3 Treatment Bays and will be installed in other areas if necessary. This will be assessed during detailed design.
- Compartment 3 on/off switches to focus air collection in the active 1 of 5 Treatment Bays being used for stockpiling treated waste discharged from the Reterra unit. This will allow a single stockpile bay hood to collect, and send for treatment, approximately 95% of the total air flow through the space.
- Quarterly personal and ambient monitoring to verify that engineering controls outlined above are effective in controlling worker exposure to contaminants.

Management of dermal contact and ingestion will be managed through standard personal hygiene practices, personal protective equipment, clothes change policy, but most importantly the use of containerised plant, mobile plant and enclosed systems to minimise physical contact with the waste streams.

As noted in Chapter 2: Project Description, quantities of reagents will be stored and used at the Waste Treatment Facility, in accordance with a Dangerous Goods (DG) Licence (as identified within Chapter 12: Hazards and Risk, these quantities do not trigger the requirement for a Preliminary Hazard Analysis under SEPP33). The Project proposes to store three Class 5.1 DGs: hydrogen peroxide; potassium permanganate; and sodium persulphate, and two Class 8 DGs: hydrochloric acid; and caustic soda. These will be delivered to the Waste Treatment Facility within intermediate bulk containers (IBCs), which will be placed into dedicated bunds inside the building. The application of these treatment chemicals will be via enclosed automated dosing systems minimising the potential for worker exposure to the reagents.

The storage areas of the Waste Treatment Facility are to be designed in accordance with:

- Oxidising substances (Class 5.1), AS 4326-2008, *The storage and handling of oxidizing agents*.
- Corrosive substances (Class 8), AS 3780-2008, *The storage and handling of corrosive substances*.

Emergency showers and eyewash stations will be installed and maintained in accordance with AS4775, *Emergency eyewash and shower equipment.*

13.5.2 Health monitoring of employees and awareness and education measures

A structured pre-employment medical and risk-based health surveillance program will be implemented for the Project. The pre-employment medical will include a health questionnaire, audiometric assessment, spirometry (lung function), biological monitoring (bloods for As, Cd, Pb) and chest Xray. The results will be reviewed by an occupational physician and assessment made of fitness for work. The health surveillance program will be annual or 2 yearly medical based on the outcomes of the pre-employment medical.

During the first year of operation a competent third-party occupational hygiene consultant will design and conducted quarterly personal and ambient monitoring for silica dust, dust and vapours. The program will evaluate the effectiveness of the control measures and level of worker exposure. The program will be reviewed at the end of the first year and adjusted based on the outcome of the results and site observations.

The Proponent has an established onboarding and induction system that includes health and safety training elements that all employees must complete. The induction includes information on the Proponent's hazard identification and risk assessment processes, procedures, incident reporting, emergency response and

training. Training is provided by a mixture of classroom, on the job and self-paced online learning via the Proponent's learning management system (LMS) Rapid Induct.

A site-specific induction will be developed as part of the OEMP that details the operation of the Project, including the key hazards within each area of the Waste Treatment Facility and critical controls. This induction will cover the following key health related elements:

- Dangerous Goods (storage, handing and use);
- Contaminants (e.g. asbestos, PAHs, dust, vapours);
- Use and maintenance of personal protective equipment;
- Personal hygiene and clothes change policy;
- Incidents and first response;
- Personal decontamination (safety showers);
- Spill Response;
- Site Critical Controls; and
- Workplace Monitoring.

This will be supplemented by signage within the Waste Treatment Facility that identifies process areas, key hazards and protective equipment requirements.

Task based training will be provided by an experienced operator via a peer to peer training and competency assessment process including written knowledge assessment and task observation. Personnel will not be permitted to work unsupervised until deemed competent.

Ongoing education and awareness will be provided through the health & safety committee, personal monitoring result discussions, safety alerts and toolbox meetings as to be further identified within the OEMP for the Project.

13.5.3 Work health and safety system

The Proponent has an established comprehensive corporate health and safety management system that has been developed to align with AS/NZS ISO 45001:2018 *Occupational Health and Safety Management Systems – Requirements with Guidance for use.* The Proponent's Safety Management System (SMS) is a five-tier management system as described in Table 37 and Figure 25.

Table 37: Management System Structure

Five Tier Safety Management System		
Tier 1	SMS Manual	Provides an overview of the workings of the Safety Management System (SMS).
Tier 2	Policy Statements	Attachments, outlining top management commitment to and application of the Safety Management System (SMS) objectives.
Tier 3	Work Practice Documents	Attachments such as Safe Work Method Statements and Safe Work Procedures outlining work practices that are critical to the Safety Management System (SMS) meeting its objectives.

Five Tier Safety Management System		
Tier 4	Working Documents	Attachments such as checklists, templates, compliance statements and registers used to plan and or record Safety Management System (SMS) directed activity.
Tier 5	Information Documents	Attachments providing relevant information to the implementation of the Safety Management System (SMS).

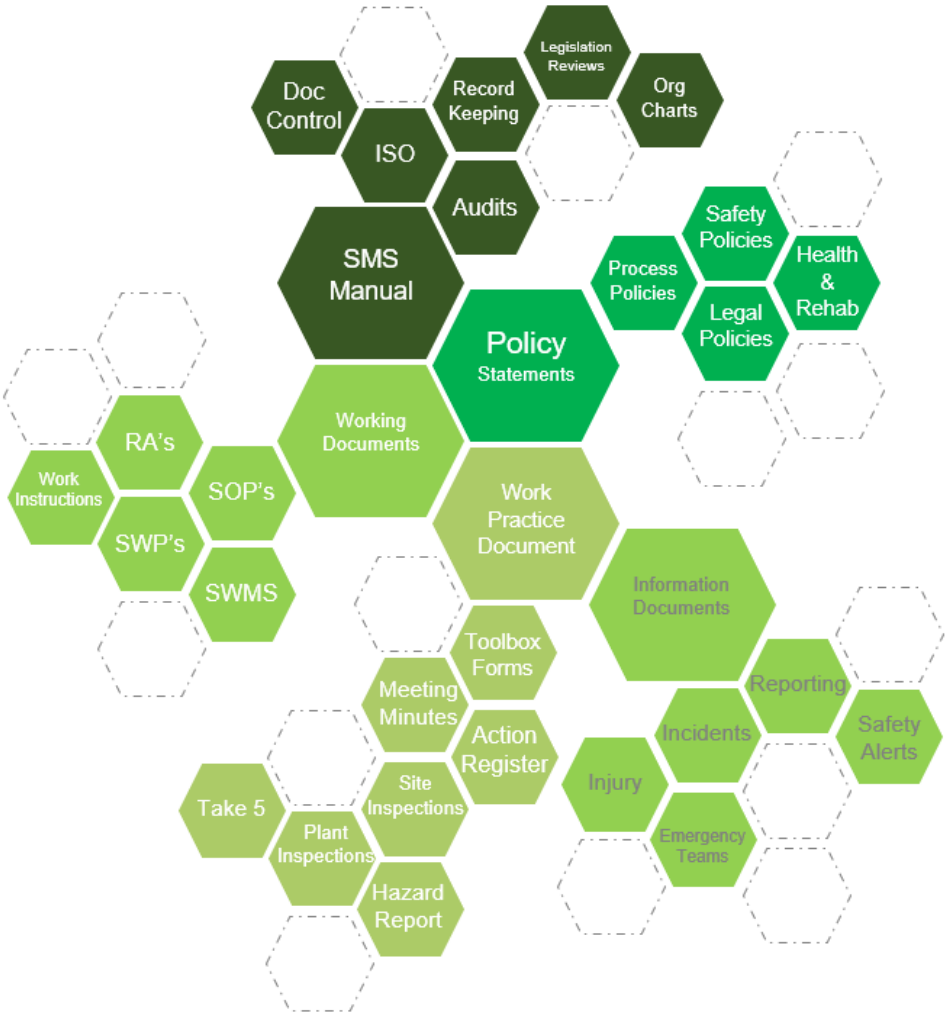


Figure 25: The Proponent's SMS System Design

The Proponent has established, implemented, and maintains the following Policies and Standards:

- Work, Health and Safety Policy;
- Fit for Work – Condition of Entry (Rapid Induction);
- 2-Workplace Bullying & Harassment Standard; and
- Return to Work Standard.

The policy statements outline Executive/Senior Management's commitment to and application of the Safety Management System (SMS) objectives and shall be communicated to all managers and workers of the Project, inclusive of contractors, visitors, and other interested parties where applicable.

The Proponent has through years of operational experience, identified and obtained organisational knowledge for the critical hazards, potential impacts and associated risks of their operations. The risk associated with these critical hazards are controlled through the establishment, implementation and review of Work Health Safety (WHS) Critical Controls, Safe Work Method Statements and Safe Work Procedures, with reviews of WHS Critical Controls focusing on opportunities for improvement.

Some of the key elements of the Proponent's SMS are listed below:

- SAF-M-01 (SMS) Management System Manual
- SAF-M-02 Chain of Responsibly Manual
- SAF-M-03 Crisis Management Plan
- SAF-M-04 Crisis Management Handbook
- SAF-M-07 Fire Response Plan Template
- SAF-M-09 Emergency Response Control Plan
- SAF-PS-01 Work Health and Safety Policy
- SAF-PS-02 Silica Health Surveillance Assessment Requirements
- SAF-PS-03 Fatigue Management Standard
- SAF-PS-04 Hazardous and Dangerous Goods Standard
- SAF-PS-05 Isolation and Tagging of Plant Standard
- SAF-PS-06 Manual Handling Standard
- SAF-PS-07 Life Saving Rules
- SAF-PS-08 Personal Protective Equipment Standard
- SAF-PS-09 Risk Assessment Standard
- SAF-WPD-01 Lock and Out of Service Procedure
- SAF-WPD-02 Electrical Test Equipment Procedure
- SAF-WPD-03 Hot Works Management
- SAF-WPD-06 Portable Electrical Tools
- SAF-WPD-07 Removal and Restoration of Power Procedure
- SAF-WPD-08 Conveyors Management Procedure
- SAF-WPD-09 Introduction of Changes to Plant Structures
- SAF-WPD-10 Lifting Cranes and Hoists Procedure
- SAF-WPD-11 Live Testing Procedure

- SAF-WPD-12 Maintenance Management
- SAF-WPD-13 Mobile and Transportable Plant
- SAF-WPD-14 Pressurised Fluid Systems Procedure
- SAF-WPD-17 Loading and Tipping Procedure
- SAF-WPD-18 Manual Handling Procedure
- SAF-WPD-20 SHE Incident Reporting Procedure
- SAF-WPD-24 Respiratory Protection Program

There are forms, templates and registers developed to implement the measures detailed within the manuals and procedures. SAF-M-01 *(SMS) Management System Manual* provides a comprehensive overview of how WHS is managed by the Proponent.

13.6 Human Health Mitigation Measures

Project mitigation and management measures for human health are a combination of measures previously identified and committed to when addressing specific technical issues in the EIS and measures specific to Work Health and Safety. For example, in addressing potential community exposure in the Health Impact Assessment (Appendix J), design and mitigation and management measures identified for specific technical issues have been utilised within this report to assess risk. This includes air quality, odour, noise, surface water, erosion and sediment, flood and groundwater during construction and operation (Chapters 10, 9 and 11 respectively). Design of the Project has also included consideration of work, health and safety to mitigate and manage the pathways to exposure, such as the location of the waste handling system, HVAC system and air intake and material unloading and handling procedures.

In addition to the above mitigation and management measures identified elsewhere in the EIS, Project specific human health mitigation and management measures as identified within Section 13.5.1 include the following, which will be part of the Proponent's SMS and/or as part of CEMP and OEMP for the Project:

- Quarterly personal and ambient monitoring to verify that engineering controls outlined above are effective in controlling worker exposure to contaminants;
- Management of dermal contact and ingestion will be managed through standard personal hygiene practices, personal protective equipment, clothes change policy and the use of containerised plant, mobile plant and enclosed systems to minimise physical contact with the waste streams.
- Emergency showers and eyewash stations will be installed and maintained in accordance with AS4775, *Emergency eyewash and shower equipment.*
- A structured pre-employment medical and risk-based health surveillance program will be implemented for the Project.
- During the first year of operation a competent, independent occupational hygienist will design and conducted quarterly personal and ambient monitoring for silica dust, dust and vapours. The program will be reviewed at the end of the first year and adjusted based on the outcome of the results and site observations.
- All employees will be required to complete the Proponent's onboarding and induction system that includes health and safety training. The induction will be site-specific and developed as part of the OEMP

for the Project, including the key hazards within each area of the Waste Treatment Facility and critical controls. This induction will include the following key health related elements:

- Dangerous Goods (storage, handing and use);
- Contaminants (e.g. asbestos, PAHs, dust, vapours);
- Use and maintenance of personal protective equipment;
- Personal hygiene and clothes change policy;
- Incidents and first response;
- Personal decontamination (safety showers);
- Spill Response;
- Site Critical Controls; and
- Workplace Monitoring.

- Signage will be provided within the Waste Treatment Facility that identifies process areas, key hazards and protective equipment requirements.
- Task based training will be provided and include a competency assessment process with personnel not being permitted to work unsupervised until deemed competent.
- Ongoing education and awareness will be provided through the health & safety committee, personal monitoring result discussions, safety alerts and toolbox meetings.
- The Proponent will maintain their health and safety management system developed to align with AS/NZS ISO 45001:2018 *Occupational Health and Safety Management Systems – Requirements with Guidance for use.*

14.0 FIRE AND INCIDENT MANAGEMENT

The Secretary's Environmental Assessment Requirements:	
Key Issues - Fire and Incident Management – including: ■ *identification of the aggregate quantities of combustible waste products to be stockpiled at any one time* ■ *technical information on the environmental protection equipment to be installed on the premises such as air, water and noise controls, spill clean-up equipment and fire (including location of fire hydrants and water flow rates at the hydrant) management and containment measures* ■ *details regarding the fire hydrant system and its minimum water supply capabilities appropriate to the site's largest stockpile fire load* ■ *details of size and volume of stockpiles and their management and separation to minimise fire spread and facilitate emergency vehicle access* ■ *consideration of consistency with NSW Fire & Rescue Fire Safety Guideline – Fire Safety in Waste Facilities (February 2020) and* ■ *detailed information relating to the proposed structures addressing relevant levels of compliance with Volume One of the National Construction Code (NCC).*	Chapter 14: Fire and Incident Management Appendix K: Appendix K Fire and Incident Management Assessment

A Fire and Incident Management Report has been completed for the Project by Core Engineering Group and is provided in Appendix K.

14.1 Existing Environment

The Site is located within an existing industrial area that is bound by Whyalla Place to the West, which also serves as the principal pedestrian and vehicular access point to the Site. The Project seeks to provide for activities on the Site 24 hours a day, seven days a week.

The existing building on the Site is comprised of approximately 4,100m^2 warehouse and 910 m^2 office floorspace. The Project will expand the existing warehouse with partial demolition of the external wall facing Whyalla Place. This will create two new compartments, Compartment 2 and Compartment 3. The spring height of the existing warehouse is 11.7 m whilst the ridge height is 12.2 m. The roof height of the proposed extension by the Project is approximately 7.5 m. The existing building is constructed of pre-cast concrete panels, supported internally by steel columns. Concept drawings for the proposed extensions to the warehouse are presented in Appendix N.

The Waste Treatment Facility is located within the Fire and Rescue New South Wales (FRNSW) jurisdictional turnout area. The closest fire station to the Site with permanent staff is located in Busby, approximately 3.6 km from the Site.

14.2 Potential Impacts and Assessment

The Project seeks to increase the existing building on the Site to a total floor area of approximately 6,400 m^2 (i.e. an extension of 1,300 m^2). The existing office space shall not be extended.

The Waste Treatment Facility building is proposed to contain equipment for treatment processes as well as stockpiles of separated waste material. Compartment 2 is proposed to contain the waste water treatment processes and Compartment 3 the soil treatment processes. The remaining processes and storage shall be in Compartment 1.

14.2.1 Project Stockpile Quantities

The maximum quantity of materials that will be stockpiled/stored at any one time is presented in Appendix C.

As discussed in Chapter 2: Project Description, the stockpiled material will be located in dedicated bays (refer to Figure 1).

The size and volume of stockpiles shall comply with the requirements of FRNSW's Guideline – Fire Safety in Waste Facilities. This includes stockpile heights not proposed to exceed 4 m and all stockpiles not separated by a masonry wall being separated by at least 6 m. Refer Appendix K for further detail.

14.2.2 Fire Protective Measures

Activities within the office area are not anticipated to pose a greater risk of fire than that in other office buildings. In the warehouse area where the waste treatment processes will occur, it is expected that there will be significant operation of mobile plant necessary for the processes, including excavators, front end loaders, dump trucks, and mixer. Refer to Appendix K for discussion of potential ignition and fuel sources.

No hazards to adjoining buildings have been identified. Due to the open space and multiple egress opportunities, internal fire exposures are also expected to be minimal as occupants in the area of fire origin are likely to immediately become aware of fire and are likely to commence evacuation.

Fire water from hydrants, sprinklers, and drenchers shall be retained through a combination of internal bunding, both from dedicated storage areas and the general warehouse floorplate. The proposed leachate collection system shall serve as the secondary containment measure for firewater and direct the collected waste to the onsite wastewater treatment system and storage tanks.

Indicative locations of fire hydrants to satisfy fire brigade operations and provide coverage at the Site are identified in Figure 26. The fire hydrant system shall be capable of simultaneously providing 30 L/s of water. This is estimated to be suitable for an internal fire up to 43 MW in size, which is not anticipated to be exceeded by the Project. Refer to Appendix K for further details.

The hydrant, sprinkler, fire detection and alarm systems and smoke hazard management are designed to be consistent with "NSW Fire & Rescue Fire Safety Guideline – Fire Safety in Waste Facilities (February 2020)" with fire water run-off containment provided through a combination of onsite bunding and onsite leachate collection system, which are discussed further in Chapter 11 and Appendix H. Also refer to Appendix K for details of the fire hydrant system including minimum water supply capabilities.

Figure 26 illustrates the site plan with fire services for the Project. This includes the existing Main Fire Indicator Panel located in the office of the Ground Floor, whilst the new sprinkler booster assembly shall be located along the truck entryway to the building adjacent the proposed sprinkler valve room. A new hydrant booster assembly shall be provided to the Site as part of the Project.

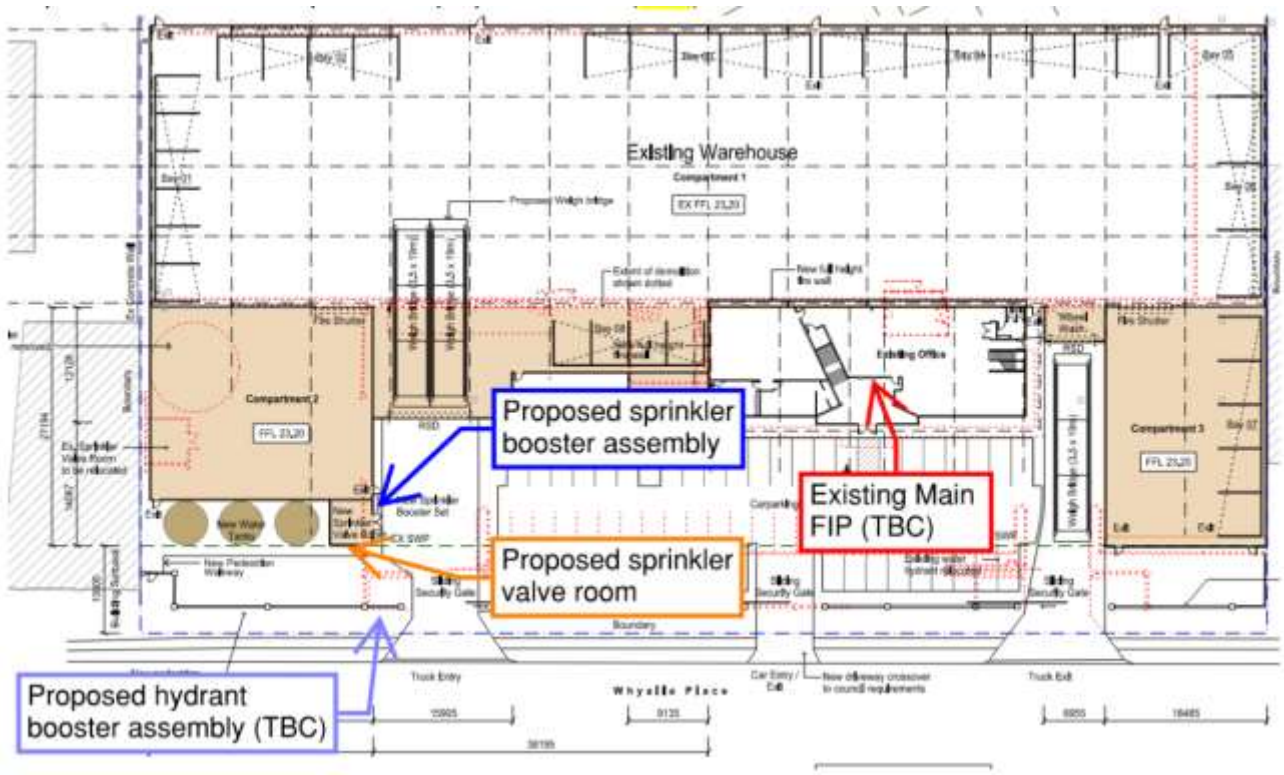


Figure 26: Proposed fire services at the Site (as adopted from Figure 5-1 Appendix K)

14.2.3 Consistency with FRNSW Guideline – Fire Safety in Waste Facilities

The Project will be consistent with FRNSW Guidelines, although it is noted that FRNSW's guideline does not apply to liquid waste treatment and/or hazardous chemicals or special waste treatment. Nonetheless, consideration of the FRNSW guideline has been undertaken as non-hazardous chemicals and materials also have the potential to be handled by the Project. Specific requirements of the FRNSW guideline that the Project will meet include:

- Access for firefighters and emergency vehicles;
- Building design;
- Sprinkler and Fire Hydrant System design (including appropriate water pressure);
- Fire detection and alarm system;
- Smoke Hazard Management;
- Fire Water Run-Off Containment; and
- Stockpile location and size.

Refer to Appendix K for further details in addition to section 14.3, which identifies the key design and application of fire safety measures that ensure the Project is consistent with FRNSW guideline requirements.

14.2.4 National Construction Code

The Project has been assessed against the levels of compliance of Volume One of the National Construction Code (NCC) and the building shall comply with the Performance Requirements of the NCC through a combination of Deemed to Satisfy (DtS) provisions and Performance Solutions. The following Performance Solutions are as follows:

- C2.2 – Oversized Fire Compartment 1; *The size of any fire compartment must not exceed that in Table C2.2 which for a Class 7b or 8 part is no greater than 5,000 m^2 in area and 30,000 m^3 in volume for a Type A building.*

Although less than 5,000 m^2 in floor area, the volume of Fire Compartment 1 is approximately 54,000 m^3 in lieu of 30,000 m^3. As such, the proposed Performance Solution shall rely on the provision of sprinklers throughout the building to control the potential growth and development of fire. Furthermore, there will be a restriction on storage to prevent any combustible storage above 4 m AFFL, noting that a maximum stockpile height of 4 m shall be implemented as per FRNSW's Guideline – Fire Safety in Waste Facilities.

In order to maintain fire compartments, internal fire compartmentation is required. Between Fire Compartment 1 and 2, and 1 and 3, a fire wall achieving minimum 240/240/240 FRL is requirement to be achieved in both directions.

- C3.3 – External exposure of fire compartments: *The distance between parts of external walls and any openings within them in different fire compartments must not be less than that in Table C3.3 unless those parts of each wall have an FRL not less than 60/60/60.*

The external wall the main fire compartment does not achieve 60/60/60 FRL at the wheel wash and weight bridge entry. However, the proposed Performance Solution is the external wall of the office and Fire Compartment 3 achieving minimum 120/120/120 FRL.

Internal structural steelwork may require treatment to achieve 240/--/-- FRL where within 3 m of the side allotment boundaries.

- C3.5 – Fire shutter in firewall; *An opening in a firewall protected by a fire shutter must achieve the integrity required by the firewall except that the insulation may be 30.*

The fire shutters used between Fire Compartment 1 and 3, and Compartment 1 and 2 achieve only --/240/-- in lieu of --/240/30 FRL. However, the proposed Performance Solution shall rely on the provision of drenchers on both sides of the fire shutter to attenuate heat and prevent fire spread.

- D1.4, D1.5 – Extended travel distances: *Alternative means of egress must not be located more than 60 m apart.*

Extended travel distances occur within the building of up to 65 m between alternative exits in lieu of 60 m. However, the proposed Performance Solution shall rely on the large internal volume of the warehouse providing a sufficient smoke reservoir to enable occupant evacuation.

- E1.10, E2.3 – Special hazard facility. *Suitable additional provision must be made if special problems of fighting fire could arise and additional smoke hazard management measures may be necessary due to the special characteristics and function or use of the building, as well as the type or quantity of materials to be stored.*

To address this point, the following measures are proposed to be provided over the minimum DtS Provisions to mitigate the potential for risk arising from the special hazard facility:

- 30 L/s of concurrent flow for the waste facility
- rationalised smoke exhaust system.

Refer to Appendix K for further details in relation to addressing the NCC.

14.3 Management and Mitigation Measures

The Project has utilised the Fire and Incident Management Report to provide input to the design and application of fire safety measures of the Project. All aspects of the Fire Safety Strategy as identified within Appendix K will be adopted and proposed fire safety measures will meet the relevant Performance Requirements of the NCC. Refer to Appendix K for further detail on the application of fire safety measures in design to address NCC requirements.

While mitigation and management measures identified in the Fire and Incident Management Assessment (Appendix K) overlap with measures identified in further key issues chapters of the EIS, in addition to design considerations, the following mitigation and management measures specific to fire and incident management would be implemented for the Project:

- The Project will be consistent with FRNSW Guidelines including:
  - Access for firefighters and emergency vehicles;
  - Building design;
  - Sprinkler and Fire Hydrant System design (including appropriate water pressure);
  - Fire detection and alarm system;
  - Smoke Hazard Management;
  - Fire Water Run-Off Containment; and
  - Stockpile location and size.
- An Emergency Management Plan should be developed and all staff receive training in emergency procedures including the Emergency Control Procedures and delegated fire wardens, the evacuation routes, and the procedures to follow in a fire event. This would be documented within an Emergency Management Plan (EMP) as part of the OEMP for the Project and be in accordance with Work Health and Safety (WHS) legislation and AS3745:2010.
- Portable fire extinguishers are to be provided throughout the building in accordance with the NCC and selected, located, and distributed in accordance with AS2444:2001.
- A dedicated smoke exhaust system in Fire Compartment 1 and 3 will be implemented to comply with the requirements of Clause 3 of Specification E2.2b of the NCC with a minimum operating duration of at least 2 hours. The exact smoke exhaust rates shall be determined through detailed design.
- Primary firewater containment shall be from process bunding pits and main floorplate within the Waste Treatment Facility building. This shall be achieved by bunding at all building entry points with drive-over bunding at the truck entry and exits. This primary containment must be capable of containing:
  - Hydrants operating at 30 L/s for a minimum of 4 hours; and
  - High hazard sprinklers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer; and
  - Drenchers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer.
- Stockpiles shall not exceed 4 m in height. Fire separating masonry walls shall extend at least 1 m above the top of a stockpile and at least 2 m beyond the outermost stockpile edge. The boundary limits of stockpiles must be permanently marked. It is noted for fire purposes these requirements shall only apply

to each 1000 m3 stockpile. Internal partitioning proposed for operational purposes need not comply with these requirements.

- Each accessible side of a stockpile shall have at least 6 m of clear unobstructed space to reduce the risk of fire spread.
- Internal stockpiles shall not impede access to exits and a minimum 1 m path must be maintained past stockpiles to ensure requires paths of travel are accessible.
- The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851 or other relevant testing regime.
- An Operations Plan shall be developed by the site operator as per Section 8.6 of FRNSWs Guideline – Fire Safety in Waste Facilities.

An Emergency Services Information Package must be provided per Section 9.4.2 of FRNSWs Guidelines – Fire Safety in Waste Facilities.

15.0 OTHER ISSUES

Other issues identified as having a low to very low level of risk (refer to Chapter 6) and/or not identified as a key issue within the SEARs SSD-9346594, or have subsequently received a waiver or exemption from further assessment for the Project are addressed within this chapter of the EIS.

The Secretary's Environmental Assessment Requirements:	
Key Issues - Biodiversity – including: ■ *an assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.*	Chapter 15: Other Issues (Biodiversity) Appendix L: Material and correspondence Biodiversity Waiver
Key Issues - Cultural Heritage and Aboriginal Cultural Heritage – including: ■ *identify and describe the Aboriginal cultural heritage values that exist across the development and document in an Aboriginal Cultural Heritage Assessment Report (ACHAR) which may include the need for a surface survey and test excavations* ■ *consultation with Aboriginal people must be undertaken and documented in ACHAR* ■ *a description of the impacts on Aboriginal cultural heritage values.*	Chapter 15: Other Issues (Heritage) Appendix M: Material and correspondence Heritage assessment exemption

15.1 Biodiversity

Given the Site is located within an existing industrial area and is not identified in the *Liverpool Local Environment Plan 2008* (LEP) as containing biodiversity values, a Flora and Fauna assessment was undertaken by Biosis Pty Ltd to confirm biodiversity values at the Site. The Flora and Fauna assessment is provided in Appendix L.

The assessment included addressing requirements of a BDAR waiver application for the Project under Section 7.9(2) of the *Biodiversity Conservation Act 2016* as follows:

"Any such application is to be accompanied by a biodiversity development assessment report unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on the biodiversity values".

On the 11 November 2020 delegates of the Secretary of DPIE and the Secretary within Environment, Energy and Science (EES) confirmed that the Project is not likely to have any significant impact on biodiversity values and that a BDAR is not required as part of the EIS. The correspondence confirming this finding is provided in Appendix L of the EIS.

15.2 Heritage

The Site is within an existing industrial area and consists of buildings and infrastructure, concrete drives and parking and landscaped area. The Project will result in negligible ground disturbance/excavation and as such, an exemption from preparing an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Project was requested prior to the SEAR SSD-9346594 being issued.

The exemption for an ACHAR for the Project was supported by an Aboriginal Cultural Heritage Due Diligence Assessment (Appendix M), which included the findings of a review of relevant databases, site walkover and field investigation. This assessment identified the Project will have negligible impact upon known heritage values.

The Aboriginal Cultural Heritage Due Diligence Assessment was provided to Heritage NSW with follow up consultation and clarification of this report. The outcome of this assessment and consultation was that on the 27 November 2020 Heritage NSW identified that an ACHAR is not required for assessment of the Project. The correspondence confirming this outcome is provided in Appendix M.

15.3 Visual

The Site is predominantly screened by other buildings in adjacent properties to the north, east and south. The proximity of adjacent buildings is shown in Figure 2 (refer to Chapter 4 of the EIS). As identified within Chapter 2 of the EIS, the Site has a 10 m setback to the primary frontage of Whyalla Place in accordance with “Liverpool City Council DCP 2008”. This setback area includes onsite vegetation. This vegetation will be increased to the north as a result of the Project and will continue to partially screen the Site, in addition to secure fencing continuing to be utilised at the Site.

Refer to Section Appendix N for Preliminary Design Drawings of the Site and Figure 27 showing the existing views of the Site from Whyalla Place.

Figure 27: Existing views of the Site from Whyalla Place

Visual impacts during construction would be short term and temporary including construction machinery for roadworks and earthworks; cranes for installation of processing equipment and stockpiling of materials used during construction.

Potential visual impacts associated with the Project are anticipated to be infrastructure and buildings such as the warehouse extension on the Site and the exit weighbridge with the waste treatment activities of the Project undertaken within the built form on the Site.

Whyalla Place is assessed as having low visual sensitivity and low visual effect due to being located within an existing heavy industrial area with typical traffic volumes (refer to Chapter 8 of the EIS) and similar industrial land uses. Together with existing vegetation screening and fencing that fronts Whyalla Street, the potential visual impacts along the western boundary at the Site will be low. Potential views from the industrial buildings on Jedda road and Ash road overlooking the Site are predominantly screened by adjacent industrial buildings along the northern, eastern and southern boundaries. As such, the Project is considered to have negligible visual impacts upon the surrounding area. This is supported by the SEARs, which do not identify visual impacts of the Project as a key issue.

15.4 Bushfire

The Site is located within an existing industrial estate that is not identified as being bushfire prone land. As identified within Chapter 14 of the EIS related to fire management, the Project will be undertaken predominantly within existing buildings with appropriate fire management procedures and will have negligible impacts associated with bushfire.

15.5 Socio Economic

The Site is located within an existing industrial estate that is zoned as IN3 Heavy Industrial and permits the Project. This land use is also consistent with all relevant policy and legislation for the Site with the Project employing up to 48 people during operation. As such, it is considered the Project is suitably located and corresponding local economies including potential market and property values will not diminish and may increase market and property values associated with land use demand and potential agglomeration of further services.

16.0 COMPILATION OF ENVIRONMENTAL MANAGEMENT MEASURES

The Secretary's Environmental Assessment requirements:	Environmental Impact Statement
General Requirements– including: ■ *a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS*.	Chapter 16 Compilation of Environmental Management Measures

16.1 Overview

Environmental management and monitoring measures to avoid, mitigate, manage and/or offset the potential impacts of the Project have been identified throughout the EIS with a consolidated summary provided in Table 38 of this chapter of the EIS. These recommendations will be adopted within an Environmental Management System (refer to Section 16.2) during construction and operation of the Project and may be revised with further data collection and/or design development.

Table 38: Proposed Environmental Management and monitoring measures of the Project

Issue	Summary of mitigation, management and commitments
General	The Proponent would implement the Project in accordance with the EIS and conditions of approval as provided by the determining authority. A Construction Environmental Management Plan would be prepared and implemented to guide environmental management and monitoring activities during construction. The CEMP would include specific environmental issue sub-plans to reduce potential impacts and in accordance with relevant commitments identified within the EIS and within this table. A monitoring program shall be conducted throughout the construction period to monitor compliance with the CEMP. An Operational Environmental Management Plan (OEMP) would be prepared and implemented to guide environmental management and monitoring activities during operation as identified within the EIS in addition to further specific issues identified within this Table. Also refer to Section 16.2 of the EIS. A Pollution Incident Response Management Plan (PIRMP) would be prepared outlining procedures to minimise the risk of a pollution incident on a premises and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident.
Stakeholder Consultation	A Stakeholder Engagement Strategy has been implemented throughout the delivery of the EIS and would be further developed as part of environmental management documentation for construction and operation of the Project. This would provide procedures for communication with stakeholders, procedures for the dissemination of information to the community, identification of the communication channels available for the community and stakeholders to provide feedback on the Project, a protocol for the Project to respond to any enquires or feedback and for managing site visits and property inspections.

Issue	Summary of mitigation, management and commitments
Materials and Waste	Waste impacts from the Project will be mitigated using both engineering controls and management controls. The engineering controls are part of the design of the Project whilst management controls to be adopted during operation and construction of the Project are as follows. ■ Prepare and maintain a Waste Management Plan to be included in the CEMP ■ Prepare and maintain a Waste Management Plan to be included in the OEMP ■ Waste Management to be included in the Site Induction ■ Signs erected around the Site providing direction for waste management and adopting the waste management hierarchy. ■ Waste storage area to be located within the building and as per Liverpool City Council DCP Requirements. ■ Planning to efficiently manage delivery and storage of materials, reduce waste and spoilage. ■ Agreements with suppliers for 'take back' to be arranged where possible. ■ General Waste and recycling skips made available and emptied regularly so as not to overflow. ■ All wastes to be managed and properly disposed of in accordance with an appropriately licensed contractor. ■ The mitigation measures proposed to be in place to prevent waste spreading from the Site include: ■ Loads covered until inside the building and before leaving the building. ■ A truck and wheel wash would 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 within the building. ■ The mitigation measures proposed to address waste treatment at the Site include: ■ Prepare and maintain a OEMP for the Site Operations. ■ Prepare and maintain a PIRMP for the Site Operations. ■ Prepare and maintain a SAQP for Soils Treatment ■ Prepare and maintain a SAQP for Waste Water

Issue	Summary of mitigation, management and commitments
	■ The OEMP, PIRMP and SAQP will be reviewed annually or more frequently on an as need basis should there be a change in risk, legislative requirements, or non-compliance. ■ Prepare and maintain key procedures for Waste Treatment Operations including: ▪ weighbridge waste acceptance procedure; ▪ non – confirming waste procedure; ▪ waste screening procedure; ▪ batch control procedure; ▪ material handling procedures – unloading and loading; ▪ maintenance procedures; ▪ verify licenses and permits for the handling, transportation, and disposal of waste; ▪ inspection, monitoring, review and auditing; and ▪ site induction and training.
Traffic and Transport	A construction and operation traffic management plan would be prepared prior to construction and operation of the Project, which would be included within the CEMP and OEMP. These plans would include standard traffic management measures including hours of access, vehicle circulation and parking.
Noise and Vibration	While the Project is below relevant noise criteria requirements, the following standard measures are proposed to further mitigate noise associated with the Project. ■ Proposed plant and equipment will be selected and maintained to achieve the sound power levels outlined in the Noise Assessment (Appendix E). ■ Plant and equipment will be maintained and not generate excessive noise. ■ Broadband reversing alarms will be utilised in place of traditional beeper reversing alarms. ■ Machinery will be operated in a manner that reduces maximum noise level events. ■ Site awareness training / environmental inductions will include a section on noise mitigation techniques / measures to be implemented when on the Site. ■ While vibration from construction and operation are not predicted to cause offsite impacts. If necessary, monitoring can be undertaken during the construction phase to assess potential impacts.

Issue	Summary of mitigation, management and commitments
	■ A Noise Management Plan will be completed for construction and operation and include: ▪ Identification of the surrounding noise-sensitive land use. ▪ A description of working hours and practices to minimise noise. ▪ A list of high noise equipment or processes along with mitigation/minimising measures where possible. ▪ A complaint register and written process for handling complaints. ▪ Contractor involvement. A description of noise generating activities will be discussed in the morning toolbox with workers to be involved in reducing the effects where possible.
Air Quality, Odour and Greenhouse Gases	Particulate matter, VOC and odour emissions from the Project will be mitigated using both engineering controls and management controls. The engineering controls are part of the design of the Project whilst management controls to be adopted during operation and construction of the Project are as follows: ■ No idling of mobile plant and haul trucks when not in use; ■ Material loading/unloading and handling procedures designed to reduce fugitive dust emissions; e.g., high-speed roller-doors required to be closed during material loading/unloading and handling; ■ Operation of emissions control devices according to their manufacturer's specifications; ■ Regular preventive maintenance of emissions control devices according to their manufacturer's specifications; ■ Truck and wheel wash station at the Waste Treatment Facility exit to reduce soil track-out and generation of fugitive dust outside the building envelope; ■ The need for fogging suppression systems where deemed necessary will be determined during detailed design. This potentially includes Compartment 3 Treatment Bays and other areas as needed; ■ Compartment 3 on/off switches to focus air collection in the active 1 of 5 Treatment Bays being used for stockpiling treated waste discharged from the Reterra unit. These HVAC controls system will allow a single stockpile bay hood to collect, and send for treatment, approximately 95% of the total air flow through the space; ■ Fabric side curtains front drop curtain to 4 m on the Bioremediation Bays are designed to contain minor contaminant generation from handling and turning process; and ■ Overall the building compartments will be maintained at > -5 Pascals (Pa) while in 'daily treatment mode'. When in 'after hours mode', the building can

Issue	Summary of mitigation, management and commitments
	exhaust air system from each compartment shall be reduced and associated outside air inlet dampers closed off to maintain > -5 Pa whilst saving energy. To validate the model predictions from the AQIA (Appendix F), it is proposed that post-commissioning stack testing be undertaken during operation. This post-commissioning testing will include: ■ Stack testing upstream and downstream of the air emissions control system to validate the manufacturer-stated PM and VOC removal efficiencies; ■ Stack testing for size resolved PM (PM2.5 and PM10) and a metals in PM assay while treating bulk soils or wastes containing heavy metals; and ■ Stack testing for VOCs or odour while treating wastes containing hydrocarbons, industrial solvents and/or odorous wastes. If post-commissioning stack testing indicates the model predictions are conservative, then stack testing will be repeated on a once-in-three years basis. If post-commissioning testing indicates that there is the potential for air impacts, then fenceline or local air quality monitoring is proposed to be undertaken. This air quality monitoring could include, but may not be limited to, the following: ■ Size resolved fenceline particulate matter monitoring (PM2.5 or PM10); ■ Dust deposition gauge monitoring; ■ Hydrocarbon or VOC monitoring; or ■ Total reduced sulfur compound or odour monitoring. Project mitigation measures during construction will include development of and adherence to a Construction Air Quality Management Plan (CAQMP) to be included in the CEMP. The CAQMP will include: ■ Identification of the surrounding land use and local stakeholders; ■ Displaying the name and contact details of person(s) responsible for air quality at the site boundary; ■ Recording all air quality complaints, identify causes and incorporating measures to reduce emissions in a timely manner; ■ Include all site staff at the morning toolbox in a discussion for planning the work day around dust suppression and minimisation; ■ Structure high dust generating activities (earthworks and demolition) around days with low windspeed and stop or pause these activities during dry and windy conditions; ■ Loads shall be covered on trucks transporting material to and from the construction site; ■ Spray the site regularly to supress dust and use a water-assisted sweeper to reduce the potential for material to be tracked off site; and ■ Cover and weight stockpiles to prevent wind erosion when they are inactive.

Issue	Summary of mitigation, management and commitments
	Energy consumption associated with the generation of GHG for the Project can be limited by the following mitigation measures, which are consistent with mitigation measures identified for Air Quality: ■ Use of fuel-efficient machinery, equipment and plant; ■ Consider energy rating when purchasing new machinery and equipment; ■ Implementing a maintenance plan for fuel and electricity powered machinery and equipment; ■ Training to and implementing energy conservation practices by all staff; and ■ Consider use of solar energy where feasible.
Soils and Water	To minimise potential impact of the Project on the water related aspects of the adjacent receiving environment: ■ The CEMP would include environmental procedures related to implementing a stormwater erosion and sediment control strategy and plan to be prepared prior to construction and implemented during construction. During operation the following design, management and mitigation measures are proposed to minimise potential operational impacts of the Project on the water related aspects of the adjacent receiving environment: ■ The minimum finished floor level for the Project be 23.6 mAHD, which is identified by Council as the maximum 1% AEP flood level at the site of 23.1 mAHD plus 0.5 m freeboard allowance. The OEMP would outline environmental procedures during operation including: ■ Implementation of the proposed post-development stormwater management strategy and plan; ■ Recycle and reuse the rainwater for the Site's activities to reduce the portable water use; ■ Allow no process water mix into the Site's stormwater system through: ▪ All storage and handling of materials undertaken inside the Waste Treatment Facility. ▪ Bunding the doorways of the Waste Treatment Facility with drive over bunding. ▪ Undertake wheel and truck wash down inside the build prior to exit with water collected and directed to the waste water treatment plant. ▪ Leachate collection within the Waste Treatment Facility. ▪ Overflow protection on all tanks. ▪ Bunding of the Waste water Treatment Plant in accordance with Australian Standards.

Issue	Summary of mitigation, management and commitments
	▪ Storage of chemicals and dangerous goods in accordance with Australian Standards. ▪ No facility wash down inside the Waste Treatment Facility. ▪ Material Safety data sheets maintained on site for all chemicals. ▪ Bunds water-proof tested on a regular basis and procedures documented in the OEMP. ▪ All bunding inspected on a regular basis and repair implement as needed and procedures documented in the OEMP. ▪ Appropriately lined Pre Treatment Pits and regularly inspected and epoxy liner and concrete repair implement as needed and procedures documented in the OEMP. ▪ Spill kits located adjacent to potentially contaminating activities and procedures would be in place for Spill Management and documented in the OEMP. ■ Installation of water efficient fixtures to conform to Council requirements. ■ No use of groundwater by the Project. ■ Quarterly monitoring of the groundwater and surface water quality. A Pollution Incident Response Management Plan (PIRMP) would outline procedures to minimise the risk of a pollution incident on a premises and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident.
Hazards and Risk	The storage and handling of dangerous goods would be as per the Dangerous Goods licence for the Site and be bunded and stored in accordance with the relevant Australian Standards including: ■ Corrosive substances (Class 8) to be stored and handled by following the methods outlined in AS 3780-2008, The storage and handling of corrosive substances. ■ Storage and handling of Class 5.1 oxidizing substances to be undertaken in accordance with AS 4326-2008, The storage and handling of oxidizing agents.
Human Health	Human health mitigation measures include relevant measures identified by other technical issues in addition to the Project specific human health mitigation and management measures including: ■ Quarterly personal and ambient monitoring to verify that engineering controls outlined above are effective in controlling worker exposure to contaminants; ■ Management of dermal contact and ingestion will be managed through standard personal hygiene practices, personal protective equipment, clothes

Issue	Summary of mitigation, management and commitments
	change policy and the use of containerised plant, mobile plant and enclosed systems to minimise physical contact with the waste streams. ■ Emergency showers and eyewash stations will be installed and maintained in accordance with AS4775, Emergency eyewash and shower equipment. ■ A structured pre-employment medical and risk-based health surveillance program will be implemented for the Project. ■ During the first year of operation a competent, independent occupational hygienist will design and conducted quarterly personal and ambient monitoring for silica dust, dust and vapours. The program will be reviewed at the end of the first year and adjusted based on the outcome of the results and site observations. ■ All employees will be required to complete the Proponent's onboarding and induction system that includes health and safety training. The induction will be site-specific and developed as part of the OEMP for the Project, including the key hazards within each area of the Waste Treatment Facility and critical controls. This induction will include the following key health related elements: ▪ Dangerous Goods (storage, handing and use); ▪ Contaminants (e.g. asbestos, PAHs, dust, vapours); ▪ Use and maintenance of personal protective equipment; ▪ Personal hygiene and clothes change policy; ▪ Incidents and first response; ▪ Personal decontamination (safety showers); ▪ Spill Response; ▪ Site Critical Controls; and ▪ Workplace Monitoring. ■ Signage will be provided within the Waste Treatment Facility that identifies process areas, key hazards and protective equipment requirements. ■ Task based training will be provided and include a competency assessment process with personnel not being permitted to work unsupervised until deemed competent. ■ Ongoing education and awareness will be provided through the health & safety committee, personal monitoring result discussions, safety alerts and toolbox meetings. ■ The Proponent will maintain their health and safety management system developed to align with AS/NZS ISO 45001:2018 Occupational Health and Safety Management Systems – Requirements with Guidance for use.

Issue	Summary of mitigation, management and commitments

Fire and Incident Management	All aspects of the Fire Safety Strategy as identified within Appendix K will be adopted and proposed fire safety measures will meet the relevant Performance Requirements of the NCC. In addition, the following mitigation and management measures specific to fire and incident management will be implemented for the Project.
	
	■ The Project will be consistent with FRNSW Guidelines including:
	  ▪ Access for firefighters and emergency vehicles;
	  ▪ Building design;
	  ▪ Sprinkler and Fire Hydrant System design (including appropriate water pressure);
	  ▪ Fire detection and alarm system;
	  ▪ Smoke Hazard Management;
	  ▪ Fire Water Run-Off Containment; and
	  ▪ Stockpile location and size.
	■ An Emergency Management Plan should be developed and all staff receive training in emergency procedures including the Emergency Control Procedures and delegated fire wardens, the evacuation routes, and the procedures to follow in a fire event. This would be documented within an Emergency Management Plan (EMP) as part of the OEMP for the Project and be in accordance with Work Health and Safety (WHS) legislation and AS3745:2010.
	■ Portable fire extinguishers are to be provided throughout the building in accordance with the NCC and selected, located, and distributed in accordance with AS2444:2001.
	■ A dedicated smoke exhaust system in Fire Compartment 1 and 3 will be implemented to comply with the requirements of Clause 3 of Specification E2.2b of the NCC with a minimum operating duration of at least 2 hours. The exact smoke exhaust rates shall be determined through detailed design.
	■ Primary firewater containment shall be from process bunding pits and main floorplate within the Waste Treatment Facility building. This shall be achieved by bunding at all building entry points with drive-over bunding at the truck entry and exits. This primary containment must be capable of containing:
	  ▪ Hydrants operating at 30 L/s for a minimum of 4 hours; and
	  ▪ High hazard sprinklers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer; and
	  ▪ Drenchers operating for a minimum of 2 hours – flowrate to be advised by fire services engineer.

Issue	Summary of mitigation, management and commitments
	■ Stockpiles shall not exceed 4 m in height. Fire separating masonry walls shall extend at least 1 m above the top of a stockpile and at least 2 m beyond the outermost stockpile edge. The boundary limits of stockpiles must be permanently marked. It is noted for fire purposes these requirements shall only apply to each 1000 m3 stockpile. Internal partitioning proposed for operational purposes need not comply with these requirements. ■ Each accessible side of a stockpile shall have at least 6 m of clear unobstructed space to reduce the risk of fire spread. ■ Internal stockpiles shall not impede access to exits and a minimum 1 m path must be maintained past stockpiles to ensure requires paths of travel are accessible. ■ The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851 or other relevant testing regime. ■ An Operations Plan shall be developed by the site operator as per Section 8.6 of FRNSWs Guideline – Fire Safety in Waste Facilities. ■ An Emergency Services Information Package must be provided per Section 9.4.2 of FRNSWs Guidelines – Fire Safety in Waste Facilities.
Other Issues: Heritage	In the unlikely event that Aboriginal or suspected Aboriginal archaeological material is uncovered during the development, then works in that area are to stop and the area cordoned off. The project manager will contact DPIE or other regulatory body to make an assessment as to whether the material is classed as Aboriginal object/s under the National Parks and Wildlife Act 1974 and advise on the required management and mitigation measures. Works are not to re-commence in the cordoned off area until heritage clearance has been given and/or the required management and mitigation measures have been implemented.

16.2 Environmental Management System

Following determination of the Project, the EIS including the proposed environmental management and monitoring measures provided in Table 38 would guide subsequent phases of the Project including for construction and operation and detailed design. As part of this process an Environmental Management System (EMS) and monitoring program would be adopted. The EMS would include overall environmental management plans for construction and operation including sub plans on the issues identified in Table 38 and contain the following objectives:

- Ensure works are carried out in accordance with the goals and requirements presented in this EIS;
- Ensure works are completed in accordance with relevant environmental statutory requirements and relevant non-statutory policy, as detailed throughout this EIS and in further legislation;
- Ensure works are carried out in such a way as to minimise the likelihood of environmental degradation;
- Ensure clear procedures for management of environmental impacts, including corrective actions;

- Ensure monitoring requirements are identified and performance is recorded and responded to appropriately;
- Ensure all employees engaged in the works comply with the terms and conditions of the EMPs including responsibilities and reporting requirements; and
- Provide for continual improvement of environmental management.

17.0 ECOLOGICALLY SUSTAINABLE DEVELOPMENT, JUSTIFICATION AND CONCLUSION

The Secretary's Environmental Assessment Requirements:	Environmental Impact Statement
Key Issues - Ecologically sustainable development – including: a description of how the development will incorporate the principles of ecologically sustainable development in the design, construction and ongoing operation of the development.	Chapter 17: Ecologically Sustainable Development, Justification and Conclusion

This chapter addresses ecological sustainable development issues. In addressing this issue, this chapter contributes and reiterates the justification of the Project in addition to providing the conclusion to the EIS. As such, it addresses further issues associated with justification not predominantly addressed in Chapter 2, or specifically elsewhere in the EIS.

17.1 Principles of Ecologically Sustainable Development

The Principles of Ecologically Sustainable Development (ESD) have been considered and incorporated into the design, construction and proposed operation of the Project as directly and indirectly addressed throughout the EIS as required by Clause 6 of the *Environmental Planning and Assessment Regulation 2000* and as defined by Clause 6(2) of the *Protection of the Environment Administration Act 1991*. The Principles of ESD are:

- The Precautionary Principle;
- Inter-generational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation, pricing and incentive mechanisms.

Precautionary principle

The Precautionary principle identifies that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii) an assessment of the risk-weighted consequences of various options.

The Project has been assessed with the purpose of reducing the risk of serious and permanent impacts on the environment, including an evaluation of the risk-weighted consequences of options that have guided the design of the Project. As identified throughout the EIS, the assessment of potential environmental impacts of the Project has been conservative and where a level of uncertainty was identified in the data used for the assessments, a conservative worst-case scenario analysis has been undertaken. Despite this, it is identified there would be no threats of serious or irreversible environmental damage during construction and operation with environmental risk ratings after proposed mitigation and management assessed as very low to negligible for all potential environmental issues of the Project.

The Site is proposing to receive waste material requiring an operating licence and performance criteria. The Project will enable the utilisation of proven technologies to treat waste to a level suitable for reuse, disposal to

landfill or disposal to sewer. Mitigation and management measures have been incorporated and described in this EIS where appropriate to reduce the potential for environmental damage. This includes:

- The use of proven operating systems and pollution control structures.
- Appropriate training of personnel.
- Environmental auditing and environmental monitoring.
- The development of contingency plans in the event that an unexpected situation, that may negatively impact upon the environment.

Inter-generational equity

The principle of inter-generational equity identifies that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The Project will enable treating waste to a level suitable for reuse, disposal to landfill or disposal to sewer. In so doing, the Project is providing for potential benefits to the environment associated with reducing the potential impacts of waste to the surrounding area and in so doing, secures an important waste infrastructure need, thereby facilitating future developments within Liverpool LGA, the Western Sydney Area and the wider Sydney metropolitan area.

The Project would secure waste treatment requirements and have a working life that would extend to future generations, providing benefits for a number of generations without relying on future generations to deal with potential waste treatment and disposal issues. Should the Project not proceed, the principle of intergenerational equity may be compromised, as future generations could inherit a higher cost for disposal and processing of waste in addition to the increased likelihood of illegal dumping. Through the Project, the Site would address the demands for private and public development of industries now and into the future and further enable reuse and resource recovery targets to be achieved.

In addition, the Project would provide for the development of management and mitigation of issues on site as to be identified and addressed through the CEMP and OEMP. Site management as identified within these management plans would be carried out to ensure appropriate waste treatment methods are being employed wherever possible that facilitate the health, diversity and productivity of the environment are maintained or enhanced for future generations. Refer to Chapter 16 that provides a consolidated table of mitigation and management measures that the Proponent is committed to providing for the Site.

Conservation of biological diversity and ecological integrity

This principle provides that biological diversity and ecological integrity should be fundamentally considered when assessing the impacts of a Project.

The Site has been previously extensively disturbed and is located within an industrial precinct. No threatened flora or fauna listed under the EPBC Act or TSC Act have been recorded within the Site, nor is the Project assess as having any impact upon known heritage values.

As identified within Chapter 17 and Appendix L of the EIS, the Project is identified by regulators including EES and DPIE as not likely to have any significant impact on biodiversity values and as such a BDAR is not required as part of the EIS. Chapter 17 also identifies that Heritage NSW identify that an ACHAR is not required in the assessment of the Project.

The Project is considered to have a negligible potential impact on biological diversity and/or ecological integrity.

Improved valuation, pricing and incentive mechanisms

This principle requires that environmental factors should be included in the valuation of assets and services, such as:

i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

iii) environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

This principle is associated with the cost associated with using or impacting upon an environmental resource being regarded as a cost incurred to protect that resource. To date, there are few widely accepted methods by which monetary values (cost) are attributed to environmental factors in the application of this principle. However, given that the Project will enable treating waste to a level suitable for reuse, disposal to landfill or disposal to sewer and meets the appropriate legislative requirements being consistent with all regulation and policy, it is considered this confirms that the Project is within acceptable parameters of cost to environmental resources and seeks to improve environmental resources through the effective treatment of waste. This includes the costs associated with construction and operation of the Site including mitigation and management measures of the Project as committed to within the EIS and as will be required by subsequent development assessment conditions of consent. Management plans to be completed prior to construction of the Project include addressing potential scenarios that have the potential to result in an environmental incident during the operation of the Project (i.e. emergency response plans, environmental management plan etc).

17.2 Justification

The Project proposes to utilise technologies aimed at treating contaminated soils, sludges and liquid wastes to a level suitable for reuse, disposal to landfill or disposal to sewer. It is considered this treatment would enable an effective management of waste and reduce potential health and environmental impacts of waste of streams generated from industrial processes and contaminated sites within the Greater Western Sydney area. The Project will facilitate more efficient recovery of resources, diversion of waste from landfill for alternative uses and beneficial reuse utilising appropriate treatment technologies. In so doing, the Project will assist in reducing the need to dispose of material to landfill thereby assisting in the achievement of the NSW Government's landfill diversion targets, conserving landfill space, and facilitating a circular economy through returning materials to the economy. With regard to ESD, in adopting a circular economy approach, the Project would increase carbon efficiency through more efficient use of materials, using less energy-intensive materials in production, increasing the lifespan of materials and products and reusing or recycling materials to avoid emissions associated with raw material extraction and production.

The Site is suitably located within an industrial area that permits the land use proposed by the Project and which is in proximity to a number of existing and future construction projects within Western Sydney including the M12, Western Sydney Airport, Western Sydney Aerotropolis area. As such, it is considered the Project will provide a strategic asset and waste treatment service that would play a key role in the delivery of construction and development within Western Sydney and the wider region.

A review of the current market indicates a need for waste treatment and processing facilities to meet state targets and support industry. For example, urban development is one of the highest contributors to contaminated soil generation that is proposed to be accepted and treated by the Project. The products and

services offered by the Project contribute to meeting current and future demand for waste treatment, processing and resource recovery.

The Project has been shown to be consistent with the relevant local and State government planning instruments with no significant environmental impacts having been identified during the preparation of the EIS. The potential impacts identified for the Project are considered to be mitigated through the implementation of the mitigation and management measures committed to by the Proponent as identified in Chapter 16.

Construction of the Project would result in minor, temporary impacts that would generally be confined to the Site. To mitigate and manage potential impacts during construction, a CEMP would be developed during the detailed design phase, incorporating mitigation and management proposed in this EIS. Assuming the CEMP is successfully implemented, no significant environmental impacts during the construction phase are predicted.

The Proponent has a unified, certified and audited Health Safety Environment and Quality Management System that is utilised for their Sites through Australia and would continue to be utilised for the Project. The ongoing implementation of the Proponent's operating procedures and maintenance routines would minimise the potential for incidents occurring during operation and will be applied to the operating conditions for the Project. To support and supplement this system, an OEMP would be developed for the Project and the Site, in accordance with the Proponent's management system and the mitigation measures as outlined in this EIS. With the successful development and implementation of the OEMP for the Project, no significant environmental impacts are predicted during operation. A Pollution Incident Response Management Plan (PIRMP) outlining procedures to minimise the risk of a pollution incident on a premises and notification, action and communication procedures to ensure the incident is dealt with safely, and all relevant people and authorities are notified, and kept informed throughout the incident.

17.3 Conclusion

The Project has been assessed within this EIS in accordance with the State Significant Development process pursuant to Part 4 of the EP&A Act. The potential environmental, social and economic impacts of the Project have been identified and assessed as part of this EIS addressing the SEARs for the Project (SEARs SSD-9346594). The assessment has concluded that no significant environmental impacts have been identified as a result of the Project and that any potential affects can be satisfactorily mitigated and managed through a range of measures that have been identified within this document. The Project is also consistent with the priorities and targets adopted in relevant Government legislation, policies and strategies.

The Project will provide significant benefit in terms of addressing and securing the capacity and capability to treat specific wastes that will be generated in the local, Western Sydney, and Sydney metropolitan area, in addition to enabling efficient, safe and productive use of waste resources. The EIS considers the Project is in the public interest for a variety of issues as detailed herein and is therefore recommended for approval.

18.0 REFERENCES

References are provided below. Also refer to the references identified within the appendices of the EIS for technical studies.

18.1 Statutory Legislation

Biodiversity Conservation Act 2016

Contaminated Lands Management Act 1997

Environmental Protection and Biodiversity Conservation Act 1999 (Cth)

Environmental Planning and Assessment Act 1979

Environmental Planning and Assessment Regulation 2000

National Environment Protection (Ambient Air Quality) Measure 2003 (NSW)

Heritage Act 1977

Liverpool Local Environmental Plan 2008

Privacy Act 1988 (Cth)

Protection of the Environment Administration Act 1991

Protection of the Environment Operations Act 1997

Protection of the Environment Operations (Clean Air) Regulation 2002

Protection of the Environment Operations (Waste) Regulation 2014

Roads Act 1993

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 55 – Remediation of Land

Threatened Species Act 1995

Waste Avoidance and Resource Recovery Act 2001

18.2 Standards

AS 1055.1-1997 “Acoustics – Description and Measurement of Environmental Noise”

AS 1940-2004 “The storage and handling of flammable and combustible liquids”

AS 2890.3-2015 “Bicycle Parking Facilities: Guidelines for Design and Installation”

AS 3780-2008 The storage and handling of corrosive substances.

AS 4326-2008 The storage and handling of oxidizing agents.

AS 4775-2007, Emergency eyewash and shower equipment.

AS/NZS ISO 4801-2001: OH&S management systems

AS/NZS ISO 9001-2015, Quality Management Systems

AS/NZS ISO 14001-2015: Environment Management Systems

AS/NZS ISO 31000-2018: Risk Management

AS/NZS ISO 45001-2018: Occupational Health and Safety Management Systems – Requirements with Guidance for use.

British Standard 9999: Code of practice for fire safety in the design, management and use of buildings, October 2008.

International Organization for Standardization ISO 9613 *Acoustics – Attenuation of Sound during Propagation Outdoors*

18.3 Policies, Guidelines and Plans

Commonwealth Government of Australia (2018) "National Waste Policy 2018: Less Waste, More Resources" (COAG SCBN, 2011).

Commonwealth Government of Australia (2019) "National Waste Policy Action Plan 2019"

Commonwealth Government of Australia (2020) "National Waste Report 2020"

Commonwealth Department of the Environment and Energy (2019) "Hazards Waste in Australia 2019"

CRC for Contamination Assessment and Remediation of the Environment (2018) "National Remediation Framework Technology Guide: Bioremediation"

Greater Sydney Commission (2018) "Greater Sydney Region Plan: A Metropolis of Three Cities"

Greater Sydney Commission (2018) "Our Greater Sydney 2056: Western City District Plan"

NSW Acid Sulfate Soils Management Advisory Committee (1998) "Acid Sulfate Soil Manual", Stone, Ahem, Blunden

NSW Government (2018) "Future Transport Strategy 2056"

NSW Government (2016) "Waste Less, Recycle More" Waste Less, Recycle More (nsw.gov.au)

NSW Department of Planning, Industry and Environment (2021) "Waste and Sustainable Materials Strategy 2041: Stage 1 2021-2027"

NSW Department of Planning, Industry and Environment (2021) "NSW Waste and Sustainable Materials Strategy: A Guide to Future Infrastructure Needs"

NSW Government (2011) "NSW 2021: A Plan to Make NSW No.1"

NSW Department of Planning and Infrastructure (2011) *Multi-Level Risk Assessment guideline*

NSW Government (2019) "Code of Practice: Managing Noise and Preventing Hearing Loss at Work, 2019".

NSW Transport Roads and Maritime Services (2016) "Construction Noise and Vibration Guideline"

NSW Waste Avoidance and Resource Recovery Strategy 2014-2021.

Liverpool Development Control Plan 2008

Liverpool City Council (2020) "Local Strategic Planning Statement: Connected Liverpool 2040"

United Nations (2020) Sustainable Development Goal 12: Responsible Consumption and Production. Sustainable consumption and production – United Nations Sustainable Development

Waste Management

Australia National Remediation Framework (August 2018) “CRC Care Technology Guide: Guideline on performing remediation options assessment.”

Australia National Remediation Framework (2017) CRC CARE Technical Report 39: Risk-based remediation and management guidance for benzo(a)pyrene

Australia National Remediation Framework (2014) CRC CARE Technical Report 32: Development of guidance for contaminants of emerging concern.

Commonwealth Government of Australia (2009) The National Waste Policy: Less Waste More Resources 2009

Crimi & Taylor, (2007) “Experimental Evaluation of Catalyzed Hydrogen Peroxide and Sodium Persulfate for Destruction of BTEX Contaminants” Soil and Sediment Contamination 16(1): 29-45

Dermatas & Meng, (2001) “Leaching of metals from soil contaminated by mining activities Journal of Hazardous Materials” 87(1-3):289-300.

Huang K. C. Zhao Z. Hoag G. E. Dahmani A. Block P. A. (2005) Degradation of volatile organic compounds with thermally activated persulfate oxidation. Chemosphere 61 (4), 551–560).

NSW Environmental Protection Agency (2014), *Waste Classification Guidelines Part 1: Classifying Waste*, November 2014.

NSW EPA “Waste Avoidance and Resource Recovery Strategy 2014-2021”

NSW EPA (2014) Waste Classification Guidelines - Part 2: Immobilisation of Waste

NSW EPA (2018) Standards for Managing Construction Waste in NSW

NSW Government (2017) Asbestos Blueprint: A Guide to the Roles and Responsibilities of Government Agencies in NSW.

R.L. Siegrist, M. Crimi, and T.J. Simpkin (eds.). (2011) In Situ Chemical Oxidation for Groundwater Remediation Springer, New York. SERDP ESTCP Environmental Remediation Technology, Vol. 3, ISBN 978-1-4419-7825-7

TPHCWG (1997). A Risk-based Approach for the Management of Total Petroleum Hydrocarbons in Soil. In *A Technical Overview of the Petroleum Hydrocarbon Risk Assessment Approach of the TPH Criteria Working Group.*: Total Petroleum Hydrocarbon Criteria Working Group

Traffic, Transport and Access

Australian Bureau of Statistics Census data for 2016

Austroads (2014) “Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas”

Austroads (2016) “Guide to Traffic Management – Pt 12: Traffic Impacts of Development”

NSW Roads and Traffic Authority (2002 as updated) “Guide to Traffic Generating Development”

NSW Roads and Maritime Services (2015-2017) “Road Design Guide”

NSW Roads and Maritime Services (2016) “Guide to Road Design Part 2”

NSW Roads and Maritime Services (2016) “Guide to Road Design Part 3, Part 4a”

NSW Roads and Traffic Authority (2013) Integrated Public Transport Service Planning Guidelines: Sydney Metropolitan Area

NSW Transport for NSW (2018) “Future Transport Strategy 2056”

NSW Transport for NSW (2018) “Greater Sydney Services and Infrastructure Plan”

Noise and Vibration

Bureau of Meteorology (2018) Holsworthy (Station No. 95761): meteorological data

NSW DEC (2006) “Assessing Vibration: A Technical Guide”

NSW EPA (2017) “Noise Policy for Industry”

NSW EPA (1999) “Environmental Criteria for Road Traffic Noise”

NSW EPA (2013) Noise Guide for Local Government

NSW DECC (2009) Interim Construction Noise Guideline

NSW EPA (2020) Draft Construction Noise Guideline

Air Quality

Air Quality Division of Michigan’s (USA) Department of Environment, Great Lakes and Energy (2019) https://www.michigan.gov/documents/pfasresponse/Frequently_Asked_Questions_on_Air_Quality_Related_Issues_-_Air_Quality_Workgroup_MPART_663729_7.pdf

NSW Environmental Protection Authority (2016) “Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales” Odour Assessment and Management of Odour from Stationary Sources in NSW”.

NSW Environmental Protection Authority’s ambient air quality monitoring station (AAQMS) located at Liverpool, NSW.

Victoria Environmental Protection Authority Publication 1551 ‘*Guidance notes for using regulatory air pollution model AERMOD in Victoria*’.

Greenhouse Gas

NGER Emissions and Energy Threshold Calculator 2019-20.

NGER (Measurement) Amendment (2019 update) Determination 2019.

National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 as amended (2020).

Soils and Water

Stormwater

NSW DEC (2006) Managing Urban Stormwater: Harvesting and Reuse

NSW Environmental Protection Authority (1996) Managing Urban Stormwater: Strategic Framework. Draft

NSW Environmental Protection Authority (1997) Managing Urban Stormwater: Council Handbook. Draft

NSW Environmental Protection Authority (2006) Managing Urban Stormwater: Treatment Techniques.

NSW Environmental Protection Authority (1998) Managing Urban Stormwater: Source Control. Draft

ARMCANZ/ANZECC (1997) Wastewater National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management

ARMCANZ/ANZECC (2000)National Water Quality Management Strategy: Guidelines for Sewerage Systems - Use of Reclaimed Water

Ball et al (2019) Australian Rainfall and Runoff (ARR) 2019 guidelines

Bewsher (2004) “Cabramatta Creek Floodplain Management Study & Plan prepared by Bewsher Consulting Pty Ltd.

EPHC, NRMMC & AHMC (2006) National Water Quality Management Strategy – Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)

EPHC, NRMMC & AHMC (2006) National Water Quality Management Strategy – Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2)

Liverpool Local Environmental Plan (LEP) 2008 - Design flood levels

Liverpool City Council (2004) On-site stormwater detention: City of Liverpool Draft On-Site Stormwater Detention Policy

Erosion and Sediment

DECC (2008) Managing Urban Stormwater: Soils & Construction Volume 2B Waste Landfills (Department of Environment and Climate Change

Landcom, (2004) Managing Urban Stormwater: Soils & Construction

Groundwater

ARMCANZ/ANZECC (2000) National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia

DECC (2007) Storing and Handling Liquids: Environmental Protection

NSW DLWC (1997) State Groundwater Policy Framework Document

NSW Office of Water (2012) Aquifer Interference Policy

NSW Office of Water (2011) Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources

Contamination

Australian and New Zealand Guidelines (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

National Environment Protection Council (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999

National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)

National Health and Medical Research Council (2011) Australian Drinking Water Guidelines.

National Uniform Drillers Licensing Committee (2020) Minimum Construction Requirements for Water Bores in Australia. 4th edition. 2020.

NSW Department of Environment and Conservation NSW (2007) Guidelines for the Assessment and Management of Groundwater Contamination.

NSW Environment Protection Authority (2020) Consultants reporting on contaminated land. Contaminated Land Guidelines. Published by the NSW EPA, April 2020.

NSW Environment Protection Authority (2017) Guidelines for the NSW Auditor Scheme (3rd Edition).

NSW Environment Protection Authority (1995) Sampling Design Guidelines. September 1995.

Hazards and Risk

Commonwealth of Australia (2014) “The Australian Dangerous Goods Code” Edition 7.3.

Department of Planning and Infrastructure (2011) Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DoP, 2011) through the Department of Planning Department of Planning and Infrastructure (2011) *Hazardous Industry Planning Advisory Paper No. 6 — Hazard Analysis*

WorkCover NSW (2005), *Code of Practice for the Storage and Handling of Dangerous Goods.*

Human Health

EnHealth (2012) “Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards”.

EnHealth (2017) “Health Impact Assessment Guidelines”

NSW Government Code of Practice: “Managing Noise and Perverting Hearing Loss at Work, 2019”.

Fire and Incident Management

Australian Building Codes Board, “Building Code of Australia, Volume One”, CanPrint Communications, Canberra 2019 Amendment 1.

Australian Building Codes Board, “Guide to the NCC 2019 Amendment 1”, CanPrint Communications, Canberra 2019 Amendment 1.

Australian Building Codes Board (2005) “International Fire Engineering Guidelines”, ABCB, Canberra.

Campbell, R., “U.S. Structure Fires in Office Properties”, National Fire Protection Association, Quincy MA, August 2013.

Australasian Fire Authorities Council, (2004” “Fire Brigade Intervention Model V2.2”

NSW Fire & Rescue (2019) “Annual report 2018/19”, 31 October 2019

Flynn, Jennifer, “U.S. Structure Fires in Eating and Drinking Properties”, National Fire Protection Association, Quincy Massachusetts, February 2007.

FM Global Data Sheet 8-9, Storage of Class 1, 2, 3, 4 and Plastic Commodities, September 2010.

Marty Ahrens, (2001) “U.S. Fire Problem Overview Report”, NFPA, Quincy, MA.

Mikalsen, R.F., Lonnermark, A., Glansberg, K., McNamee, M., and Storesund, K. (2021) “Fires in Waste Facilities: Challenges and Solutions from a Scandanavian Perspective”, Fire Safety Journal, Issue 120, 2021

National Fire Protection Association, ‘Fire Protection Handbook’, 19th edition, Volumes I and II, 2003.

PD 7974-6:2004., “Human factors: Life safety strategies – Occupant evacuation, behaviour and condition (Sub-system 6)”, British Standard, 1 July 2004.

The SFPE Engineering Guide to Human Behaviour in Fire, June 2002. Society of Fire Protection Engineers “Engineering Guide to Human Behaviour in Fire”, Review Draft August 2002,

Society of Fire Protection Engineers, ‘Handbook of Fire Protection Engineers’, 3rd Edition, 2002.

Technical Report FCRC-TR 96-02: Building Fire Scenarios – An analysis of Fire Incident Statistics, Fire Code Reform Research Program, March 1996

Technical Standard, “NFPA 92B: Standard for Smoke Management Systems in Malls, Atria and Large Spaces”, National Fire Protection Association (NFPA), 2009.

The Chartered Institute of Building Services Engineers, ‘CIBSE Guide E, “Fire engineering’, 2nd Edition, September 2003.

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