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SOIL, WATER AND LEACHATE MANAGEMENT PLAN

EASTERN CREEK RECYCLING ECOLOGY PARK (& LANDFILL)

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SOIL, WATER AND LEACHATE MANAGEMENT PLAN (SWLMP)

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Date	Revision #	Section / Paragraph	Description of Change	Authorised by
18/02/2021	A	Whole Document	Draft	Ros Dent

ACRONYMS AND DEFINITIONS

Acronym / Term	Meaning
AHD	Australian height datum
ANZECC	Australian and New Zealand Environment and Conservation Council
Bingo	Bingo Industries Limited
C&D	Construction and demolition
C&I	Commercial and industrial
CoA	Conditions of Approval
DADI	Dial-a-Dump Industries
DECCW	Department of Environment Climate Change and Water NSW (now NSW Environment, Energy and Science, a part of the DPIE)
DPIE	Department of Planning, Industry and Environment
EAR	Environmental Assessment Report
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
Ha	Hectares
kL	Kilolitres
LGA	Local Government Area
Mg/L	Milligrams per litre
ML	Megalitres
MOD6	Modification 6 (06_0139)
MPC	Materials Processing Centre
NSW	New South Wales
OEH	NSW Office of Environment and Heritage (now NSW Environment, Energy and Science, a part of the DPIE)
OSD	On site detention
POEO Act	*Protection of the Environment Operations Act 1997*
POEO Regulations	*Protection of the Environment Operations (Waste) Regulation 2014*
PSE	Pre-sort Enclosure
SEQ	Integrated Occupational Health, Safety, Environment and Quality Management Systems
SoC	Statement of Commitments from the Environmental Assessment Report
SWLMP	Soil, Water and Leachate Management Plan

Acronym / Term	Meaning
TOC	Total organic carbon
TPA	Tonnes per Annum
VENM	Virgin excavated natural materials
WSUD	Water Sensitive Urban Design

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1 INTRODUCTION

1.1 Background

Bingo Industries Limited (Bingo) acquired the Eastern Creek Recycling Ecology Park (& Landfill) ('the Facility') in February 2019 and took over the management of the Eastern Creek site in April 2019. The site was previously known as the Genesis Facility.

The Facility is located at Honeycomb Drive, Eastern Creek in the central western suburbs of Sydney NSW, approximately 36 km west of the Sydney CBD, 18 km west of Parramatta and 12 km east of Penrith. The site is wholly within the Local Government Area (LGA) of Blacktown, situated in the area known as the M7 Business Hub. The site was previously a breccia quarry that closed when it ceased extraction activities.

The existing Facility, including recycling centre/s and landfill, was granted approval by the then Minister for Planning under Section 75J of the *Environmental Planning and Assessment (EP&A) Act 1979* on 22 November 2009 (MP 06_0139) and commenced operation in June 2012.

The Facility operates under two Environment Protection Licences (EPLs) issued by the Environment Protection Authority (EPA); EPL 20121 focusses on resource recovery and EPL 13426 covers landfill operations. The Facility has approval to:

- Accept up to two million tonnes per annum (Mtpa) of C&D (construction and demolition) and C&I (commercial and industrial) waste
- Landfill up to 1 Mtpa of non-putrescible waste and asbestos
- Stockpile up to 50 tonnes of waste tyres
- Stockpile up to 20,000 tonnes of green waste.

The Facility is operated by Dial-a-Dump (EC) Pty Ltd. (DADEC), a fully owned subsidiary of Bingo Industries Pty Ltd.

1.2 Purpose and Application

This Soil, Water and Leachate Management Plan (SWLMP) has been prepared to satisfy the requirements of the Project Approval (MP 06_0139, as modified) and, in particular, *Schedule 3 Condition 21* of the Project Approval which requires the preparation of a SWLMP to the satisfaction of the Secretary of the Department of Planning, Industry and Environment (DPIE). The specific conditions relevant to the development of this plan are identified in **Section 3.2.1**.

The plan also identifies the environmental management measures that will be applied to activities undertaken across the Facility (detailed in **Section 2**) to manage identified environmental risks, specifically those impacting soil, water and leachate management.

The SWLMP has also considered the following:

- The Statement of Commitments (SoC) included in the Environmental Assessment Report[1] (EAR) (EMM, 2008) and subsequent modification assessments
- Requirements and obligations stipulated within EPL 20121 and EPL 13426
- NSW Government Guidelines for Environmental Management Plans (Post Approval Guideline, April 2020).

[1] Environmental Assessment Report, Environmental Resources Management Australia (ERM), dated December 2008 (Reference: 0088621)

1.3 Objectives and Targets

Table 1-1 outlines the objectives and targets set out for the Facility for the management of soil, water and leachate during operation.

Table 1-1: Objectives and Targets

Objective	Target	Timeframe	Accountability
Reusing stormwater to meet water needs whilst minimising potable water use	Minimal reliance on mains water supply	Ongoing	Site Operations Manager Environmental Manager NSW
Surface water runoff flow rates and volumes are controlled	Surface water is captured and directed to the site onsite detention storage (OSD)	Ongoing	Site Supervisor Site Environmental Officer
Minimising the potential for pollutants to escape into the surrounding environment and waterways.	No polluted water is discharged to the environment. No spills of hazardous materials into sensitive environments. No contaminants recorded in groundwater.	Ongoing	Site Supervisor Site Environmental Officer
Minimising the potential for surface water runoff to mobilise sediment and/or pollutants and adversely impact the downstream environment	OSDs and associated stormwater management features effectively contain and treat stormwater runoff before discharge to the environment	Ongoing	Site Supervisor Site Environmental Officer
Preventing erosion of land and sedimentation of downstream waterways	No evidence of erosion or destabilisation after rainfall events	Ongoing	Site Supervisor Site Environmental Officer
Ongoing monitoring and maintenance	Comply with the requirements of: • Project Approval 06_0139 (as modified) • EAR (EMM, 2008) and subsequent modification assessments • EPL 13426 and EPL 20121	Ongoing	Site Supervisor Site Environmental Officer

1.4 Consultation

In accordance with *Schedule 3 Condition 21 (c)* of the Project Approval, the SWMLP is required to be prepared in consultation with DECCW[2] and Blacktown City Council.

Table 1-1 summarises the consultation undertaken, while **Appendix A** demonstrates evidence of consultation.

[2] DECCW – Former Department of Climate Change and Water, now NSW Environmental Protection Authority (EPA)

Table 1-2: Summary of Consultation with Agencies

Relevant Agency	Date	Person Contacted	Comments	Status
NSW EPA	**[TBC]**			
Blacktown City Council	**[TBC]**			

Schedule 3 Condition 21 (a) of the Project Approval requires that the SWLMP is approved by the DPIE, prior to construction[3].

1.5 Author Details

The SWLMP has been prepared by the following authors:

Author Details	Qualifications and Experience
Jamie Crawford	B Sc (Biochemistry & Pharmacology), M Sc (Environmental Science) Jamie has over 14 years' experience in environmental impact assessment and post approvals, including the preparation and review of environmental management plans, on-site construction environmental management and environmental auditing.
Firas Naji (Surface Water)	Firas is a highly experienced Civil/Environmental Engineer with over 30 years' experience across government and consultancy environments. His specialties are in water resources management, and the planning, design and management of water cycle infrastructure covering water supply, recycled water, sewerage, stormwater and the interfaces between these systems. Firas holds a Master's degree in Environmental Engineering and is highly regarded for his work on decision-support systems used to tackle water-related issues. He has worked as a designer and project manager on various sustainable water projects, and has had a heavy involvement in Water Sensitive Urban Design (WSUD) and water recycling initiatives for medium and large-scale subdivisions. In the latter, Firas' experience includes the award-winning 100 Ha mixed-use Rouse Hill Regional Centre subdivision, an 83 Ha industrial / residential subdivision in Sydney's west, and the 2,500-lot new suburb at Fyansford, Geelong (Victoria).

[3] Note that the Facility has been in operation since 2009,however since the Facility was acquired in 2017, all management plans are being updated to address the approved modifications and will require approval by the Secretary as stipulated in the Project Approval.

2 FACILITY DESCRIPTION

2.1 Facility Overview

The Facility covers an operational area of 54 Ha (including the surface area of the quarry) at Lot 1 DP 1145808; and Lot 2 DP 1247691, within an area being developed for commercial and industrial use under the *State Environmental Planning Policy (Western Sydney Employment Area) 2009*. The adjacent land is owned by a mix of private companies and the NSW Government.

The Facility is currently accessed via Kangaroo Avenue located to the east and north-east of the site. The M4 Western Motorway is located to the north and Archbold Road is located to the west. An open grassland is located to the south.

The residential area of Minchinbury is about 430 m north and Erskine Park is about 1,200 m west of the nearest site boundaries. The nearest industrial premises are adjacent to the northern boundary of the site (See **Figure 2-1**).

The Facility as managed under the Environmental Management Strategy (EMS) and the SWLMP includes:

- Site entrance with security and weighbridge
- Site offices and amenities
- Parking for light vehicles, trucks, staff and visitors
- Materials processing equipment comprising:
  - screening areas with overhead gantry crane, screener and conveyors
  - storage bays
  - load out area
- Segregated stockpile area
- Pre-sort enclosure (PSE)
- General solid (non-putrescible) landfill
- Wheel wash bay.

Mounds of overburden material (amenity berms) which act as impervious barriers and visual screens are located on all sides of the Facility operational area. A Conservation Area is also located at the north-western corner of the operations area which is fenced and maintained as part of the operations of the Facility.

Appendix C shows the layout of the Facility.

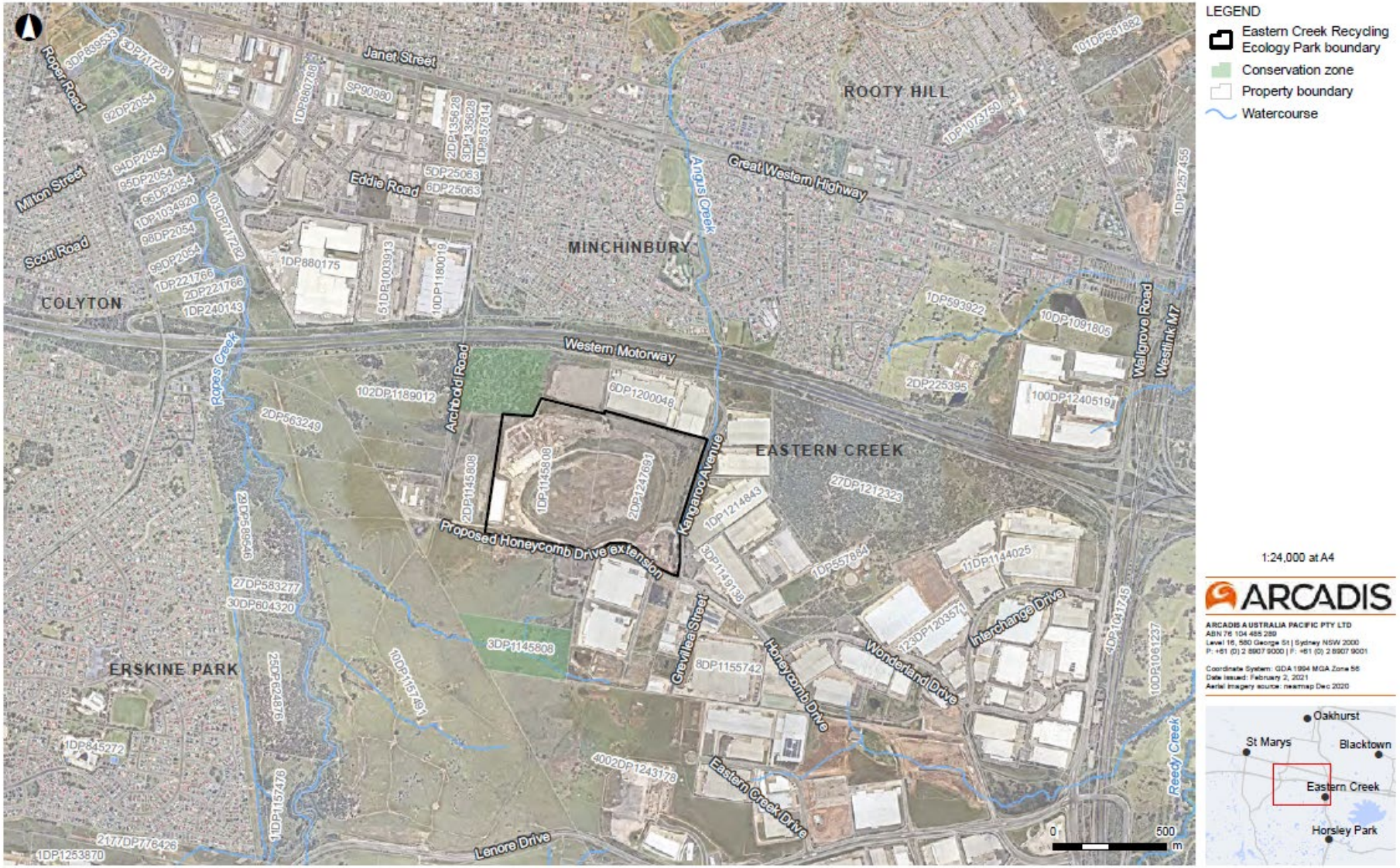


Figure 2-1: Facility Location

2.2 Waste Sources

Waste sources are summarised below and discussed in more detail in Section 2.2 of the Environmental Management Strategy (EMS).

2.2.1 Permissible Waste

The Facility has the capacity to receive up to 2 Mtpa general solid waste (non-putrescible) types, as defined by Schedule 2 of the *Protection of the Environment Operations (POEO) Act 1997:*

The following type of materials will be received:

- Construction and demolition (C&D) waste
- Commercial and industrial (C&I) waste
- Waste streams complying with acceptable waste for general solid waste (non-putrescible) facilities and assessed to be inert waste or solid waste following the technical assessment procedure outlined in Part 1 of the *Waste Classification Guidelines (NSW EPA, 2014)*
- Green waste.

Materials received will comprise both segregated materials and mixed materials, which include but are not limited to, brick, concrete, virgin excavated natural material (VENM), terracotta roof tiles, soils, green waste, timber, metals, paper and plastics. The undifferentiated materials incapable of economic separation or later sale, or which is the residue from recycling processes, will be taken to the landfill for disposal.

Materials suitable for recycling include, but are not limited to, both hardfill materials (e.g. sand, soil concrete, brick and tile) and also specified materials (e.g. metals (including steel), plastics, paper, timber, vegetation, carpet and mattresses etc).

Materials recycled for sale will meet specifications prescribed by the POEO Act and the Licensee's resource recovery orders and exemptions.

2.2.2 Non Permissible Wastes

Schedule 3 Condition 1 of the Project Approval details which wastes cannot be received at the Facility. Screening of wastes at the weighbridge is for early detection of non-conforming waste to prevent entry to the site.

2.2.3 Conditional wastes

Conditional wastes are those materials that are not permitted in the Materials Processing Centre (MPC) but may be accepted if approved by NSW EPA and listed on the sites licence, and by prior arrangement for landfilling. Some conditional wastes may be accepted but require prior treatment or particular disposal procedures.

2.2.4 Non-Conforming Waste

Vehicles attempting to leave unacceptable or excluded wastes at the MPC will be identified and directed to return to the weighbridge. Bingo will record details of the waste and carrier and communicate this information to the gatehouse and then to the NSW EPA under the provisions of the POEO Act.

2.3 Waste Processing

Section 2 of the **Environmental Management Strategy (EMS)** and the **Waste Monitoring Plans** describe the waste process flow in detail.

Figure 2-2 details the processing flow of waste material as the material is segregated, processed, stored and sold or disposed at the landfill.

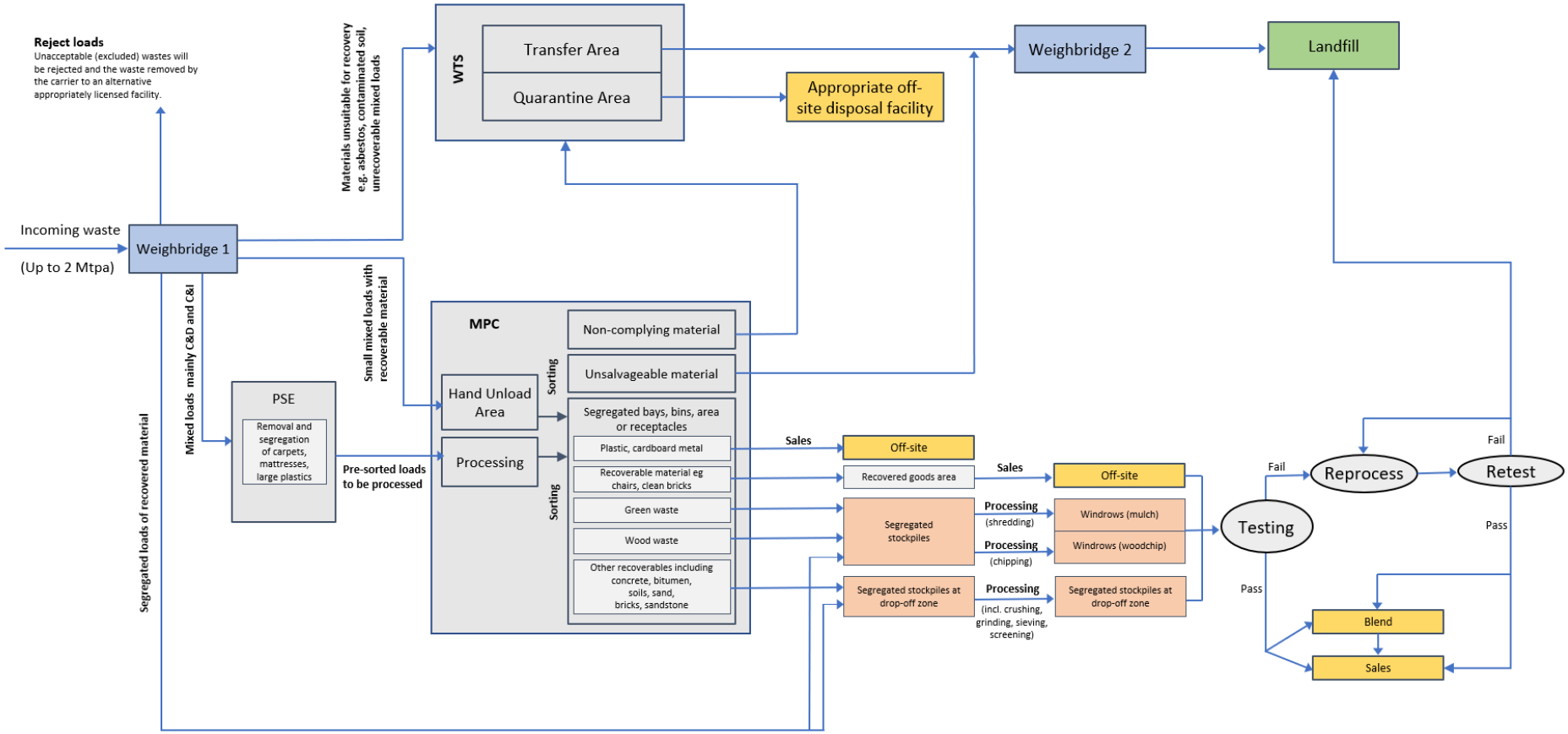


Figure 2-2: Process Flow of Facility Inputs and Outputs

2.4 Operating Hours

Table 2-1 details the operating hours as approved under *Schedule 3 Condition 39* of MP 06_0139 Modification 6.

Table 2-1: MP 06_0139 (As Modified) Approved Operating Hours

Activity	Day	Time
Construction	Monday to Friday	7:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	Nil
Material Processing Centre (MPC) and Pre-sort Enclosure (PSE): Operation, waste receival, chute use and maintenance	Monday to Friday	24 hours
	Saturday	24 hours
	Sunday and Public Holidays	24 hours
Segregated Material Area (SMA): Crushing and screening	Monday to Friday	6:00am to 6:00pm
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
Segregated Material Area (SMA): Receipt of segregated material	Monday to Friday	24 hours
	Saturday	8:00am to 4:00pm
	Sunday and Public Holidays	8:00am to 4:00pm
Landfill: Truck deliveries	Monday to Friday	5:00 am to 9:00pm
	Saturday	5:00 am to 9:00pm
	Sunday and Public Holidays	5:00 am to 9:00pm

3 STATUTORY REQUIREMENTS

3.1 Legal and Other Obligations

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

- *Environmental Planning and Assessment Act (EP&A) 1979*
- *Environmental Planning and Assessment Regulation (EP&A Reg) 2000*
- *Protection of the Environment Operations (POEO) Act 1997*
  - It is an offence to pollute waters under the Act
  - It is an offence to wilfully or negligently cause any substance to leak, spill or otherwise escape in a manner that harms or is likely to harm the environment
  - Pollution incidents causing or threatening material harm are to be reported to the EPA
- *Sydney Water Act 1994*
- *Water Management Act 2000.*

Additional legislation, standards and guidelines relating to the management of soil, water and leachate include:

- Environment Protection Licences:
  - EPL 20121 which allows for compositing, resource recovery and waste storage
  - EPL 13426 which allows for waste disposal (application to land) and waste storage
- Environmental Guidelines for Solid Waste Landfills (NSW EPA, 2016)
- Managing Urban Stormwater: Soils and Construction ('the Blue Book') (Landcom, 2004)
- Managing Urban Stormwater: Harvesting for reuse (Landcom, 2004)
- Storing and handling liquids: Environmental Protection Manual (DECC, 2007)
- Australian Rainfall and Runoff, Engineers Australia
- Blacktown Council's Water Sensitive Urban Design Developer Handbook (2020)
- NSW Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Modelling Guidelines (Greater Sydney Local Land Services, 2015).

3.2 Development Consent

3.2.1 EP&A Act Approval

The original Project Approval for the site was granted by the then Minister for Planning in 2009 (06_0139) under Section 75J of the NSW EP&A Act. Six modifications have been approved since 2009, with the most recent modification (MOD6) approved on 29 April 2020.

The Project Approval includes requirements to be addressed in this plan and to be delivered during operation of the Facility. These requirements, and how they are addressed in the plan are provided in **Table 3-1**.

Table 3-1: Conditions of Approval (CoA) 06_0139 MOD6

#	Requirement	Document Reference
SCHEDULE 3 SPECIFIC ENVIRONMENTAL CONDITIONS		
21	The Proponent shall prepare and implement a **Soil, Water and Leachate Management Plan** for the site to the satisfaction of the Director-General. This plan must:	This SWLMP
(a)	be submitted to the Director-General for approval prior to construction;	Section 1.2
(b)	be prepared by a suitably qualified and experienced expert;	Section 1.5
(c)	be prepared in consultation with the DECCW and Council; and include	Section 1.4
(d)	and include • a site water balance;	Section 4
	• an erosion and sediment control plan;	Section 5.3 Appendix D
	• a stormwater management scheme;	Section 5.3 Section 8
	• a surface water, groundwater and leachate monitoring program; and	Section 5.4 Section 6.4 Section 7.4 Table 10-1
	• a surface water, groundwater and leachate response plan.	Section 9 Section 10.5
22	The site water balance must:	
(a)	include details of all water extracted, transferred, used and/or discharged by the development;	Section 4 Section 5.3
(b)	identify the source of all water collected or stored on the site, including rainfall, stormwater and groundwater;	Section 4 Section 5.3
(c)	describe the measures that would be implemented to minimise water use on site.	Section 4.5 Table 8-1
23	The erosion and sediment control plan must:	
(a)	be consistent with the requirements in the latest version of *Managing Urban Stormwater: Soils and Construction* (Landcom);	Section 5.3 Appendix D
(b)	identify the activities on site that could cause soil erosion and generate sediment; and	Section 4.2
(c)	describe what measures would be implemented to:	
	• minimise soil erosion and the transport of sediment to downstream waters, including the location, function and capacity of any erosion and sediment control structures; and	Section 5.3 Section 5.3 Table 8-1 SW-01 to SW-03 Appendix D
	• maintain these structures over time.	Section 5.2 Section 5.3 Table 8-1 SW-01 to SW-03 Appendix D

#	Requirement	Document Reference
24	The stormwater management scheme must:	Section 4.2
(a)	be consistent with the guidance in the latest version of Managing Urban Stormwater: Council Handbook (DEC); and	Section 5.2 Section 5.3
(b)	include the detailed plans for the proposed surface water management system.	Section 5.3 Table 8-1 SW-04, SW-05, SW-10
27	The surface water, groundwater, and leachate monitoring program must:	Section 5.4 Section 6.4 Section 7.4 Table 8-1 SW-8
(a)	be generally consistent with the guidance in benchmark techniques 4, 5, 6, 7 and 8 of Appendix A of the DECCW's *Environmental Guidelines for Solid Waste Landfills* (1996[4], or the relevant sections of the latest version of the guideline); and include:	Section 5.4 Section 6.4 Section 7.4 Section 10.1
(b)	baseline data;	
	• details of the proposed monitoring network; and	Appendix B
	• the parameters for testing and respective trigger levels for action under the surface water, groundwater and leachate response plan (see below).	Section 10.5
28	The surface water, groundwater and leachate response plan must: • include a protocol for the investigation, notification and mitigation of any exceedances of the respective trigger levels; and	Section 10.5
	• describe the array of measures that could be implemented to respond to any surface or groundwater contamination that may be caused by the development.	Section 9
SCHEDULE 5 ENVIRONMENTAL MANAGEMENT, REPORTING & AUDITING		
2	**Management Plan Requirements** The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	This Plan
(a)	detailed baseline data;	Section 5.1 Section 6.1 Section 7.1
(b)	a description of: • the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3
	• any relevant limits or performance measures/criteria;	Section 10.1
	• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	Section 10.1
(c)	a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Table 8-1

[4] The 1996 Solid Waste Landfill Guidelines was replaced by a second edition in 2016, the EMS continues to refer to the 1996 Guidelines, where relevant, as the Landfill was constructed and became operational before the second edition was released.

#	Requirement	Document Reference
(d)	a program to monitor and report on the: • impacts and environmental performance of the project;	Section 10.1
	• effectiveness of any management measures (see c above);	Section 10.4
(e)	a contingency plan to manage any unpredicted impacts and their consequences;	Section 9
(f)	a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 10.4
(g)	a protocol for managing and reporting any: • incidents;	Section 10.5
	• complaints;	Section 10.6
	• non-compliances with statutory requirements; and	Section 10.7
	• exceedances of the impact assessment criteria and/or performance criteria; and	Section 10.1
(h)	a protocol for periodic review of the plan.	Section 10.4
Secondary conditions relating to soil, water and leachate management		
25	Should a Precinct Plan Stormwater Scheme be initiated by Council, the Proponent shall commit to that scheme and provide a development contribution to Council toward the implementation of that scheme (see below). The Precinct Plan Stormwater Scheme (as it relates to the Project) must:	**[BINGO TO ADVISE]**
(a)	be prepared in consultation with DECCW and Council and be submitted to the Director-General for approval prior to the commencement of construction of the Precinct Plan Stormwater Scheme works;	**[BINGO TO ADVISE]**
(b)	be consistent with the guidance in the latest version of Managing Urban Stormwater: Council Handbook (DECCW); and	**[BINGO TO ADVISE]**
(c)	include detailed plans of the Precinct Plan Stormwater Scheme as it relates to the Project.	**[BINGO TO ADVISE]**
26	Within three years of this approval, or when a Section 94 Contributions Plan that covers the site is made, whichever is sooner, the Proponent shall contribute toward the acquisition, design and construction of the Precinct Plan Stormwater Scheme. If a Section 94 Contributions Plan does not exist, the Proponent shall enter into a Voluntary Planning Agreement and/or works in kind deed of agreement with Council for those development contributions at that time. If a Section 94 Contributions Plan is not in place, the development contribution amount shall:	**[BINGO TO ADVISE]**
(a)	be calculated by Council, (by apportioning the cost of the Precinct Plan Stormwater Scheme amongst the Precinct Plan landowners in the relevant catchments), and be to the satisfaction of the Director General;	**[BINGO TO ADVISE]**
(b)	be calculated in accordance with the Land Acquisition (Just Terms Compensation) Act 1991; and	**[BINGO TO ADVISE]**
(c)	be independently verified by a quantity surveyor whose appointment has been approved by the Director-General.	**[BINGO TO ADVISE]**
	The development contribution toward the Precinct Plan Stormwater Scheme should be calculated in accordance with developable areas (52.41 ha) detailed in at Appendix 3 and exclude the quarry void itself initially. Development Contributions toward the Precinct Plan Stormwater Scheme are payable for the quarry void area (22.602 ha) at least 12 months prior to the completion of landfilling.	**[BINGO TO ADVISE]**

#	Requirement	Document Reference
17	**Discharge Limits** Except as may be expressly provided in an EPL for the project, the Proponent shall comply with Section 120 of the POEO Act.	Section 10.5
18	Except as may be expressly provided in an EPL for the project, the Proponent shall discharge wastewater, including treated wastewater, to sewer, in accordance with a Trade Waste Agreement with Sydney Water.	Table 3-3 Section 6.3 Table 8-1 SW-10 and L-01
20	**Bunding** The Proponent shall store all chemicals, fuels and oils used on site in appropriately bunded areas, with impervious flooring and sufficient capacity to contain 110% of the largest container stored within the bund. These bunds shall be designed and installed in accordance with the requirements of all relevant Australian Standards, and/or DECCW's Storing and Handling Liquids: Environmental Protection manual.	Table 8-1 SW-6

The Statement of Commitments (SoC) relevant to soil, water and leachate were identified in the 2008 Environmental Assessment Report[5] (EAR). These have been summarised in **Table 3-2**.

Table 3-2: Relevant Statement of Commitments (EAR, 2008)

#	Statement of Commitment	Document Reference
5. Operational Environmental Performance		
5.1 Surface Water		
5.1.1	A detailed stormwater management plan shall be developed and include the requirements set out in the Surface Water Report prepared by Storm Consulting dated April 2008, which will include management for spills from drainage lines, sediment traps, check dams, erosions control, bunds infiltration areas, sediment fences, filters and all other erosion and sediment control devices.	Table 8-1 SW-1, SW-2 and SW--3 Appendix D
5.1.2	Water sampling at the OSD basin and in pit stormwater pond to be conducted quarterly for the first 12 months of operations and six-monthly for following years to ensure re-used/released water is of the appropriate quality for end-use in accordance with ANZECC guidelines and relevant NSW guidance and the sites Environmental Protection Licence. Water sampling shall test for compliance with specified water quality standards for discharge. Sampling requirements will include TSS, turbidity, ammonia, Biochemical Oxygen Demand, TN and TP.	Section 10.1
5.1.3	An OSD basin and Gross Pollutant Trap Cleaning Program to be implemented to provide more frequent monitoring as site settles from development. The Cleaning Program will include: • sediment and weed removal from the OSD basin and its associated sediment control/stilling basin; and • checking integrity of in-pit stormwater basin, plus sediment removal. A maintenance and monitoring check-sheet shall be developed that allows for the data entry, location of stormwater management devices on-site (e.g. based on a map with numbered locations), type of monitoring (visual, water sampling, etc), outcome (e.g. all clear, device needs cleaning), actions taken, and any follow up required.	Table 8-1 SW-4

[5] Environmental Assessment Report, Environmental Resources Management Australia (ERM), dated December 2008 (Reference: 0088621)

#	Statement of Commitment	Document Reference
5.1.4	Periodic removal of sediment and other materials from site storages and sediment traps and waste oil and sludge from the oil / water separators and wheel wash sediment separator, immediate stabilisation and disposal at an appropriate off-site facility. Storage dams will have markers that indicate when sediment is to be removed so that minimum storage requirements can be maintained.	Table 8-1 SW-4
5.1.5	Diesel fuel will be stored in bunded above ground double skin diesel fuel tanks located near the workshop. The tanks will be designed and manufactured in accordance with AS1940 and AS1692. Any refuelling facilities or fuel/ chemical (including oil and lubricant) storages, are to be located in covered, bunded areas or self bunded storage containers, designed to prevent the entry of stormwater and capable of containing the full storage volume of the container plus an additional 10%.	Table 8-1 SW-6
5.1.6	Potential spills will be contained, in the first instance, by bunding and grading to sumps with backup containment created by the main storage basins. Spill kits will be available on-site and staff will be trained in their use to contain spills and prevent them from entering the stormwater drainage system. Runoff from areas where spills can occur will not be discharged off-site	Table 8-1 SW-7
5.2 Groundwater		
5.2.1	A groundwater monitoring program is to be prepared to the satisfaction of DECC and the Environmental Protection Licence (EPL) issued for the Project to satisfy reporting requirements.	Section 7.4 Section 10.1 Table 8-1 GW-03
5.2.2	Water quality samples shall be taken from all nine (9) bore wells to establish the base water quality standard for groundwater quality monitoring. The base water quality samples are to be provided to DECC satisfaction.	Section 10.1 Table 8-1 GW-03
5.3 Leachate		
5.3.1	The LEMP will set out leachate management to maintain the collection and treatment system. Visual inspections of the leachate collection system (sump and riser) shall be undertaken quarterly for the first 18 months of initial operations and if no adverse impacts of operations is observed, will be reduce to every 6 months throughout the life of the Landfill and resource recovery facility. Visual inspection shall also occur proceeding significant rainfall events. Submission of water quality monitoring results shall be submitted to the relevant authority as required by the EPL.	Table 8-1 L-06
5.3.2	The leachate collection system shall be monitored for clogging every year throughout the life of the landfill and resource recovery facility. The system shall be unclogged as required to maintain the level of leachate within the pit below the regional groundwater table.	Table 8-1 L-06

3.3 Environment Protection Licence

The most recent EPLs associated with the Facility were issued by NSW EPA on 12 April 2018 (EPL 20121) and 7 June 2019 (EPL 13426).

Conditions within that EPLs associated with soil, water and leachate and how they have been addressed within this plan are presented in **Table 3-3**. The EPLs will be amended to align with Modification 6.

Table 3-3: Relevant EPL Conditions

EPL 20121 Condition	EPL 13426 Condition	Requirement	Document Reference
Discharges to water and land			
P1.2	P1.1	The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area. (Appendix B contains a summary of these tables)	Section 9.1 Section 9.5 Appendix B
P1.3	P1.2	The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point. (Appendix B contains a summary of these tables)	Section 9.1 Section 9.5 Appendix B
Pollution of waters			
L1.1	L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	Table 8-1 SW-10
L1.2	L1.2	The licensee must operate the premises in a manner that ensures that all stormwater from all areas of the premises which has the potential to mobilise sediments and other material is controlled and diverted through appropriate erosion and sediment control/pollution control measures and sedimentation ponds.	Table 8-1 SW-1 and SW-5 Appendix D
NA	L1.3	Sediment ponds must be maintained in a manner that ensures these retain an appropriate freeboard to minimise the potential for any turbid discharge. Depth indicators must be installed and maintained within these ponds that indicate the required freeboard to be maintained.	Table 8-1 SW-4
NA	L1.4	Surface water must be diverted away from any area where waste is being landfilled.	Table 8-1 SW-5
Concentration limits			
L2.1	L2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table. (Appendix B contains a summary of these tables)	Section 10.1 Table 8-1 SW-8 Appendix B
L2.2	L2.2	Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.	Section 9.1 Table 8-1 SW-8 Appendix B
L2.3	L2.3	To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.	Section 9.1 Table 8-1 SW-8 and SW-10 Appendix B
NA	L2.4	The licensee is not taken to have exceeded a concentration limit specified in this licence, for monitoring points 5 and 6, if the discharge has occurred solely as a result of a rainfall event at the premises exceeding a total of 45 millimeters over any consecutive five day period and the licensee has taken all practical measures to avoid or minimise water pollution.	Section 10.5 Appendix B
L2.4	L2.5	Water and/or Land Concentration Limits (Appendix B contains a summary of these tables)	Appendix B

EPL 20121 Condition	EPL 13426 Condition	Requirement	Document Reference
Operating conditions			
O5.7	NA	All stormwater and stormwater treatment devices (including drainage systems, sumps and traps) must be regularly maintained.	Table 8-1 SW-4
O5.8	NA	Sediment ponds must be maintained in a manner that ensures these retain an appropriate freeboard to minimise the potential for any turbid discharge. Depth indicators must be installed and maintained within these ponds that indicate the required freeboard to be maintained.	Table 8-1 SW-4
O6.6	O5.9	Landfill leachate must not be irrigated and/or used for dust control except as expressly permitted by a condition of this licence.	Table 8-1 L-02
O6.5	O5.10	Water which contacts waste, other than virgin excavated natural material, must be managed as leachate. Leachate must only be disposed of by: a) disposal to sewer via a trade waste agreement, b) disposal at a facility licensed to accept such waste.	Table 8-1 L-01
NA	O5.14	Landfilling of waste and leachate levels must be managed to ensure the groundwater gradient directs groundwater flows inwards towards the landfill void.	Table 8-1 GW-01
	O5.15	The licensee must ensure that the leachate levels within the landfill below RL 25m AHD are maintained at least 5m below the minimum elevation of the waste surface.	Table 8-1 GW-05
O6.7	NA	The Licensee must not cause or permit any leachate to pool at the premises.	Table 8-1 GW-03
NA	O6.1	The licensee must manage any groundwater extracted from groundwater interception system in accordance with the report titled "Genesis Landfill Facility - Proposed Groundwater Sump" (Ref:BJ07/LT264 Rev B) by IGGC and dated 9 October 2012.	Table 8-1 GW-02
O7.1	O6.5	Bunding must be maintained for the leachate storage tanks that: • is impervious to the fluids contained; and • has sufficient capacity to contain 110% of the of the largest vessel; and will contain all pressurised leaks or spills.	Table 8-1 SW-06
O7.2	O6.6	The licensee shall store all chemicals, fuels and oils used on site in an appropriately designed impervious bunded area that contains 110 percent of the largest container contained within the bund. These bunds shall be designed and installed in accordance with the requirements of all relevant Australian standards, and/or EPA's Environment Protection Manual Technical Bulletin Bunding and Spill Management.	Table 8-1 GW-01
Requirement to monitor concentration of pollutants discharged			
NA	M2.1	For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table. (Appendix B contains a summary of these tables)	Section 10.1 Table 8-1 SW-10 Appendix B
NA	M2.2	Water and/ or Land Monitoring Requirements (Appendix B contains a summary of these tables)	Appendix B

EPL 20121 Condition	EPL 13426 Condition	Requirement	Document Reference
NA	M3.1	Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.	Section 10.1 Appendix B
M4.2	M4.1	Rainfall at the premises must be measured and recorded in millimetres per 24 hour period, at the same time each day.	Table 8-1 SW-9
NA	M7.4	The Licensee must monitor and record, weekly, the height of the leachate relative to the Australian Height Datum at EPA Points 31 and 32.	Table 8-1 L-05
Reporting conditions			
R2.3	R2.3	If the results of surface water quality monitoring in the sediment pond(s) required by condition M2.2 indicate ammonia concentrations greater than 1mg/L the licensee must contact the EPA within 24 hours and advise of the results of that monitoring.	Section 10.5 Appendix B
R2.4	R2.4	If leachate is discharged to surface waters from the premises the licensee must notify the event to the EPA in accordance with condition R3.1.	Section 10.5

3.4 Roles and Responsibilities

Key roles and responsibilities applicable to this SWLMP are presented in **Table 3-4**.

Table 3-4: Roles and Responsibilities

Roles	Responsibilities
General Manager Resource Recovery NSW	• Ensuring an SWLMP is developed and implemented; ensuring compliance with Project Approval conditions and any regulatory or other requirements • Ensuring appropriate resources are available to implement all aspects of the SWLMP and maintain necessary records
Safety and Quality Manager NSW	• Provide support for the Site Supervisor • Participate in investigations of accidents on site • Take action to resolve non-conformances, non-compliances and incidents
Site Environmental Officer	• Identifying risks to soil, water and leachates associated with the operations undertaken on site • Developing and implementing procedures and measures to minimise or eliminate any risks identified • Ensuring that all personnel undertaking work at the site receive adequate training and education in the environmental measures developed to mitigate or minimise risks associated with soil, water and leachate management at the site • Implement appropriate soil, surface water and groundwater monitoring to ensure that the management measures adopted are effective • Undertaking reporting and internal audit annually • Review, maintain and assist implementation of the Environmental Management System

Roles	Responsibilities
Site Operations Manager	• Effectively implement environmental controls on-site in accordance with environmental obligations • Demonstrate that suppliers and sub-contractors are implementing environmental requirements • Report environmental non-conformances, incidents and potential incidents to the Environment Manager NSW and General Manager Operations NSW • Manage and direct works in a manner that minimises potential for environmental impacts or stop works if there is a risk of environmental harm
Site Supervisors (Landfill / MPC / Crusher)	• Assisting in the development, implementation and maintenance of mitigation measures to minimise or eliminate the identified environmental risks • Complying with environmental measures and procedures implemented to minimise or eliminate environmental risks • Maintaining site records and documents for inspection as required • Attending environmental training and other educational sessions • Reporting any environmental incidents that may occur in accordance with the SWLMP • Inducting all staff, workers and any person conducting or engaged by the company to complete any works onsite
Yard and Plant Operators (all sites)	• Completing the site induction • Assisting management to mitigate any environmental hazards • Ensuring that the site is regularly inspected for potential hazards that may cause harm • Attending environmental training and other educational sessions • Continuous awareness of activities and processes that may have environmental impacts • Reporting incidents promptly and assisting with implementing control measures as required
Contractors	• Completing the site induction • Identifying the environmental risks associated with their activities at the site • Developing mitigating measures to minimise or eliminate the identified environmental risks • Being aware of and following onsite instructions and procedures implemented to minimise or eliminate environmental risks

3.5 Training and Competence

All personnel undertaking work at the Facility will undergo general environmental awareness training and training relevant to their responsibilities under the Facility **Environmental Management Strategy (EMS)**.

Records of Project environmental induction and other environmental training will be maintained and readily accessible.

Details of training are provided in Section 4.4 of the EMS.

4 SITE WATER BALANCE

4.1 Overview

This section provides an overview of the site's water balance to reflect the latest and most accurate project information based on Modification 6 (approved 29 April 2020). Supporting information is provided in **Appendix E**.

4.2 Water Management System

The operational water management system comprises the following systems and is schematically represented in **Figure 4-1**:

- Surface water management
- Wastewater and leachate management.

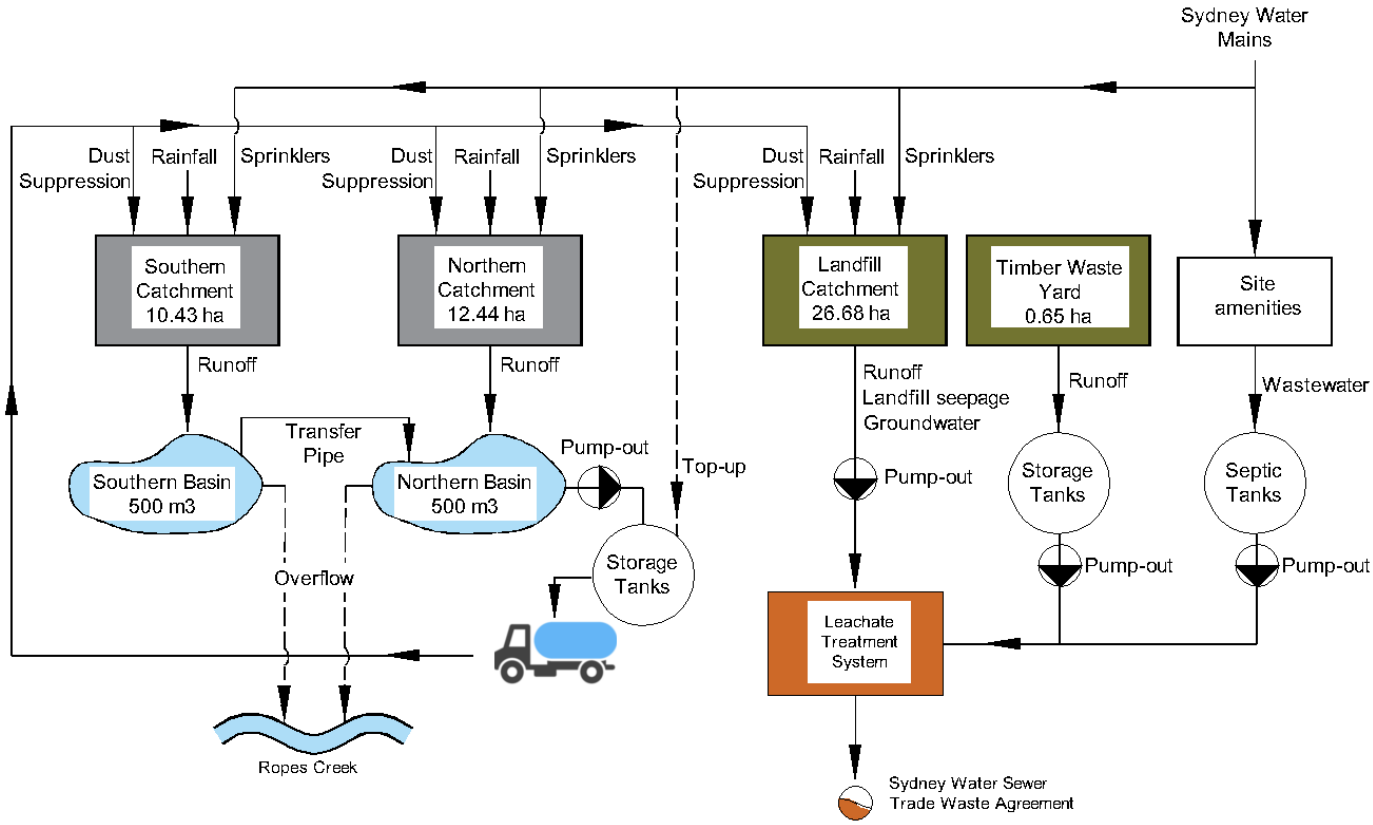


Figure 4-1: Schematic of the Site's Water Management System

Below is a summarised description of the site's existing surface water and wastewater and leachate management systems.

4.2.1 Surface Water Management

The operational area has been split into two catchments, northern and southern, based on the topography of site. **Appendix E** shows the extent of the catchments.

- The northern catchment, which largely drains the MPC building and the segregated stockpile area, drains to the northern onsite detention (OSD) basin for flood control and reuse purposes. **Figure 4-2** presents images of the northern OSD basin. Refer to **Appendix E** for the extent of the northern catchment and location of the northern OSD basin.

- The southern catchment, including the PSE, drains to the southern OSD basin for flood control and storage purposes. The southern OSD basin is connected by a gravity pipe to the northern OSD basin. Both basins overflow during extended rainfall periods through natural drainage to Ropes Creek. **Figure 4-3** presents images of the southern OSD basin. Refer to **Appendix E** for the extent of the southern catchment and location of the southern OSD basin.

Stored water from the northern OSD basin (and from the southern OSD basin via a transfer pipe to the northern OSD basin) is transferred via a pump station (**Figure 4-4**) to five aboveground reuse water tanks with a total combined capacity of 112.5 kL. These tanks are used to provide water to the site's water carting facility (used to fill water carts and for truck wet-down) (**Figure 4-5**). These tanks are also topped up by mains water when the reuse storage basins are empty.

Figure 4-2: The Northern OSD Basin

Figure 4-3: The Southern OSD Basin

Figure 4-4: Northern OSD Pump Station

Figure 4-5: Water Carting Facility and Reuse Water Tanks

4.2.2 Wastewater and Leachate Management

Contaminated runoff from the timber waste yard is collected in a bunded sump with overflow tanks, and then pumped to the leachate treatment plant. **Figure 4-6** shows the bunded sump draining from the timber waste yard. **Figure 4-7** shows the bunded tanks used to store runoff from the timber waste yard and landfill leachate.

Runoff draining to the landfill pit is collected with landfill seepage and contaminated groundwater and then pumped to the leachate treatment plant.

Wastewater from the site amenities is collected in septic tanks and then pumped to the leachate treatment plant.

All leachate, wastewater and contaminated runoff are treated onsite by the leachate treatment plant, which is a sequenced batch reactor, and then disposed to Sydney Water's sewerage network via a trade waste agreement. **Figure 4-8** shows images of the site's leachate treatment plant.

Figure 4-6: Bunded Sump Draining the Timber Waste Yard

Figure 4-7: Bunded Tanks for Storing Runoff from Timber Waste Yard and Landfill Leachate

Figure 4-8: Leachate Treatment System

4.3 Water Sources and Uses

Water sources at the Facility are summarised as follows:

- Mains water supply, supplied by Sydney Water to the site
- Onsite water reuse
- Landfill leachate.

This section summarises the main water sources and uses at the Facility.

4.3.1 Mains Water

Raw and potable water supplied to the site is sourced from the Minchinbury surface reservoir via connection to the current reticulated water supply servicing Lot W DP 419612.

Mains water is used for site amenities, for dust suppression (sprinklers and misters) within the MPC and PSE buildings and for operational use within the landfill pit. Mains water is also used to supplement the five aboveground reuse water tanks (which are primarily supplied from the basins via the pump station).

Based on Sydney Water bills provided for the period November 2019 to November 2020, the annual total mains water usage for the site is 41,337 kL/year, or an average of 113 kL/day.

4.3.2 Onsite Water Reuse

Water from the northern OSD basin (which is connected to the southern OSD basin via a transfer pipe) is pumped to five aboveground reuse water tanks with a total combined capacity of 112.5 kL, to supply water to the site's water carting facility.

Both the northern and southern OSD basins are primarily used for on-site detention (i.e. to temporarily hold water for flood control). However, both basins have permanent pool volumes (below the outlet invert level) that can be used for reuse purposes. The volume capacity details for these basins are presented in **Table 4-1**.

Table 4-1: OSD Basin Capacity

Basin	Provided Permanent Pool Volume (kL)	Source of Information
Northern OSD basin	500	Consolidated Stormwater Management Plan (Martens Consulting Engineers November 2011)
Southern OSD basin	746	Pre-Sorting Centre, Eastern Creek – Section 75W Approval, Stormwater Management Report (At&I December 2014)

Earlier reports estimated the average annual reuse demand to be 110 kL/day (Martens' Consolidated Stormwater Management Plan 2011 and At&I's Section 75W Approval Stormwater Management Report 2014). However, based on a three-day audit undertaken in January 2021, the average daily water cart use is estimated to be 178 kL/day, or 64,970 kL/year, accounting for weather variations.

4.3.3 Landfill Leachate

Refer to **Appendix E** for the extent of the landfill catchment area.

To support the Modification 6 development approval, CES prepared a detailed estimation of the leachate generation volumes from the landfill pit area as part of their water balance report (Water Balance Model Report – Modification 6, 17 August 2017). The CES report has been used to inform the contribution of landfill leachate to the site water balance.

Below is a summary of the latest available information relating to the generation of landfill leachate:

- As outlined in the CES report, water balance calculations for the landfill pit area estimated a net positive leachate volume of 65,660 kL/year. This estimate was based on considering water inputs such as rainfall, irrigation of waste and groundwater seepage and losses from events such as evapotranspiration.
- The CES report outlines that metered leachate pump-out from the landfill pit in 2016 was 61,485 kL/year. However, recent meter readings for the leachate pump-out provided for the period from April 2019 to end of January 2021 indicate that the average leachate volume pumped out from the leachate treatment system is 31,370 kL/year (including amenities wastewater and contaminated runoff from the timber waste yard).
- Two storage dams indicated in the CES report to collect runoff from the landfill pit area (Pit Dam and NE OSDB) have since been decommissioned.
- The CES report outlines that the site's sequenced batch reactor leachate treatment system has a capacity of 219,000 kL/year.

4.4 Water Balance Calculations

4.4.1 Approach

The aim of water balance calculations is to assess the effectiveness of the onsite water reuse system in meeting the site's water carting reuse demands.

With the existing water management system, stormwater from the southern and northern catchments is collected and stored in the southern and northern OSD basins and in the five reuse water tanks and then utilised to supply the water carting facility. This information is therefore considered in the water balance calculations.

All leachate, wastewater and contaminated runoff from the timber waste yard, which are treated and then disposed to Sydney Water sewer network, are not included in these water balance calculations.

Water balance calculations for the site's reuse storages are undertaken using MUSIC (Model for Urban Stormwater Improvement Conceptualisation) software, considering the stormwater catchment inflows, rainfall, evapotranspiration losses and the daily reuse demand for the water carting facility. Mains water top-up is also calculated as the shortage in the reuse water supply when water is not available in the site's storages for the reuse demands. Stormwater overflows from the site's storages are also calculated.

4.4.2 Model Inputs

The layout for the MUSIC model for the site's water balance is presented in **Appendix E**. The MUSIC modelling parameters and assumptions are presented below.

Meteorological Data

Meteorological data was obtained from daily pluviographs from Blacktown station (067059), simulated for 30 years (1963-1993) according to Blacktown Council guidelines. Monthly evapotranspiration rates were used for the Sydney region according to Blacktown Council's WSUD (Water Sensitive Urban Design) Developer Handbook (2020).

The average annual rainfall for the selected simulation period is 854 mm/year and the average annual evapotranspiration is 1,261 mm/year.

Soil Parameters

Soil classification is assumed to be disturbed terrain. The soil parameters used in the MUSIC model are shown in **Table 4-2**. These are based on the NSW Music Modelling Guidelines (2015).

Table 4-2: Soil Parameters

Soil Parameter	Value
Soil Capacity (mm)	108
Initial Storage (%)	30
Field Capacity (mm)	73
Infiltration Capacity Coefficient a	250
Infiltration Capacity Coefficient b	1.3
Initial Depth (mm)	10
Daily Recharge Rate (%)	60
Daily Baseflow Rate (%)	45
Deep Seepage (%)	0.00

Catchments

The location and extent of the catchments that drain to the site's OSD basins for potential reuse are presented in **Appendix E**. Details associated with the catchments are presented in **Table 4-3**.

Table 4-3: Catchment Details of the Northern and Southern Basins

Basin	Catchment Area	% Impervious
Northern OSD basin	12.44 ha (not including the timber waste yard)	30%
Southern OSD basin	10.43 ha	35%

Onsite Reuse Demand

The site's reuse demand used in the MUSIC model is 178 kL/day, or 64,970 kL/year, as outlined in **Section 4.3**. This water is mainly used for the water carting facility.

Reuse Storages

Details of the site storage facilities used to store local stormwater runoff for reuse are presented in **Table 4-4**.

Table 4-4: Storage Volume used in MUSIC Modelling

Storage	Volume
Northern OSD basin	500 kL
Southern OD basin	746kL
Reuse water tanks	112.5 kL
Total	**1,358.50 kL**

4.4.3 MUSIC Model Results

Detailed water balance MUSIC modelling results are summarised in **Table 4-5**. The results for runoff inflow into storages (i.e. OSDs), storage overflow (overflow from the northern and southern OSD basins to Ropes Creek) and water volume in storage (i.e. OSDs and tanks) are also presented visually in **Appendix E.**

Table 4-5: Water Balance Results

Storage inflows	Storage overflows	Onsite reuse water supplied	Reuse demand (water carting)	Mains water top-up
79,200 kL/year	43,800 kL/year	30,000 kL/year	64,970 kL/year	34,970 kL/year

The modelling results show that a considerable proportion of the site's reuse demand (i.e. 30,000/64,970 = 46%) is being supplied from site storage. As a result, the remaining 34,970 kL/year required to meet the reuse demand is met by mains water top-up.

The results also show that there is potentially more opportunity to increase the supply of the reuse water from the site stormwater discharges by providing more onsite storage, i.e. 43,800 kL/year currently overflows from the southern and northern OSD basins to the surrounding off site surface water environment.

4.5 Water Minimisation

The main water conservation strategy utilised on site is the reuse of onsite stormwater discharges for dust suppression through supply to the water carting facility. As discussed earlier, this is achieved by reusing water stored at the site's northern and southern OSD basins and thereafter at the reuse water tanks.

The vast majority of the current mains water use at the site is for non-potable uses such as dust suppression using sprinklers and misters, and to supplement the water supply for the water carting facility. The non-potable water use currently supplied by mains water can be estimated as follows:

- Mains water use = non-potable water use + amenities water use
- The amenities water use = 40 L/person/day x 160 employees on the site = 2,336 kL/year
- Thus, non-potable water use (provided by mains water) = 41,337 kL/year (from **Section 4.3.1**) – 2,336 kL/year = 39,001 kL/year.

Based on the model results presented in **Table 4-5**, an average of 43,800 kL/year of stormwater discharges overflow from the northern and southern OSD basins to Ropes Creek and is therefore not currently available for reuse on site.

Further, 31,370 kL/year of treated leachate (from **Section 4.3.3**) is currently being discharged to sewer and not currently available for reuse on site.

Both of these off-site discharge streams, subject to further treatment and/or onsite storage, could potentially be utilised to supply water for the site's non-potable uses. As non-potable water is currently being supplied by mains water, harnessing these additional water sources could represent improved water conservation on site.

5 SURFACE WATER MANAGEMENT

5.1 Existing Environment

The site falls within the broader Hawkesbury-Nepean catchment and the surface water drainage network is characterised by wide, flat and generally poorly defined drainage lines, which is fairly typical of western Sydney. Surface water features surrounding the site include:

- Ropes Creek which flows in a northerly direction, about 1 km west of the quarry pit
- The channel of Upper Angus Creek, which originates adjacent to the eastern site boundary and runs north into an artificial drainage system through Minchinbury and connects to Eastern Creek
- Eastern Creek which flows in a northerly direction, about 3 km east of the quarry pit.

Refer to **Figure 2-1** for an overview of the surface water features surrounding the Facility.

Surface stormwater runoff generated on-site is categorised as 'clean' or 'dirty'.

- Clean stormwater runoff will be generated from building roofs, roads, car parks and other hardstand areas; materials stockpile area/ working floor/ drop off zone; and pit walls, haul road and capped areas within the landfill, and is addressed in this section
- 'Dirty' runoff comprises stormwater that has come into contact with mixed wastes, green and timber wastes and uncovered landfill wastes. Dirty runoff is collected separately from clean stormwater and is treated as leachate. Dirty runoff is addressed in **Section 6**.

5.2 Operational Impacts and Risks

The operation of the Facility presents several risks which have the potential to impact on local soils and waterways if not correctly managed. These include

- Storm and rainfall events can result in high volume and/or high velocity surface water movement which could result in destabilisation and erosion of exposed soils, stockpiles or the landfill pit
- Eroded landscapes present a risk from mobilisation of sediments which could result in sedimentation and pollution of nearby waterways
- Pollution of surrounding environments and waterways from the discharge of potentially contaminated water or spills of chemicals and toxic materials.

5.3 Surface Water Management

The main surface water management strategy is to separate clean surface water from leachate, thus preventing it from being contaminated and allowing it to be used on site or discharged to the environment. At the same time, this strategy would prevent surface water infiltration into the landfill, helping to reduce the quantity of leachate generated and requiring treatment.

The site has been designed and constructed to include several stormwater infrastructure components for the separation of clean water from leachate and the ongoing management of surface water. Some of these features are identified on **Figure 5-1** and include:

- Two OSD basins with capacity to store surface water flows from both the pit and operational areas and also to contain runoff for the 1 in 100 year rainfall event
- A leachate trench, sump, bunding and site grading which allows runoff within the landfill pit to be separated into stormwater and leachate. This system minimises clean surface water flows into the active landfill area therefore reducing overall creation of leachate
- Sediment control measures around the stormwater discharge point including a check dam and double layer of geotextile-wrapped filter bales to ensure discharged stormwater is free of sediment which could impact downstream waterways

- Separately allocated and bunded refuelling location to minimise risk of pollutants from spills associated with refuelling
- Water quality monitoring points (boreholes) to continually monitor and test water quality.

These features will ensure the quality of stormwater being discharged from site is consistent with the EPL and conditions of approval and provides treatment options for reducing key pollutants.

Ongoing management measures for the operational lifecycle of the facility are outlined in **Table 8-1**.

5.3.1 Erosion and Sediment Control

Schedule 3 Condition 23 of the Project Approval outlines the requirements of the erosion and sediment control plan required as part of the SWLMP. This section provides an overview of measures required to minimise soil erosion and the transfer of sediment to downstream waters and measures to maintain erosion and sediment control structures over time. A schematic of the plan is included in **Appendix D**.

The following measures will be undertaken to minimise onsite erosion due to stormwater runoff and reduce the sediment load generated from the disturbed areas of the site during storm events:

- Disturbed areas (cleared, exposed and unvegetated) on site will be minimised to reduce areas that can generate suspended solids (including sediments) within runoff during storm events
- Exposed areas will be stabilised as soon as possible. All completed areas of the landfill will be progressively revegetated using hydro-seeding or hydro-mulching to minimise the effects of erosion
- Concentrated stormwater flows will be managed by using diversions, armouring channels to provide scour protection (e.g. with rip rap), check dams, batter drains, grade control structures and flumes, outlet dissipation structures, and revetments
- Stockpiles will be located away from concentrated stormwater flow. They will be protected by up-slope diversion banks, be stabilised with vegetative cover or mulches or matting products and will be provided with sediment control fencing
- Erosion potential from internal unsealed roads will be minimised. Detailed guidance on erosion and sediment control for access tracks is provided in *Managing Urban Stormwater: Soils and Construction Volume 2C Unsealed Roads* (NSW DECC, 2008).

The following measures will be undertaken to ensure the maintenance of erosion ad sediment control structures over time:

- All sediment basins and / or traps will be cleaned when the structures are a maximum of 60% full of solid materials and disposed in a manner that prevents further pollution of site
- Controls will be inspected regularly and after any significant rainfall (more than 25 mm in a day) and will be repaired as necessary.

5.4 Surface Water Monitoring Program

The surface water infrastructure features identified in **Section 5.3** will require regular inspection and maintenance to ensure their ongoing effectiveness. Routine inspections will be carried out to assess their structural stability and effectiveness and identify any maintenance requirements. Regular collection and removal of accumulated sediment and debris is also essential to maintain the system in good working order.

It is a condition of the EPL that surface water quality is monitored continually throughout the operation of the Facility. Surface water quality monitoring at EPA ID2 and EPA ID3 (**Figure 5-1**) is to be undertaken quarterly for the pollutant parameters identified in **Appendix B**. Additional monitoring is required at the two surface water overflow points (EPA ID5 and EPS ID6). This is required on the first day of an authorised discharge event and weekly thereafter if the discharge continues. Monitoring will also occur at these points within three days of the first day of discharge which occurs as the result of a rainfall event. Pollutant parameters to be monitored are identified in **Appendix B**.

Surface water monitoring requirements and concentration limits for EPA ID2,3,5,6 will be reviewed by the EPA after one year of monitoring, with a view to reduce or remove these requirements where surface water quality at these points is deemed not to be impacted by waste or leachate.

Monitoring requirements are outlined in **Table 10-1**.

Figure 5-1: Soil, Water and Leachate Management Features

6 LEACHATE MANAGEMENT

6.1 Existing Environment

The volume of leachate generated for the landfill site is dependent on the balance between various liquid inputs in the pit and water losses. These are summarised in **Table 6-1**.

Table 6-1: Liquid Inputs and Outputs to the Waste Mass

Inputs	Outputs
• Infiltration of rainfall directly into waste • Infiltration of rainfall through the landfill cap • Infiltration of stormwater runoff from on-site and off-site areas • Groundwater ingress • Liquid waste inputs (considered negligible as no liquid waste is received by the facility)	• Direct evaporation from waste surface • Direct evaporation from hard-surfaced areas • Run-off and discharge of stormwater from hard-surfaced areas • Evaporation from capped areas • Absorption by the waste • Leachate disposal to sewer or treatment plant • Leakage into underlying strata (considered negligible given the inward hydraulic gradient)

Putrescible waste streams are usually associated with high concentrations of organic and inorganic materials in leachate materials. Putrescible wastes are not permitted in this waste landfill however all water that comes into contact with waste, other than virgin excavated national material, is treated and managed as leachate as there is still the potential leachate could contain hazardous materials or other pollutants.

6.2 Operational Impacts and Risks

Any discharge of untreated leachate or leaks and spills associated with leachate storage tanks have the potential to pollute local land or waterways.

If leachate levels within the pit rise as waste is added, to a level that meets or goes above the regional groundwater level, then potential pollutants within the leachate could contaminate the local groundwater. The amount of leachate pumped out of the landfill pit will need to be managed to minimise the risk of groundwater contamination.

Table 6-2 provides a summary of the leachate volumes and net water balance to determine the volume of leachate required to be pumped to maintain levels below the groundwater.

Table 6-2: Leachate Balance

Inputs		Outputs		Balance (m^3/yr)
Source	Leachate volume (m^3/yr)	Source	Leachate volume (m^3/yr)	
Rainfall	126,509	Evaporation	88,332	
Irrigation	26,753	Leachate pumping	61,485	
Groundwater ingress	730			
Total	**153,992**	**Total**	**149,817**	**4,175**

These volumes show that there is a net positive water volume within the landfill pit which could be available to generate leachate. However, the leachate treatment system, comprising five sequence batch reactors (SBRs) is of sufficient capacity (219,000m^3/yr) to contain and manage this predicted net water balance.

6.3 Leachate Management

The generation of leachate is minimised where possible by the diversion and separation of stormwater as discussed in **Section 5**.

All leachate generated in the pit is collected in a leachate collection system and prevented from escaping into groundwater or surface water. This system is comprised of the following key features:

- A drainage layer comprising a permeable granular blanket of geosynthetic and granular materials on the floor of the pit which were installed prior to the commencement of filling
- A leachate trench on the pit floor which collects leachate runoff from uncovered areas of the active tipping area
- A sump with rises and extraction pumps located at the lowest elevation of the pit base which collects the leachate in preparation for removal
- Leachate storage tanks which are protected by bunding.

Leachate is then treated and disposed of to the sewer system via a trade waste agreement with Sydney Water.

This system minimises the potential for leachate migration into the groundwater system and also the potential for pollution of the surrounding environment from discharge of untreated leachate.

Ongoing management measures for the operational lifecycle of the facility are outline in **Table 8-1**.

6.4 Leachate Monitoring Program

The leachate collection infrastructure features identified in **Section 5** will require regular inspection and maintenance to ensure their ongoing effectiveness. Routine inspections will be carried out to assess any maintenance requirements.

As per the conditions of the EPL, ongoing monitoring and reporting of pollutant parameters will be undertaken at the identified leachate monitoring point (EPA ID32 shown on **Figure 5-1**). Pollutant parameters to be monitored are identified in **Appendix B**.

Monitoring requirements are outlined in **Table 10-1**.

7 GROUNDWATER MANAGEMENT

7.1 Existing Environment

The geology consists of Bringelly Shale of the Wianamatta Group producing soils of the Blacktown soil landscape which have low fertility and are poorly drained. The site's topography and soils have largely been disturbed by historic quarrying activities and earthworks. Previous groundwater assessments have suggested that the hydrology and groundwater characteristics at the site are controlled by the Wianamatta Shales which underly the site. The soils produced by this geological material have low permeability and hence a limited ability to transmit groundwater.

A shallow perched and intermittent groundwater system is located within the shallow fill and weathered shale and clay up to depths approximating 32 m below ground level. This is underlain by discrete layered aquifer systems within the shales, with the majority of flow occurring via fractures and bedding planes. It is likely that historical quarrying activities may have led to an increase in the fracturing of the surrounding shale geology and therefore may also have resulted in an increase in the permeability of the quarry. There is very little seepage from the clay and weathered shale deposits into the open pit. A deeper regional aquifer system is present within the shale and volcanic sediments. The permeability of this aquifer system is very low.

7.2 Operational Impacts and Risks

Impacts to this intermittent perched aquifer system from leachate are likely to be minimal provided that the leachate levels remain below the depth of the existing aquifer.

The site represents a very low risk for potential groundwater impacts because of the very low permeability of the surround strata and limited degree of hydraulic connection; the strong inward hydraulic gradient; and the low groundwater inflow rate.

7.3 Groundwater Management

Ongoing management measures for the operational lifecycle of the facility are outline in **Table 8-1**.

7.4 Groundwater Monitoring Program

Ongoing groundwater monitoring is a requirement of the EPL to document both groundwater quality and groundwater levels throughout the lifecycle of the facility. A network of monitoring points have been established as shown on **Figure 5-1**.

The quality samples will monitor for any contamination that may be as a result of the landfill activities and show any changes over time. Groundwater level monitoring will similarly assess if there are any changes in the groundwater level which could be attributed to the facility. Sampling methods will remain consistent to maximise data comparability.

Groundwater monitoring will be undertaken at monthly, quarterly and yearly intervals for key pollutants outlined in the EPL and summarised in **Appendix B**.

Monitoring requirements are outlined in **Table 10-1**.

8 SUMMARY OF MANAGEMENT MEASURES

Management measures are summarised in **Table 8-1**. These measures are based on best practice and compliance matrices detailed in **Section 3.2**, as well as Bingo's (Facility Delivery Company) requirements and standards. They are also consistent with the management measures as outlined within the assessments of soil, water and leachate presented to support the EAR.

Table 8-1: Management Measures

#	Management Measure	Timing	Responsibility	Reference
Surface water				
SW-1	• Erosion and sediment control • All stormwater from all areas of the premises which has the potential to mobilise sediments and other material is to be controlled and diverted through appropriate erosion and sediment control/pollution control measures and sedimentation ponds. Erosion and sediment controls will include management for spills from drainage lines, sediment traps, check dams, erosions control, bunds infiltration areas, sediment fences, filters and all other erosion and sediment control devices.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.1 MP_06 0139 Sch 3 CoA C23 & C24 Section 5.3 Appendix D
SW-2	• Any new earthworks (movement of berms, cutting into pit) will be undertaken in accordance with the erosion and sediment control measures outlined in the Managing Urban Stormwater: Soils and construction - Volume 1 "the Blue Book".	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.1 MP_06 0139 Sch 3 CoA C23 & C24 Appendix D
SW-3	• All erosion control structures should be inspected regularly and after any significant rainfall and repaired as necessary.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.1 MP_06 0139 Sch 3 CoA C23 & C24
SW-4	**Maintenance of stormwater treatment features** • All stormwater and stormwater treatment devices (including drainage systems, sumps and traps) must be regularly maintained. Sediment ponds, OSD basins and gross pollutant traps must be cleaned and maintained in a manner that ensures they retain an appropriate freeboard, using depth indicators, to minimise the potential for any turbid discharge. This includes removing sediment build up, removal of waste oils/sludge and weed removal which would be disposed of at appropriately licensed facilities. The structural integrity of all features will also be maintained	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.3 & 5.1.4 Section 5.3

#	Management Measure	Timing	Responsibility	Reference
SW-5	**Surface water diversions** • Surface water flows must be diverted away from any area where waste is being landfilled and managed using channels, dams and drains to dissipate the potential erosive effect of stormwater.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 13426 Section 5.3
SW-6	**Materials storage** • All refuelling facilities and storage of chemicals, fuels and oils used on site will be in an appropriately designed above ground, impervious, bunded area that is designed to prevent entry of these chemicals into stormwater. It should be of capacity which can contain 110 percent of the largest container contained within the bund.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.5 MP_06 0139 Sch 3 CoA C20 Section 5.3
SW-7	**Spills** • Accidental spills will be contained, in the first instance, by bunding and grading to sumps with backup containment created by the main storage basins. Spill kits will be available on-site and staff will be trained in their use to contain spills and prevent them from entering the stormwater drainage system. Runoff from areas where spills can occur will not be discharged off-site without treatment.	In response to spills	Site Supervisor Site Environmental Officer	SoC 5.1.6 Section 5.2
SW-8	**Monitoring** • Ongoing surface water monitoring is required at the monitoring point locations and at the frequency specified in the EPLs and summarised in Appendix B. For each monitoring point, the concentration of pollutants measured must not exceed the limits specified in the EPL. If pollutant exceedances are recorded these must be treated as an incident and reported appropriately according to the requirements of the EPLs.	Quarterly, after discharge and after rainfall events as per EPL schedule in Appendix B	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 SoC 5.1.2 MP_06 0139 Sch 3 CoA C27 Section 9.1 Appendix B
SW-9	• Rainfall at the premises must be measured and recorded in millimetres per 24 hour period, at the same time each day.	Daily	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426
SW-10	**Discharge** • No water is to be discharged which has not been tested for the pollutants identified in Appendix B, has been found to not exceed the concentration limits or has been treated appropriately. • All discharge of wastewater, including treated wastewater will be to sewer, in accordance with a Trade Waste Agreement with Sydney Water.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 MP_06 0139 Sch 3 CoA C18 Appendix B

#	Management Measure	Timing	Responsibility	Reference
Leachate				
L-01	**Leachate classification** • Water which contacts waste, other than virgin excavated natural material, must be managed as leachate. Leachate must only be disposed of by disposal to sewer via a trade waste agreement or at a facility licensed to accept such waste.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 Section 6.3
L-02	**Leachate storage and use** • Untreated leachate must not be used for irrigation or dust control	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426 Section 6.3
L-03	• Leachate must not be permitted to pool in any areas other than those designed for leachate storage.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 Section 6.3
L-04	• Leachate storage tanks must be protected by bunding that is impervious and has sufficient capacity to contain 110% of the of the largest vessel; and will contain all pressurised leaks or spills.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 20121 EPL 13426
L-05	**Managing leachate levels in the pit** • Leachate levels within the landfill must be kept within RL 25m AHD and maintained at least 5m below the minimum elevation of the waste surface. The height of the leachate relative to AHD, at monitoring points 31 and 32 must be monitored and recorded weekly	Ongoing throughout operation Weekly height recording	Site Supervisor Site Environmental Officer	EPL 13426 Section 6.2
L-06	**Maintenance of leachate collection system** • All structural components of the leachate collection system are to be regularly monitored and maintained. Yearly inspections for clogging should be undertaken. Visual inspections should also occur following significant rainfall events.	Quarterly for the first 18 months of operation and then every 6 months throughout the life of the facility	Site Supervisor Site Environmental Officer	SoC 5.3.1 and 5.3.2 MP_06 0139 Sch 3 CoA C27
L-07	**Monitoring** • Ongoing leachate monitoring is required at the monitoring point location and at the frequency specified in the EPL and summarised in Appendix B.	Quarterly or yearly as per the time frame in the EPL, summarised in Appendix B	Site Supervisor Site Environmental Officer	EPL 13426 Section 10.1 Appendix B

#	Management Measure	Timing	Responsibility	Reference
Groundwater				
GW-01	• Landfilling of waste and leachate levels must be managed to ensure the groundwater gradient directs groundwater flows inwards towards the landfill void.	Ongoing throughout operation	Site Supervisor Site Environmental Officer	EPL 13426
GW-02	• The licensee will manage any groundwater extracted from groundwater interception system in accordance with the report titled "Genesis Landfill Facility - Proposed Groundwater Sump" (Ref:BJ07/LT264 Rev B) by IGGC and dated 9 October 2012.	If required	Site Supervisor Site Environmental Officer	EPL 13426
GW-03	**Monitoring** • Ongoing groundwater level and quality monitoring is required at the monitoring point locations and at the frequency specified in the EPLs and summarised in Appendix B. For each monitoring point, the concentration of pollutants measured must not exceed the limits specified in the EPL. If pollutant exceedances are recorded these must be treated as an incident and reported appropriately according to the requirements of the EPLs.	Monthly, quarterly or yearly as per schedule in the time frame in the EPL, summarised in Appendix B	Site Supervisor Site Environmental Officer Environmental Manager NSW	SoC 5.2.1 MP_06 0139 Sch 3 CoA C27 Section 7.2 Section 10.1 Appendix B
GW-04	• If increased drawdown is detected in the groundwater bores, the cause will be investigated by an appropriately qualified hydrogeologist and relevant management measures implemented.	Ongoing throughout operation	Site Environmental Officer Qualified hydrogeologist	SoC 5.2.1 MP_06 0139 Sch 3 CoA C27 Section 7.2 Appendix B

9 CONTINGENCY OPERATIONAL MEASURES

A contingency plan is required in the event that internal (breakdown of management systems) or external (extreme weather conditions) events result in unauthorised and unforeseen threats to the environment such as spills or contaminated discharges. Any such events should be treated as a reportable incident and managed in accordance with the incident response procedure outlined in **Section 10.5** of this SWLMP and Section 4.7 of the EMS.

10 MONITORING AND REVIEW

Monitoring of both the general effectiveness of the SWLMP as well as ongoing monitoring of targeted pollutants at the specified monitoring points is required throughout the operational life of the Facility.

A daily site inspection and visible observations will be performed by the Site Supervisor and will include relevant checks to ensure that the soil, water and leachate management measures including erosion and sediment control features outlined in **Table 8-1** are in place and effective. Any identified remedial actions will be promptly addressed. Particular attention will be paid to the performance of control measures following rainfall events.

Through observations made during the site check, or through notification by staff or contractors, the Site Supervisor will have the authorisation to review operations performed on-site and alter site activities and/or additional controls necessary to effectively manage those risks.

Procedures relating to incidents and complaints are detailed in **Section 10.5** and **Section 10.6** of this SWLMP.

Key Performance Indicators for the operation of the Facility would be associated with the triggers in **Table 10-2.**

10.1 Monitoring Requirements

Water quality monitoring will be conducted as per the requirement of this SWLMP, the EPLs and the Project Approval. Monitoring requirements relevant to the SWLMP are summarised in **Table 10-1**.

Table 10-1: Monitoring Requirements

ID	Limits/ Performance indicator	Activity	Location	Resources	Responsibility	Frequency
1	Stormwater pollution	Weekly site inspections	Whole site	Site Supervisor observation Stop Work Report Form	Site Supervisor	Daily issues recorded in Site Supervisor Checklist
2	EPL 13426: Landfill EPL 20121: Resource recovery	Surface water quality monitoring	Point 2,3	Sampling equipment Water consultant (if required) and Nata Laboratory Sampling / monitoring results	Site Supervisor Water consultant	Quarterly
3	EPL 13426: Landfill EPL 20121: Resource recovery	Surface water overflow	Point 5,6	Sampling equipment Water consultant (if required) and Nata Laboratory Sampling / monitoring results	Site Supervisor Water consultant	a) on the first day of the authorised discharge that is compliant with Condition L2.1 and weekly thereafter if the discharge continues; and b) within three days of the first day of discharge that is occurring as a result of a rainfall event at the premises.
4	EPL 13426: Landfill	Groundwater monitoring	Point 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30	Sampling equipment Water consultant (if required) and Nata Laboratory Sampling / monitoring results	Site Supervisor Water consultant	Monthly, quarterly or yearly as per Appendix B
5	EPL 13426: Landfill	Groundwater quality monitoring	Point 31	Sampling equipment Water consultant (if required) and Nata Laboratory Sampling / monitoring results	Site Supervisor Water consultant	Monthly

ID	Limits/ Performance indicator	Activity	Location	Resources	Responsibility	Frequency
6	EPL 13426: Landfill	Leachate quality monitoring	Point 32	Sampling equipment Water consultant (if required) and Nata Laboratory Sampling / monitoring results	Site Supervisor Water consultant	Quarterly or yearly as per table Appendix B
7	Erosion and sediment controls	Wet weather inspection and maintenance and after every > 25 mm rainfall event within 24 hrs	Whole site	Yard and Plant Operators	Site Supervisor	After the rain event
8	Effectiveness of soil, water and leachate management measures	Monthly inspection / maintenance	Whole site	Yard and Plant Operators Observation	Site Supervisor	Monthly

10.1.1 Monitoring Criteria

Water monitoring exceedance criteria (triggers) are provided in **Table 10-2**.

In the event of a non-attainment of the relevant trigger levels, works will be reviewed and modified at the direction of the Environmental Manager NSW. Appropriate and remedial measures will be implemented relevant to the conditions and the potential for off-site risks. Any exceedance of criteria will be treated as a reportable incident and managed in accordance with the incident response procedure outlined in **Section 10.5** of this SWLMP and Section 4.7 of the EMS.

Table 10-2: Triggers for Remedial Measures

Monitoring Focus	Trigger	Action	Responsibility
Groundwater quality monitoring	• Ammonia concentrations greater than 2mg/L and/or • Total organic carbon exceeds 20mg/L	The EPA must be contacted within 24 hours and advise of the results of the monitoring	Site Supervisor and Environmental Scientist
Surface water overflow monitoring	• Ammonia concentrations greater than 1mg/L and/or • pH outside the range of 6.5-8.5 • Total suspended solids greater than 50mg/L	The EPA must be contacted within 24 hours and advise of the results of the monitoring	Site Supervisor and Environmental Scientist
Surface water quality monitoring in the sediment ponds	Ammonia concentrations greater than 1mg/L	The EPA must be contacted within 24 hours and advise of the results of the monitoring	Site Supervisor and Environmental Scientist

Monitoring Focus	Trigger	Action	Responsibility
Leachate discharge to surface waters	Any untreated leachate is discharged to surface waters	Written report within 7 days of the date on which the discharge occurred which includes: (a) the volume of the leachate discharged and over what time period the discharge occurred; (b) the date and time of the commencement of the overflow; (c) the weather conditions at the time of the discharge, specifying the amount of rainfall on a daily basis that had fallen: - on the day(s) of the discharge; and - for the one week period prior to the discharge; (d) the most recent monitoring results of the chemical composition of the leachate; (e) an explanation as to why the discharge occurred; (f) the location(s) of the discharge; and (g) a plan of action to prevent a similar discharge in the future.	Site Supervisor and Environmental Scientist
Complaints	Complaint notification	Logging details in the Complaint Register Complaint investigation (including operation and effectiveness of management measures outlined in **Section 9.6** and remedial action, if required)	Site Supervisor / NSW Environmental Manager
Incident	Notification	Logging details and investigation as per the Incident Reporting and Management Procedure as relevant	Site Supervisor / NSW Environmental Manager

10.2 Environmental Auditing

Auditing will be undertaken in accordance with the SEQ Management system and Project Approval requirements as outlined within the overarching EMS. Auditing applicable to this SWLMP is summarised in **Table 10-3**.

Table 10-3: Environmental Auditing Requirements

Requirement	Area/Location	Responsibility	Frequency	Ref
Independent 3rd party audit	SWLMP	External Independent Auditor	Annually	MP_06 0139 MOD 6, Sch5 C7

10.3 Reporting

Reporting requirements for monitoring, auditing and as required in the Project Approval will be undertaken in accordance with the overarching EMS. Reporting requirements applicable to this SWLMP is summarised in **Table 10-4**.

Table 10-4: Environmental Reporting Requirements

Requirement	Area/Location	Responsibility	Frequency
Incident reporting to EPA	Site	Environmental Manager NSW	Upon identification of an incident resulting in material environmental harm.
Written report to the EPA upon discharge of untreated leachate	Site	Environmental Manager NSW	Within 7 days of unauthorised discharge

10.4 Review and Continuous Improvement

Review and improvement of this plan will be undertaken in accordance with the Project Approval and Section 6.6 of the EMS. Continuous improvement will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan against regular environmental auditing, environmental policies, objectives and targets.

The updated plan and a summary of changes will be available on site and distributed to all relevant stakeholders in accordance with SEQ Management System document control procedure.

10.5 Incidents

In the event of a safety / environmental incident or unpredicted impacts relating to soil, water and leachate, it is the responsibility of all personnel to report the incident or event to the Site Supervisor.

All environmental incidents are to be reported and managed in accordance with *Incident Reporting and Management Procedure (SOP-COM003)*. Incidents are classified based on the incident's severity as shown in Section 4.7 of the EMS.

All incidents will be managed and reported according to Section 4.7.2 of the EMS.

10.6 Complaints

Complaints may be received directly from stakeholders, or indirectly via the dedicated phone number, website. Complaints handling will be undertaken in accordance with Section 4.6 of the EMS.

10.7 Non-Compliance, Non-Conformances and Corrective Actions

Non-compliance may be identified via internal and external audits, site monitoring, inspections and observations, environmental incidents and emergencies, complaints and management reviews.

Non-compliance, non-conformances and resulting corrective actions are to be managed in accordance with Section 6.3 of the EMS.

11 REFERENCES

- Department of Environment and Conservation (2006) *Managing Urban Stormwater: Harvesting for reuse*. Sydney: DEC.
- DPIE (2020) *Environmental Management Plan Guideline: Guideline for Infrastructure Projects.* Reference DOC20/277703
- Environment Protection Authority (2016) *Environmental Guidelines: Solid Waste Landfills*. New South Wales: EPA (2nd Edition).
- ERM (2008) *Light Horse Business Centre, Volume 1: Environmental Assessment Report.* Reference: 0088621. Environmental Resources Management Australia, Pyrmont. And associated modifications
- Landcom (2004) *Managing Urban Stormwater: Soils and Construction ("the Blue Book").* New South Wales: DPIE (4th Edition)

APPENDIX A CONSULTATION

APPENDIX B EPL MONITORING DETAILS

Identification of water and land monitoring/discharge points

Location of each monitoring point is shown on **Figure 5-1**.

EPA ID. No EPL13426	EPA ID No. EPL20121	Type of monitoring point	Borehole reference number	Borehole depth
2	5	Surface water quality monitoring		
3	6	Surface water quality monitoring		
5	7	Surface water overflow		
6	8	Surface water overflow		
7		Groundwater monitoring	BH05s	Shallow
9		Groundwater monitoring	BH08s	Shallow
10		Groundwater monitoring	BH09s	Shallow
11		Groundwater monitoring	BH14s	Shallow
12		Groundwater monitoring	BH15s	Shallow
13		Groundwater monitoring	BH16s	Shallow
14		Groundwater monitoring	BH02i	Intermediate
15		Groundwater monitoring	BH04i	Intermediate
16		Groundwater monitoring	BH07i	Intermediate
17		Groundwater monitoring	BH11i	Intermediate
18		Groundwater monitoring	BH13i	Intermediate
19		Groundwater monitoring	BH03d	Deep
20		Groundwater monitoring	BH06d	Deep
21		Groundwater monitoring	BH10d	Deep
22		Groundwater monitoring	BH12d	Deep
23		Groundwater monitoring	BH17d	Deep
24		Groundwater monitoring	BH18d	Deep
25		Groundwater monitoring	BH19s	Shallow
26		Groundwater monitoring	BH20s	Shallow
27		Groundwater monitoring	BH21s	Shallow
28		Groundwater monitoring	BH22s	Shallow
29		Groundwater monitoring	BH23i	Intermediate
30		Groundwater monitoring	BH24i	Intermediate
31		Groundwater quality monitoring		
32		Leachate quality monitoring		

Water and/or land concentration limits

EPA ID No. EPL13426	EPA ID No. EPL20121	Pollutant	Unit of measure	100 percent concentration limit
5,6	5,6,7,8	Ammonia	mg/L	1
		pH	pH	6.5-8.5
		Total suspended solids	mg/L	50

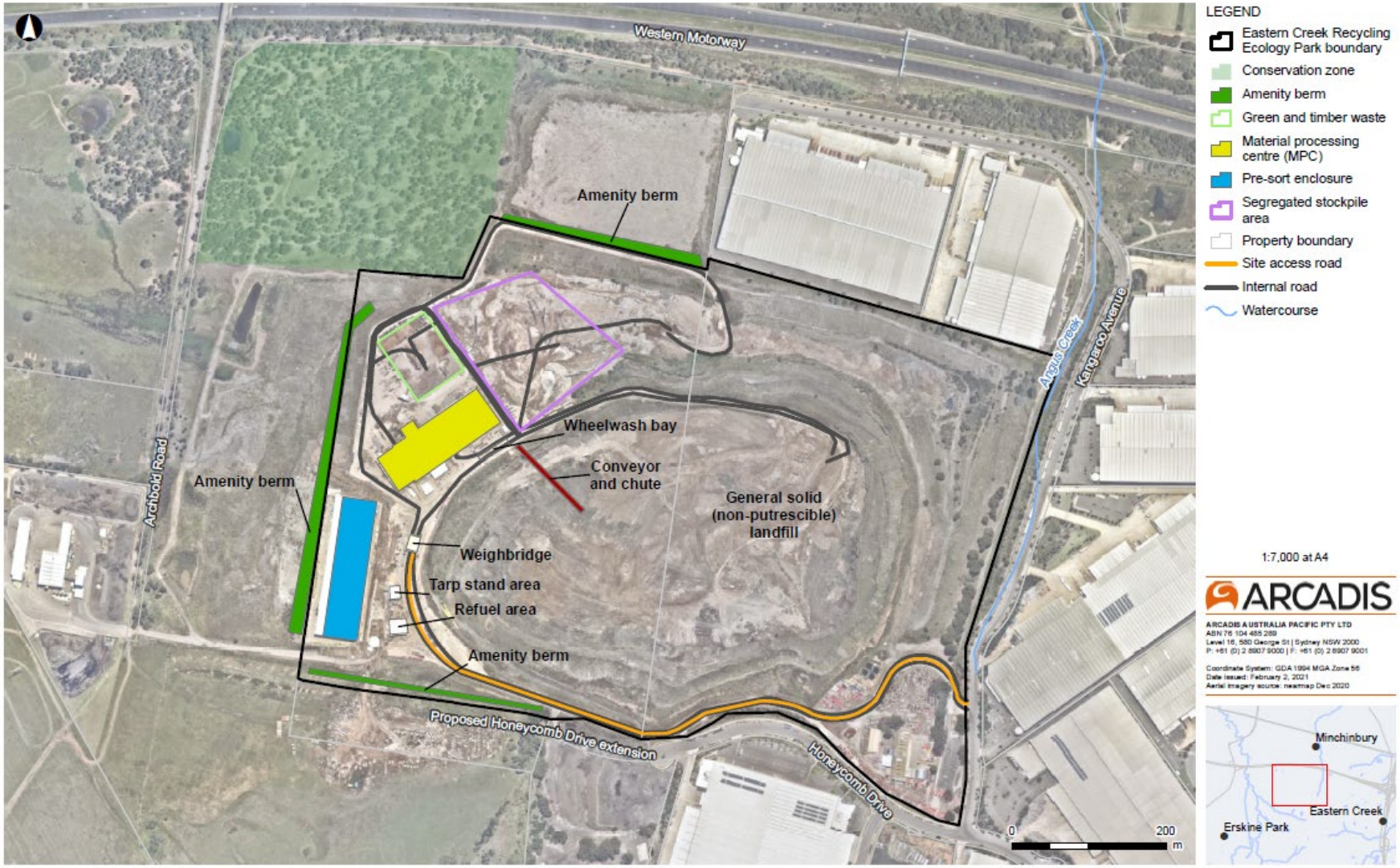
Water and/or land monitoring requirements (ELP 13462 only)

Frequency	Pollutant	Unit of measure	Sampling method
Surface water quality monitoring at point 2,3			
Quarterly	Ammonia	Milligrams per litre	Grab sample
	Arsenic	Milligrams per litre	Grab sample
	Cadmium	Milligrams per litre	Grab sample
	Chromium (total)	Milligrams per litre	Grab sample
	Copper	Milligrams per litre	Grab sample
	Electrical conductivity	Milligrams per litre	Grab sample
	Lead	Milligrams per litre	Grab sample
	Mercury	Milligrams per litre	Grab sample
	Nickel	Milligrams per litre	Grab sample
	pH	pH	Grab sample
	Total organic carbon	Milligrams per litre	Grab sample
	Total suspended solids	Milligrams per litre	Grab sample
	Zinc	Milligrams per litre	Grab sample
Surface water overflow at point 5,6			
Special frequency 1: a) on the first day of the authorised discharge that is compliant with Condition L2.1 and weekly thereafter if the discharge continues; and b) within three days of the first day of discharge that is occurring as a result of a rainfall event at the premises.	Ammonia	Milligrams per litre	Grab sample
	Electrical conductivity	Microsiemens per centimetre	Grab sample
	pH	pH	Grab sample
	Total organic carbon	Milligrams per litre	Grab sample
	Total suspended solids	Milligrams per litre	Grab sample
Groundwater monitoring at point 7,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30			
Monthly	Zinc	Milligrams per litre	Grab sample
Quarterly	Alkalinity (as calcium carbonate)	Milligrams per litre	Grab sample
	Calcium	Milligrams per litre	Grab sample
	Chloride	Milligrams per litre	Grab sample
	Electrical conductivity	Microsiemens per centimetre	Probe
	Magnesium	Milligrams per litre	Grab sample
	Nitrate + nitrite (oxidised nitrogen)	Milligrams per litre	Grab sample
	Nitrogen (ammonia)	Milligrams per litre	Grab sample

Frequency	Pollutant	Unit of measure	Sampling method
	Ph	pH	Probe
	Potassium	Milligrams per litre	Grab sample
	Redox potential	Millivolts	Probe
	Sodium	Milligrams per litre	Grab sample
	Sulfate	Milligrams per litre	Grab sample
Yearly	Aluminium	Milligrams per litre	Grab sample
	Arsenic	Milligrams per litre	Grab sample
	Barium	Milligrams per litre	Grab sample
	Benzene	Milligrams per litre	Grab sample
	Cadmium	Milligrams per litre	Grab sample
	Chromium	Milligrams per litre	Grab sample
	Copper	Milligrams per litre	Grab sample
	Ethyl benzene	Milligrams per litre	Grab sample
	Fluoride	Milligrams per litre	Grab sample
	Lead	Milligrams per litre	Grab sample
	Manganese	Micrograms per litre	Grab sample
	Mercury	Milligrams per litre	Grab sample
	Phenols	Micrograms per litre	Grab sample
	Phosphorous	Milligrams per litre	Grab sample
	Toluene	Milligrams per litre	Grab sample
	Total organic carbon	Milligrams per litre	Grab sample
	Total petroleum hydrocarbons	Milligrams per litre	Grab sample
	Xylene	Milligrams per litre	Grab sample
Groundwater quality monitoring at point 31			
Monthly	Ammonia	Milligrams per litre	Grab sample
	Total organic carbon	Milligrams per litre	Grab sample
Leachate quality monitoring at point 32			
Quarterly	Alkalinity (as calcium carbonate)	Milligrams per litre	Grab sample
	Calcium	Milligrams per litre	Grab sample
	Chloride	Milligrams per litre	Grab sample
	Electrical conductivity	Microsiemens per centimetre	Probe
	Fluoride	Milligrams per litre	Grab sample
	Magnesium	Milligrams per litre	Grab sample
	Manganese	Milligrams per litre	Grab sample
	Nitrate	Milligrams per litre	Grab sample
	Nitrite	Milligrams per litre	Grab sample
	Nitrogen	Milligrams per litre	Grab sample
	Ph	pH	Grab sample
	Phosphorous (total)	Milligrams per litre	Grab sample
	Potassium	Milligrams per litre	Grab sample

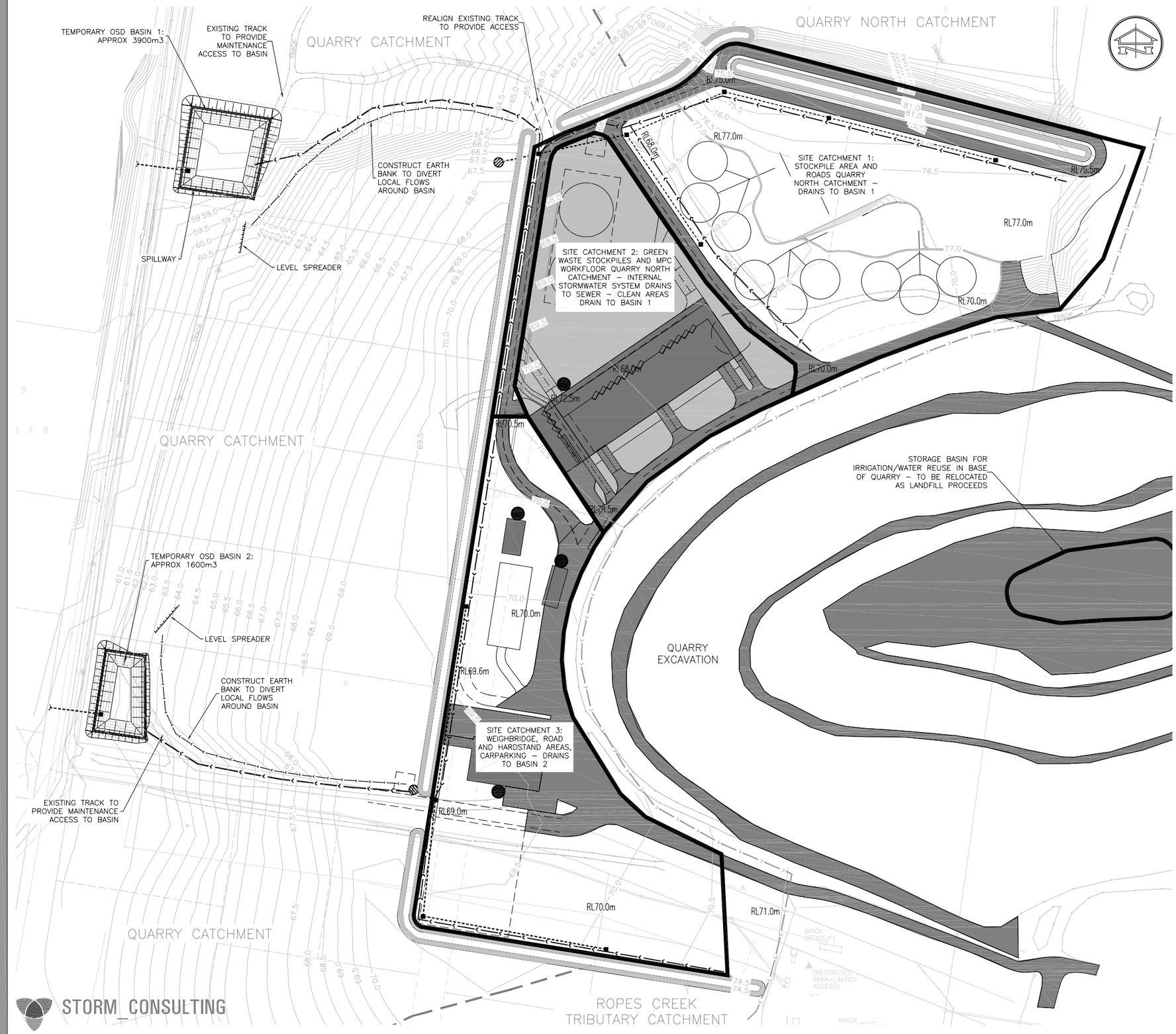
Frequency	Pollutant	Unit of measure	Sampling method
	Sodium	Milligrams per litre	Grab sample
	Standing water level	Metres	In situ
	Sulfate	Milligrams per litre	Grab sample
	Total dissolved solids	Milligrams per litre	Grab sample
	Total suspended solids	Milligrams per litre	Grab sample
Yearly	Aluminium	Milligrams per litre	Grab sample
	Arsenic	Milligrams per litre	Grab sample
	Barium	Milligrams per litre	Grab sample
	Benzene	Milligrams per litre	Grab sample
	Cadmium	Milligrams per litre	Grab sample
	Chromium	Milligrams per litre	Grab sample
	Cobalt	Milligrams per litre	Grab sample
	Copper	Milligrams per litre	Grab sample
	Ethyl benzene	Milligrams per litre	Grab sample
	Lead	Milligrams per litre	Grab sample
	Mercury	Milligrams per litre	Grab sample
	Organochlorine pesticides	Micrograms per litre	Grab sample
	Organophosphate pesticides	Milligrams per litre	Grab sample
	Phenols	Milligrams per litre	Grab sample
	Polycyclic aromatic hydrocarbons	Milligrams per litre	Grab sample
	Toluene	Milligrams per litre	Grab sample
	Total organic carbon	Milligrams per litre	Grab sample
	Total petroleum hydrocarbons	Milligrams per litre	Grab sample
	Xylene	Milligrams per litre	Grab sample
	Zinc	Milligrams per litre	Grab sample

APPENDIX C SITE LAYOUT



Appendix C - Site Layout

APPENDIX D EROSION AND SEDIMENT CONTROL PLAN



LEGEND

- INDICATIVE STORMWATER PIT LOCATION
- INDICATIVE STORMWATER PIPE LOCATION
- OVERLAND FLOW/ SWALE DIRECTION
- OVERLAND FLOW SWALE TO DETENTION BASIN
- GROSS POLLUTANT TRAP
- DESIGN CONTOURS (0.5m INTERVAL)
- MIN 10kL RAINTANKS FOR BUILDINGS (INTERNAL REUSE – TOILET FLUSHING, LOCAL IRRIGATION, TOP UP OF WHEEL WASH)
- INDICATIVE FUTURE OVERLAND FLOW SWALE FROM FINAL LANDFILL FORMATION

NOTES

1. ALL ROADS AND CONTSTRUCTED PLATFORMS MINIMUM GRADE 0.5%,
2. ALL CONSTRUCTED PLATFORMS AND ROADS TO BE DRAINED BY PIT/PIPE DESIGNED FOR 20 YEAR ARI CAPACITY, AND OPEN SWALE DESIGNED FOR 100 YEAR ARI CAPACITY.
3. ALL SWALES AND CULVERT OUTLETS TO BE ARMOURED/VEGETATED AS PER DETAILED DESIGN.
4. ALL AREAS TO DRAIN TO DETENTION BASINS TO THE WEST OF THE SITE AS PER COUNCIL INSTRUCTIONS.
5. IRRIGATION/ DUST SUPPRESSION LINE TO BE INSTALLED ALONG BERMS AND AS DETAILED BY HYDRAULIC ENGINEER.
6. TYPICAL SECTION OF DETENTION BASIN SHOWN ON DRAWING D02.
7. BASIN VOLUME GIVEN IS IN ADDITION TO WETLAND PERMANENT STORAGE AND REUSE STORAGE.
8. REFER TO DRAWING D02 FOR EARTH BANK DETAIL AND LEVEL SPREADER DETAIL

SITE CATCHMENTS

	CATCHMENT 1 [INCLUDES CRUSHED MATERIAL STOCKPILE AREA]	CATCHMENT 2 [GREEN WASTE STOCKPILE AREA AND MPC WORKSHOP]	CATCHMENT 3 [WEIGHBRIDGE, HARDSTAND AREAS, OTHER BUILDINGS]
TOTAL AREA	6.5HA	3.3 HA	4.8 HA
TEMPORARY OSD BASIN VOL (BASED ON 400m3/Ha WITH STAGED DISCHARGE OUTLETS AT BASIN)	3,900m3 FOR TOTAL AREA OF CATCHMENTS 1 AND 2. VERY CONSERVATIVE OSD VOLUME AS MAJORITY OF RUNOFF FROM CATCHMENT 2 UP TO 100 YEAR EVENT WILL BE COLLECTED AND PUMPED TO LEACHATE TREATMENT SYSTEM		1,600m3

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DATUM:
DRAWN: BF DESIGNED: BF
SCALE: 1:1500
DATE: NOV 2008
CHECKED: NL

CLIENT:
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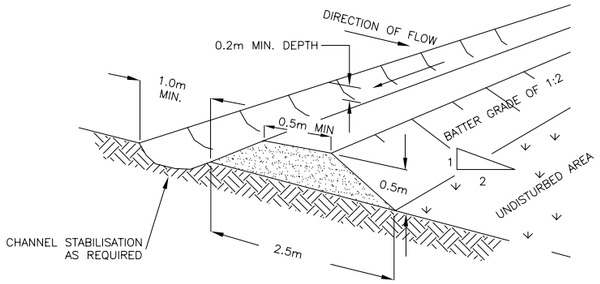
32 Burrows Road
Alexandria NSW 2015
(02) 9519 9999

LIGHT HORSE BUSINESS CENTRE
STORMWATER MANAGEMENT PLAN
GERERAL ARRAGEMENT AND LAYOUT

DRAWING: P01
SHEET: 1 OF 3
A1

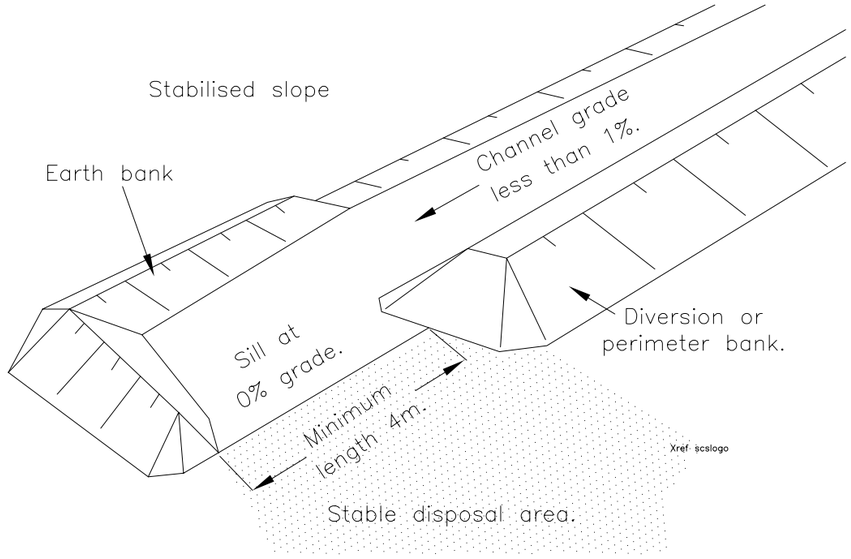


EARTH BANK DETAIL

NTS

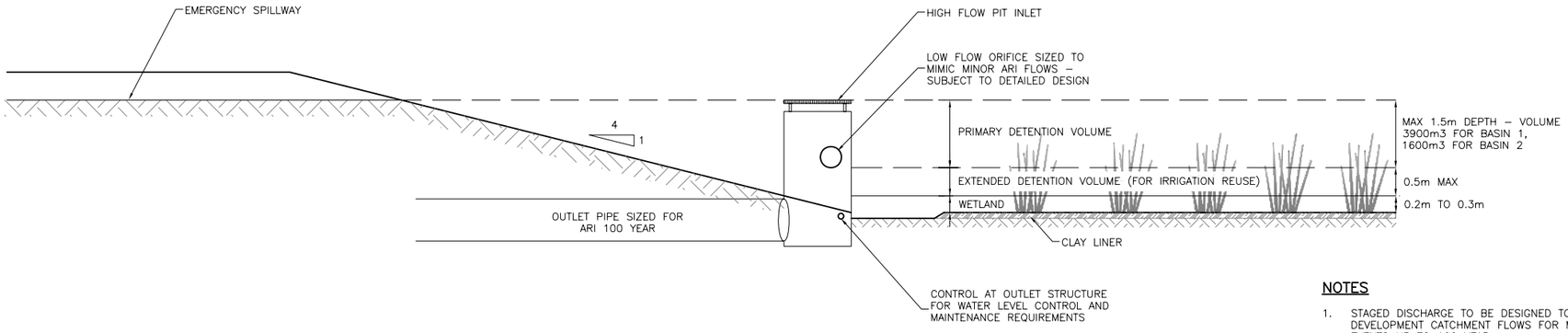
EARTH BANK CONSTRUCTION NOTES

1. CONSTRUCT AT A GRADIENT BETWEEN 1 AND 5%
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE – WORK AROUND THEM
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V-SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITH 10 DAYS OF CONSTRUCTION.
7. WHERE DISCHARGING TO ERODIBLE LANDS, ENSURE THEY OUTLET THROUGH A PROPERLY CONSTRUCTED LEVEL SPREADER.
8. CONSTRUCT LEVEL SPREADER AT A GRADIENT OF LESS THAN 1%
9. WHERE POSSIBLE, ENSURE THEY DISCHARGE WATERS ONTO EITHER STABILISED OR UNDISTURBED DISPOSAL SITES WITH THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED. APPROVAL MIGHT BE REQUIRED TO DISCHARGE INTO OTHER SUBCATCHMENTS.



LEVEL SPREADER

NOT TO SCALE



SCHEMATIC OF DETENTION BASIN AND STAGED DISCHARGE OUTLET

SCALE 1:50

NOTES

1. STAGED DISCHARGE TO BE DESIGNED TO MATCH PRE AND POST DEVELOPMENT CATCHMENT FLOWS FOR MAJOR AND MINOR ARI RAINFALL EVENTS UP TO 100 YEAR.
2. PRIMARY DETENTION VOLUME TO CATER FOR UP TO 100 YEAR ARI.
3. EXTENDED DETENTION (REUSE) VOLUME TO BE INCLUDED DEPENDING ON FINAL WATER BALANCE AND REUSE REQUIREMENTS – SUBJECT TO DETAILED DESIGN.
4. WETLAND DESIGN AND PLANTING SUBJECT TO DETAILED DESIGN.

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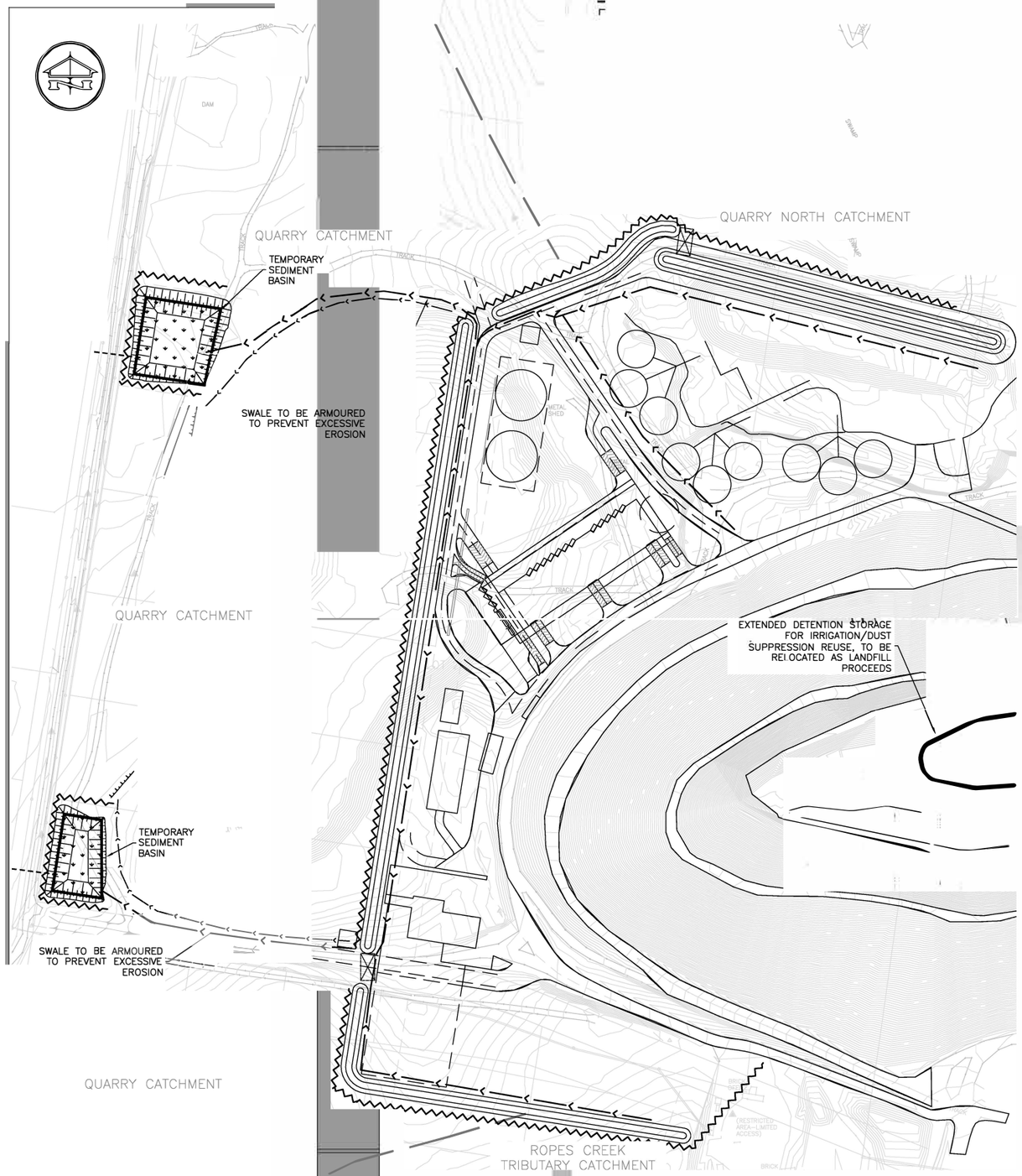
Alexandria NSW 2015
(02) 9519 9999

LIGHT HORSE BUSINESS CENTRE
STORMWATER MANAGEMENT PLAN
OSD TYPICAL SECTION

DRAWING: D02
SHEET: 2 OF 3
A1

STORM CONSULTING SUITE 3, 6 WEST STREET PYMBLE NSW, AUSTRALIA 2073 PH: +61 2 9499 4333 FAX: +61 2 9499 4311 www.stormconsulting.com.au



GENERAL REQUIREMENTS

THE FOLLOWING SOIL AND WATER MANAGEMENT PLAN (SWMP) HAS BEEN DEVELOPED IN GENERAL ACCORDANCE WITH LANDCOM (2004) – MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION, OTHERWISE KNOWN AS "THE BLUE BOOK". THE CONTRACTOR SHALL BE AT ALL TIMES RESPONSIBLE FOR TAILORING THE SOIL AND WATER MANAGEMENT PLAN TO SUIT SITE CONDITIONS. AS CONSTRUCTION PROGRESSES THE CONTRACTOR SHALL AMEND THE SOIL AND WATER MANAGEMENT PLAN ACCORDINGLY. IT IS THE CONTRACTOR'S RESPONSIBILITY ALL TIMES TO ENSURE THAT THE SOIL AND WATER MANAGEMENT MEASURES COMPLY WITH THE REQUIREMENTS OF THE BLUE BOOK.

SITE ESTABLISHMENT

PRIOR TO THE COMMENCEMENT OF EARTHWORKS ON THE SITE THE FOLLOWING SHALL BE UNDERTAKEN AS A MINIMUM:

1. ERECT SAFETY FENCING WITH SIGNAGE CLEARLY INDICATING THAT THE SITE IS A CONSTRUCTION ZONE AND ACCESS IS RESTRICTED AS DEEMED NECESSARY.
2. ERECT CLEARLY VISIBLE BARRIER FENCING AT LOCATIONS SHOWN OR IF NOT SHOWN AT THE DISCRETION OF THE SITE SUPERINTENDENT TO ENSURE TRAFFIC IS CONTROLLED AND TO PROHIBIT UNNECESSARY SITE DISTURBANCE.
3. INSTALL STABILISED SITE ACCESS IN ACCORDANCE WITH DRAWING SD6–14 AT EACH SITE ACCESS POINT TO PREVENT CONSTRUCTION EQUIPMENT FROM CARRYING SEDIMENT OFF THE SITE ONTO SURROUNDING ROADS.
4. INSTALL SEDIMENT AND EROSION CONTROL DEVICES IN ACCORDANCE WITH THE CONSTRUCTION DETAILS SPECIFIED IN THIS DRAWING SET AND/OR THE REQUIREMENTS OF THE 'BLUE BOOK'.

CONSTRUCTION

5. TOPSOIL, FROM ALL AREAS TO BE DISTURBED, SHALL BE STRIPPED PRIOR TO CONSTRUCTION OF ANY WORKS AND STOCKPILED AND LATER RESPREAD TO AID REVEGETATION IN LANDSCAPED AREAS. TOPSOIL SHALL BE STOCKPILED IN WINDROWS OUTSIDE OF MAJOR FLOW AREAS.
6. ALL DRAINAGE WORKS SHALL BE CONSTRUCTED AND STABILISED AS EARLY AS POSSIBLE DURING DEVELOPMENT.
7. ALL TAIL–OUT DRAINS SHALL BE GRASSED AND TRAPEZOIDAL IN SECTION. HAY BALES SHALL BE PLACED AS A SEDIMENTATION CONTROL DEVICE WHERE REQUIRED.
8. ALL DISTURBED AREAS SHALL BE REVEGETATED AS SOON AS THE RELEVANT WORKS ARE COMPLETED. TOPSOIL SHALL BE AMELIORATED AND COMPOSTED TO LANDSCAPE ARCHITECTS SPECIFICATIONS.
9. INLET FILTERS WILL BE INSTALLED WHERE SHOWN TO PREVENT WATER FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE. IF THE LOCATION OF INLET FILTERS ARE NOT SHOWN ON THE PLAN THEIR LOCATION SHALL BE AT THE DISCRETION OF THE SUPERINTENDENT.

STOCKPILES

10. SPOIL AND TOPSOIL STOCKPILES SHALL BE LOCATED NO CLOSER THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
11. IF STOCKPILES ARE TO BE IN PLACE FOR LONGER THAN 10 DAYS THEN THEY SHALL BE STABILISED BY COVERING WITH MULCH OR WITH TEMPORARY VEGETATION.
12. STOCKPILES SHALL BE IN WINDROWS NO HIGHER THAN 2m HIGH AND SHALL HAVE BATTER SLOPES NO STEEPER THAN 1 IN 2. AN EARTH BANK SHALL BE INSTALLED ON THE UPSLOPE SIDE AND SEDIMENT FENCING SHALL BE INSTALLED ALONG THE LENGTH OF THE DOWNSLOPE SIDE ON ANY STOCKPILE.

MAINTENANCE

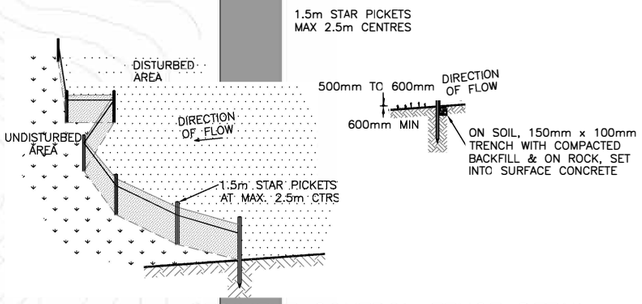
13. ALL SEDIMENT BASINS AND TRAPS SHALL BE CLEANED WHEN THE STRUCTURES ARE A MAXIMUM OF 60% FULL OF SOLID MATERIALS (INCLUDING DURING THE MAINTENANCE PERIOD) AND DISPOSED OF IN A MANNER THAT PREVENTS FURTHER POLLUTION OF THE SITE.
14. TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES WILL BE RETAINED UNTIL AFTER THE LANDS THEY ARE PROTECTING, ARE COMPLETELY REHABILITATED.
15. THE CONTRACTOR WILL INSPECT THE SITE AT LEAST WEEKLY OR AFTER ANY STORM EVENT AND WILL:
    - ENSURE THAT DRAINS OPERATE PROPERLY AND TO EFFECT ANY NECESSARY REPAIRS;
    - REMOVE SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS (E.G. LANDS CLOSER THAN FIVE METRES FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY DRAINS, WATERWAYS AND PAVED AREAS);
    - REMOVE TRAPPED SEDIMENT WHENEVER LESS THAN DESIGN CAPACITY REMAINS WITHIN THE STRUCTURE;
    - ENSURE REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND TO INITIATE UPGRADING OR REPAIR AS APPROPRIATE;
    - CONSTRUCT ADDITIONAL EROSION AND/OR SEDIMENT CONTROL WORKS AS REQUIRED;
    - MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED; AND
    - REMOVE TEMPORARY EROSION AND SEDIMENT CONTROL STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

SEQUENCE OF WORKS:

1. INSTALL SOIL AND WATER MANAGEMENT MEASURES AS DETAILED.
2. CONSTRUCT EARTHWORKS
3. CONSTRUCT DRAINAGE STRUCTURES
4. CONSTRUCT ROADS
5. REHABILITATE SITE AND REMOVE MANAGEMENT DEVICES.
6. CLEAN SEDIMENT BASINS AND CONSTRUCT AS OSD BASINS AS PER DETIALED DESIGN.

OTHER:

2. DETENTION BASINS TO BE CONSTRUCTED AT COMMENCEMENT OF PROJECT AND USED AS SEDIMENT BASINS UNTIL CONSTRUCTION OF OPERATIONAL AREA IS COMPLETE.
3. SEDIMENT BASINS TO BE CONVERTED TO OSD AT THE COMPLETION OF CONSTRUCTION AND WHEN SITE HAS BEEN STABILISED.
4. MAIN BUNDS AROUND SITE TO BE FORMED AT COMMENCEMENT OF EARTHWORKS.
5. ALL SITE SEDIMENT AND EROSION CONTROL MEASURES TO BE REVIEWED AS EARTHWORKS PROCEED.



SEDIMENT CONTROL FENCE DETAIL

NTS

SEDIMENT FENCE CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10YR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO THE GROUND AT 2.5m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF–SUPPORTING GOETEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

LEGEND:

- PROPOSED SWALE (AND DIRECTION OF FLOW)
- PROPOSED SEDIMENT FENCE
- DESIGN SURFACE CONTOURS (0.5m INTERVAL)
- STABILISED SITE ACCESS
- SEDIMENT BASIN LOCATION

LAND USE	LIMITATIONS	COMMENTS
CONSTRUCTION AREAS	DISTURBANCE TO BE NO FURTHER THAN FIVE (5) AND PREFERABLE TWO (2) METRES FROM THE EDGE OF ANY ESSENTIAL ENGINEERING ACTIVITY AS SHOWN ON THE PLAN	ALL SITE WORKERS WILL CLEARLY RECOGNISE THESE ZONES THAT, WHERE APPROPRIATE, ARE IDENTIFIED WITH BARRIER FENCING (UPSLOPE) AND SEDIMENT FENCING (DOWNSLOPE) OR SIMILAR MATERIALS
ACCESS AREAS	LIMITED TO A MAXIMUM WIDTH OF TEN (10) METRES	THE SITE MANAGER WILL DETERMINE AND MARK THE LOCATION OF THESE ZONES ONSITE. ALL SITE WORKERS WILL CLEARLY RECOGNISE THEIR BOUNDARIES THAT, WHERE APPROPRIATE, ARE MARKED WITH BARRIER MESH, SEDIMENT FENCING, OR SIMILAR MATERIALS.

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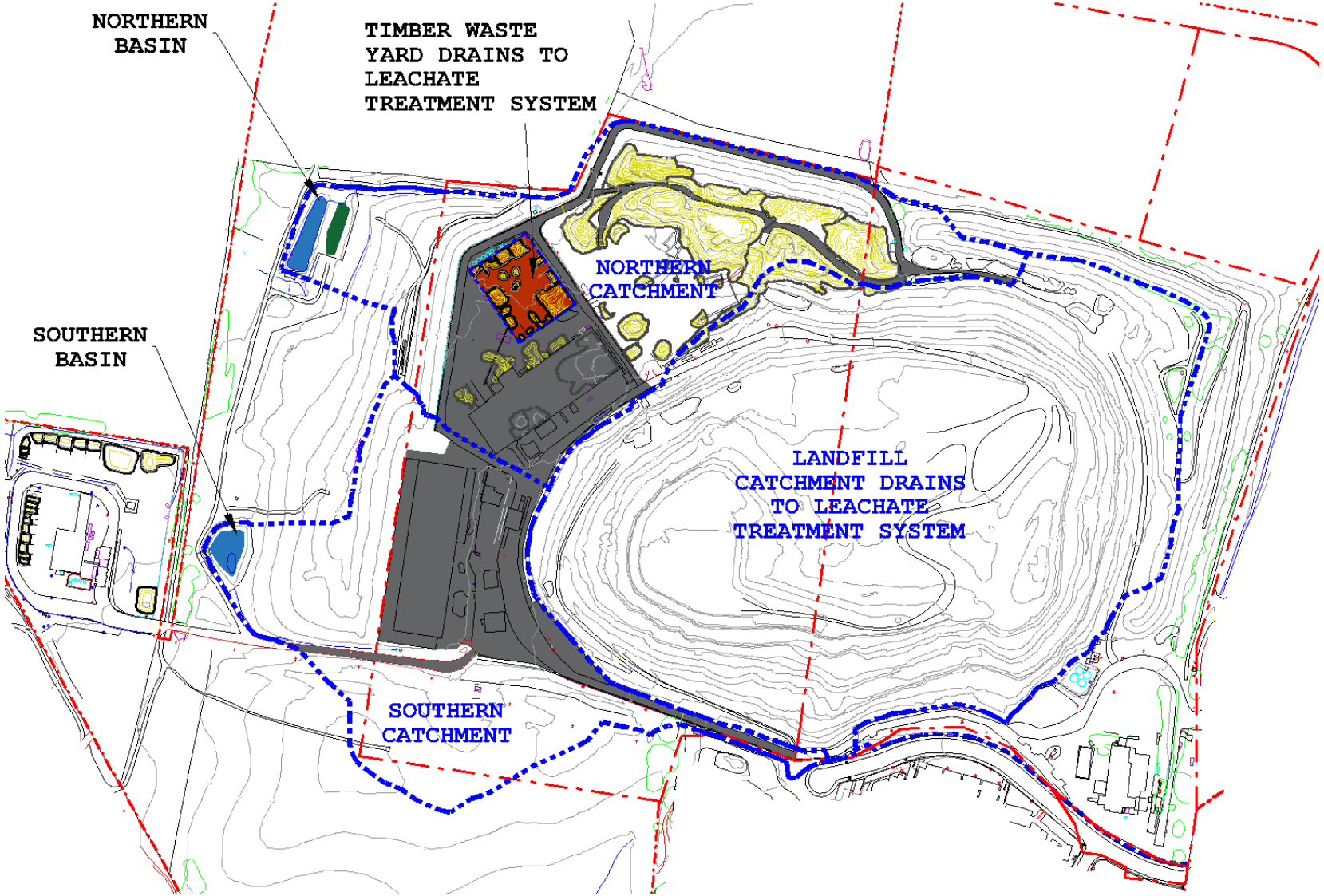
Alexandria NSW 2015
(02) 9519 9999

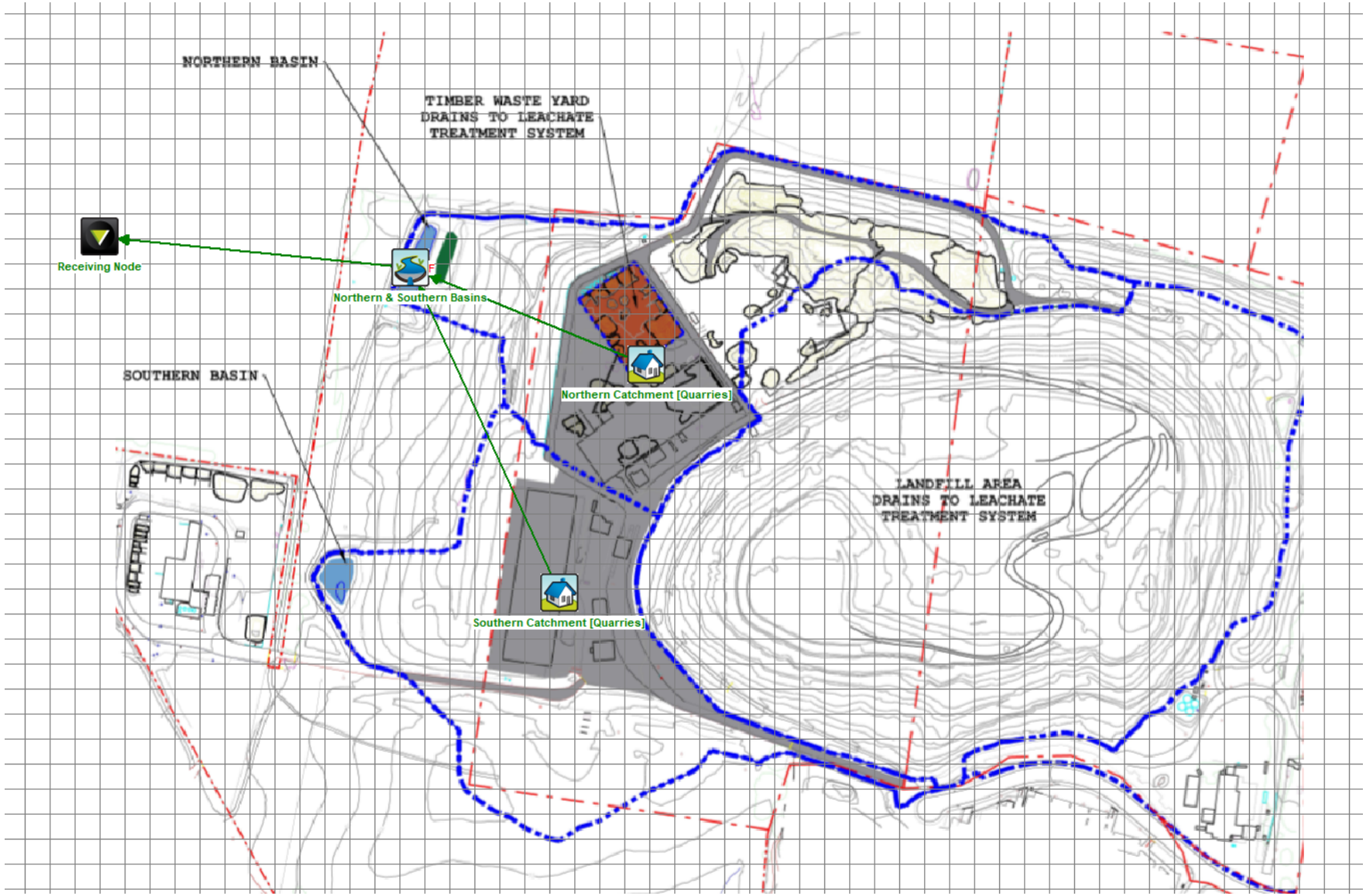
LIGHT HORSE BUSINESS CENTRE
STORMWATER MANAGEMENT PLAN
EROSION AND SEDIMENT CONTROL PLAN

DRAWING P03
SHEET 3 OF 3
A1

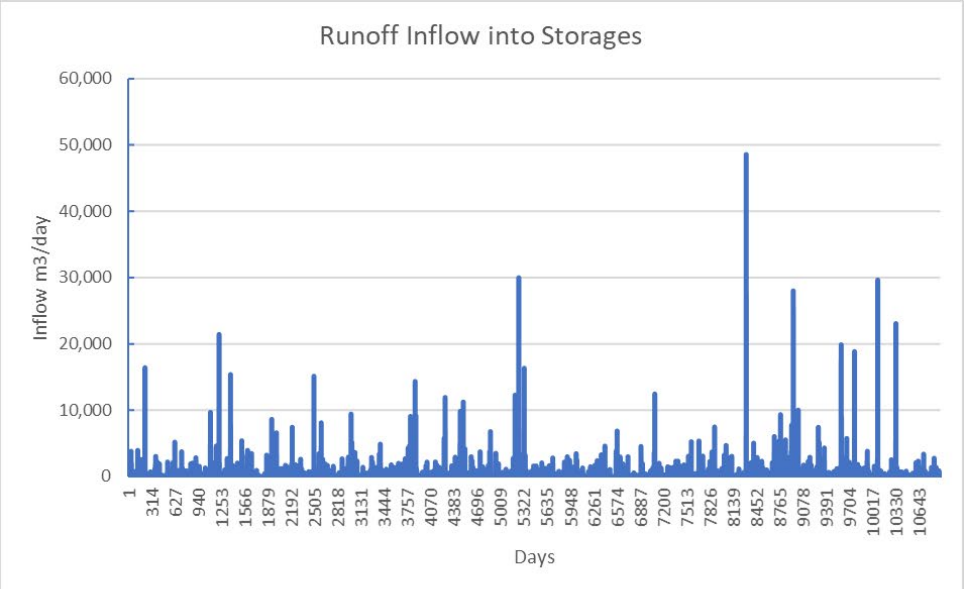
APPENDIX E WATER BALANCE MODELLING SUPPORTING DATA

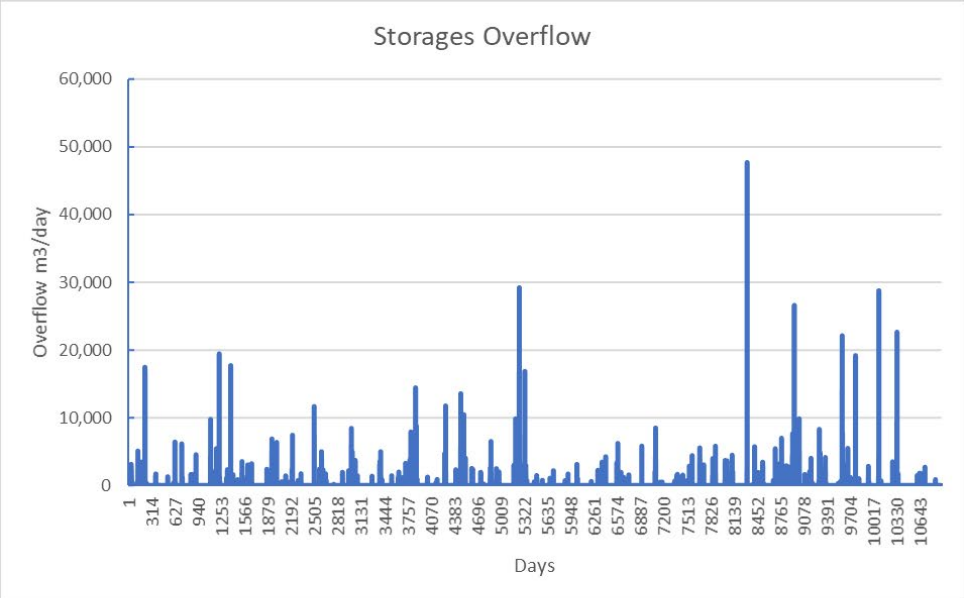


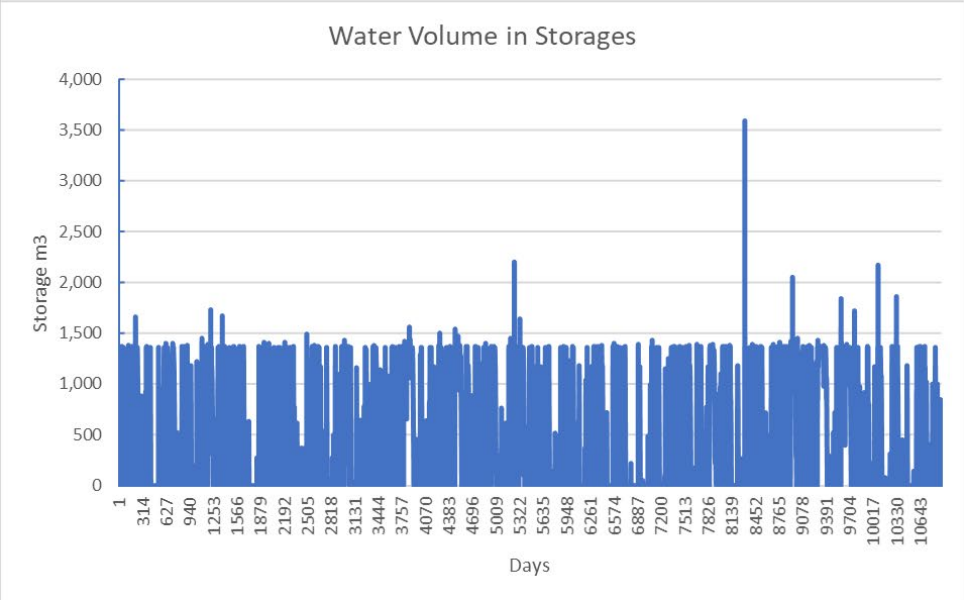
Site's Catchments and Storage Basins



Site's MUSIC Water Balance Model







Water balance calculation results for the current scenario