Willow Tree Waste Management Facility

Landfill Environmental Management Plan

Liverpool Plains Shire Council

19 January 2024

The Power of Commitment

GHD Pty Ltd | ABN 39 008 488 373
133 Castlereagh Street, Level 15
Sydney, New South Wales 2000, Australia
T +61 2 9239 7100 | **F** +61 2 9239 7199 | **E** sydmail@ghd.com | **ghd.com**

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	Draft A	H. Liew R. Huynh	C. Nivison-Smith	DRAFT	J. Roworth	DRAFT	19/01/24

Contents

Table index

Figure index

Appendices

Glossary

Acronym/Terms	Definition
APZ	Asset Protection Zone
CRG	Community Reference Group
EIS	Environmental Impact Statement
EMR	Environmental Management Representative
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environment Protection Licence
GSV	Gas Screening Value
HDPE	High density polyethylene
LEMP	Landfill Environmental Management Plan
LFG	Landfill Gas
LGA	Local Government Area
LPSC	Liverpool Plains Shire Council
OEMP	Operational Environmental Management Plan
OU	Odour Units
PE	Polyethylene
PoEO Act	*Protection of the Environment Operations Act 1997*
SOP	Standard Operating Procedure
UV	Ultraviolet
WHS	Work, Health and Safety
WHS Act	*Work Health and Safety Act 2011*
WTWMF	Willow Tree Waste Management Facility

1. Introduction

1.1 Background

Liverpool Plains Shire Council (LPSC or Council) is proposing to expand the Willow Tree Waste Management Facility (WTWMF) (the project) at Lot 213 DP 1173230, Merriwa Road, Willow Tree (the site) within the Liverpool Plains Local Government Area (LGA).

The staged expansion of the existing landfill at the WTWMF will occur in three stages. Stage 1 would involve construction of the Stage 1 basal and side wall liners, leachate barrier system and leachate basin as well as installation of a weighbridge, site office and amenities, resource recovery area including a community recycling centre, and drop-off locations for domestic customers for tyres, concrete, steel, green waste, bulky wastes, etc and small vehicles transfer station for domestic customers, for transfer by the site operator or collections contractor to the landfill cells.

1.2 Purpose

The purpose of this draft Landfill Environmental Management Plan (LEMP) is to provide a framework for site personnel for the operation of the landfill, with a focus on safe operational practices and suitable environmental management practices.

This draft version of the LEMP has been prepared to support the development application for the expansion – supplementary to the Environmental Impact Statement (GHD, 2023) (EIS), and specifically to demonstrate the safe operation of the facility as a result of the proposed layout of the facility.

1.3 Scope of this plan

Specifically, this plan includes:

- Overview of relevant regulatory guidance and compliance.
- Overview of site setting.
- Overview of historical and future landfill development.
- Description of landfill facility design.
- Description of landfill facility operations, including roles and responsibilities for employees involved in operation.
- Identification of potential key environmental performance issues.
- Overview of incident and contingency management procedures.
- Overview of environmental management, monitoring and reporting measures.

1.4 Revisions and updates

This LEMP is not a static document. It is a working document that requires regular review and updating to ensure ongoing suitability and effectiveness for environmental management at the WTWMF.

This LEMP shall be reviewed and updated regularly:

- To remain consistent with relevant regulations and guidelines.
- Should improvements to the management measures be required.
- To take advantage of new technologies, innovations and methodologies that are superior to the management measures presented in the current version of the LEMP.
- After changes are made with regards to landfill operations that may affect management measures in the current version of the LEMP.

Changes made to the LEMP, as well as the reasons for the changes made, will be documented as part of the review process. Copies of the original LEMP, as well as all future versions of the LEMP, shall be retained by Council and made available at prominent locations such as the weighbridge office, staff amenities etc.

At a minimum, this document will be reviewed and updated prior to the commencement of operation, every 5 years from commencement of operation and prior to the commencement of each landfill cell.

1.5 Limitations

This plan has been prepared by GHD for Liverpool Plains Shire Council and may only be used and relied on by Liverpool Plains Shire Council for the purpose agreed between GHD and Liverpool Plains Shire Council as set out in Section 1.2 of this plan.

GHD otherwise disclaims responsibility to any person other than Liverpool Plains Shire Council arising in connection with this plan. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the plan.

The opinions, conclusions and any recommendations in this plan are based on conditions encountered and information reviewed at the date of preparation of the plan. GHD has no responsibility or obligation to update this plan to account for events or changes occurring subsequent to the date that the plan was prepared.

The opinions, conclusions and any recommendations in this plan are based on assumptions made by GHD described throughout this plan. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Site setting

2.1 Site location

A summary of key site location details is provided in Table 2.1. The site locality and surrounding land is shown in Figure 2.1 and Figure 2.2.

Table 2.1 Site information summary

Item	Details
Address	Merriwa Road, Willow Tree, NSW, 2339
Land title	Lot 213, DP 1173230
Site landowner	Liverpool Plains Shire Council
Land zoning	SP1: Special Activities RU1: Primary Production
Overview of site location and surrounds	The site is surrounded by rural land with the Willow Tree township located 2 km northeast of the site. A privately run gravel quarry (Willow Tree Gravel Quarry) is located adjacent to the landfill site. Access to the site is provided off Merriwa Road. Merriwa Road is the only access route by road and connects the site directly to the township of Willow Creek Tree and the New England Highway. This highway is a major state road providing a direct transit route between the outer suburbs of Newcastle to the Queensland border.

Paper Size ISO A4

0 1,000 2,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Liverpool Plains Shire Council
Willow Tree Waste Management Facility Expansion
Environmental Impact Statement

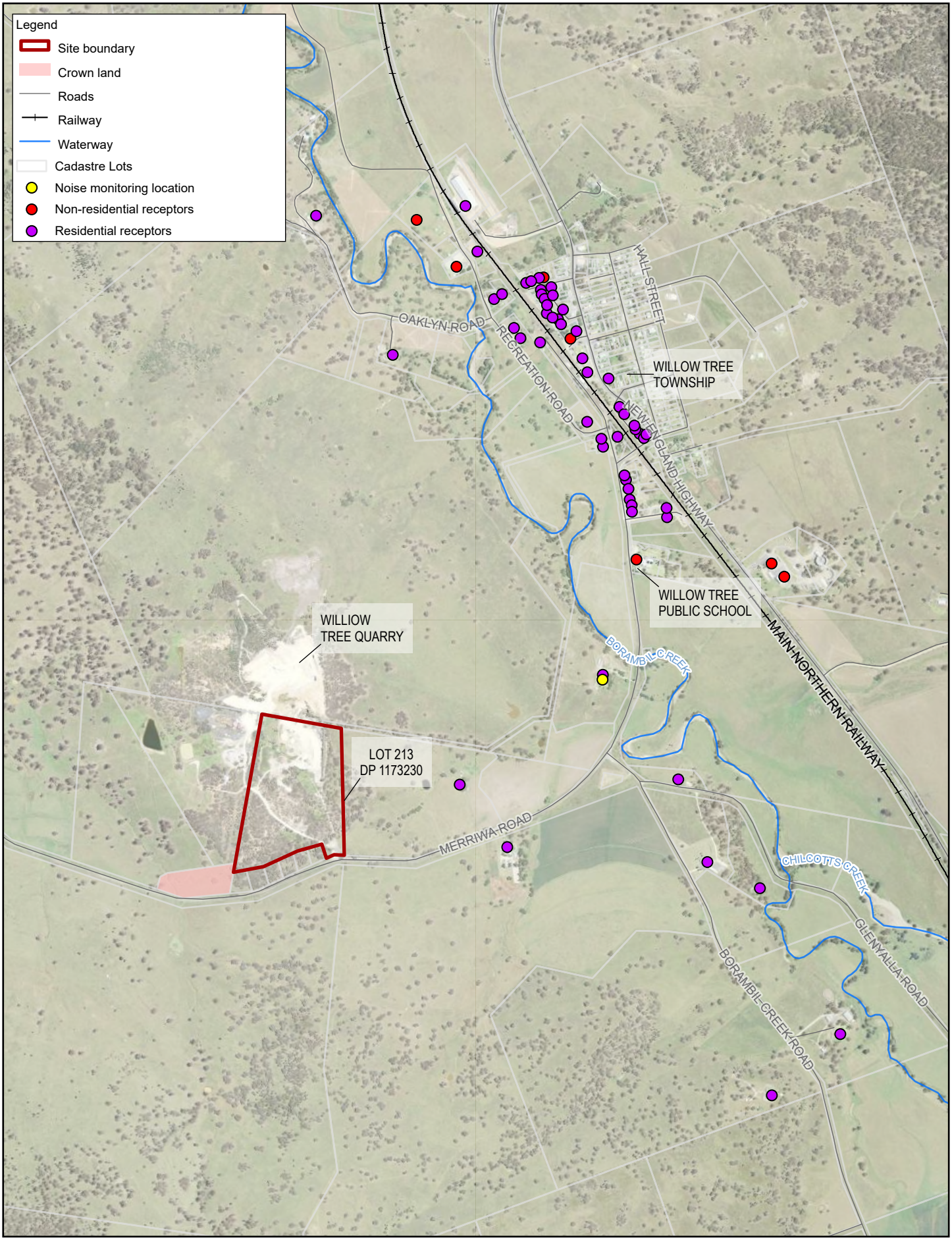
Project No. **12534581**
Revision No. **0**
Date **1/12/2022**

Regional location

FIGURE 2.1

N:\AU\Newcastle\Projects\22\12534581\GIS\Maps\Deliverables\12534581_EIS_0.aprx
12534581_EIS001_RegionalLocation_0
Print date: 01 Dec 2022 - 16:37

Data source: NPWS Reserves, Waterways - DFSI, 2022; Crown Land, Roads, Railways - DCS, 2022; NSW_Imagery: © Department of Customer Service 2020
World Street Map: Esri, HERE, Garmin, NGA, USGS. Created by: pfernandes



Paper Size ISO A4

0 200 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Liverpool Plains Shire Council
Willow Tree Waste Management Facility Expansion
Environmental Impact Statement

Project No. **12534581**
Revision No. **0**
Date **12/7/2022**

Site context

FIGURE 2.2

N:\AU\Newcastle\Projects\22\12534581\GIS\Maps\Deliverables\12534581_EIS_0.aprx
12534581_EIS002_SiteContext_0
Print date: 08 Dec 2022 - 10:39

Created by: rvillalon

2.2 Topography and hydrology

A roughly north-south trending ridge forms a central portion with an unsealed access track along it. The northern part of this ridge has been removed by quarrying such that the high point is now near the central western area of the site. The land slopes away from this high point in all directions.

The northern portion of the site has been modified by quarrying and landfilling whereas the southern portion is largely undisturbed. The northern portion generally drains towards a number of ponds that are central to this area and were likely formed during the quarrying activities. The southern and eastern portions sheet flow away in all directions from the high point, with an intermittent waterbody present in the southwestern corner of the site.

2.3 Hydrogeology and geology

2.3.1 Geological setting

Reference to the NSW Seamless Geology dataset (accessed via MinView) indicates the site is situated on lower Triassic age Banks Wall Sandstone [Tnrb] as shown in Figure 2.3.

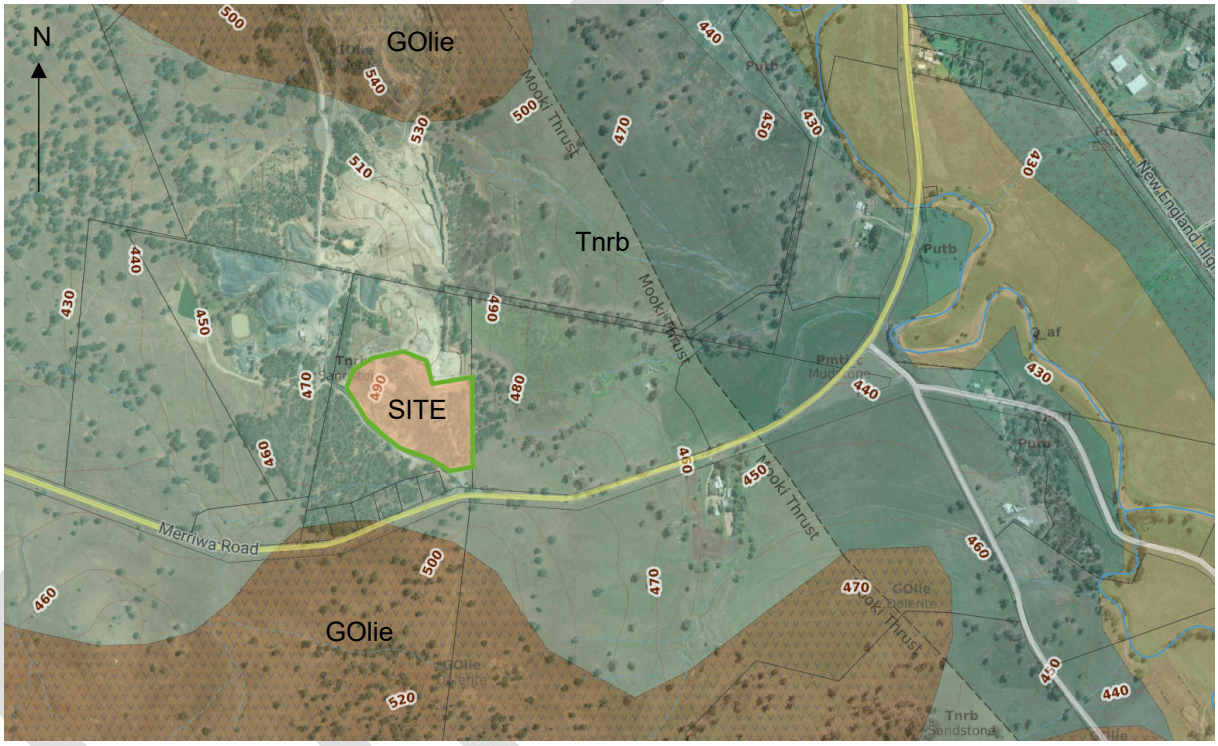


Figure 2.3 Geological setting

The superseded 1:250,000 scale Geological Series Sheet for Tamworth indicates that the site is situated on the Digby Conglomerate of the Narrabeen Group [Rrd].

As observed from bedrock outcrops on the site, this unit has bedding generally dipping toward a bearing of about 190° to 230° at 12° to 18° dip. The local lithology was observed to comprise conglomerate, pebbly sandstone and sandstone beds.

The Mooki thrust fault is located about 500 m to the north-east and dolerite capped hills, mapped as Liverpool East Basalt [GOlie], are about 1 km to the north of the site and south of Merriwa Road.

Willow Tree Gravel Quarry adjacent to the site quarries both the Liverpool East Basalt and Banks Wall Sandstone units to produce a variety of road and rail construction materials.

2.3.2 Soil landscape

Reference to the 1:100,000 scale Soil Landscapes of the Murrurundi map indicate that the site has a Ferrosol and Kandosol soil landscape. The soil landscape is characterised by undulating to rolling low hills with slopes ranging 5-15%. Slopes are typically 375-625 m long with elevation ranging from 400-460 m. Total relief is less than 50 m and a local relief of less than 30 m with minor to moderate erosion hazards. The typical soil profile consists of fine sandy loam to silt loam, overlying a loamy clay to clay.

2.3.3 Hydrogeology

Limited information is available on the hydrogeological conditions at the site. A review of nearby registered groundwater monitoring bores suggests groundwater levels significantly below the existing surface level.

2.4 Climate

Climate data for the site was obtained from the Bureau of Meteorology and is presented in Table 2.2 and Figure 2.4. Precipitation and temperature data was sourced from Murrurundi Gap AWS (Station no. 061392), located 11.8 km away from Willow Tree, NSW. Evaporation data was sourced from Lostock Dam (Station no. 061288), located 105 km away from the site.

Table 2.2 Climate statistics[1]

Time period	Mean monthly rainfall (mm) (Murrurundi Gap AWS, no. 061392)	Mean monthly maximum temperature (°C) (Murrurundi Gap AWS, no. 061392)	Mean monthly minimum temperature (°C) (Murrurundi Gap AWS, no. 061392)	Mean monthly[2] evaporation (mm) Lostock Dam, no. 061288)
January	65.9	28.5	16.6	189.1
February	68.9	27.2	15.7	145.6
March	79.1	24.4	14.2	124.0
April	32.4	20.9	11.2	96.0
May	34.7	16.7	8.1	77.5
June	63.9	13.0	5.9	66.0
July	47.5	12.6	5.0	77.5
August	42.3	14.7	5.8	108.5
September	46.2	18.4	8.5	138.0
October	55.7	21.7	11.0	167.4
November	86.8	24.3	13.0	174.0
December	83.6	26.4	14.7	207.7

[1] Climate data accessed 8 January 2024
[2] Calculated by multiplying daily evaporation by the number of days in that month, 28 days used for February.

Time period	Mean monthly rainfall (mm) (Murrurundi Gap AWS, no. 061392)	Mean monthly maximum temperature (°C) (Murrurundi Gap AWS, no. 061392)	Mean monthly minimum temperature (°C) (Murrurundi Gap AWS, no. 061392)	Mean monthly[2] evaporation (mm) Lostock Dam, no. 061288)
Annual (total for rainfall/evaporation and average for temperature)	718.2	20.7	10.8	1,569.5

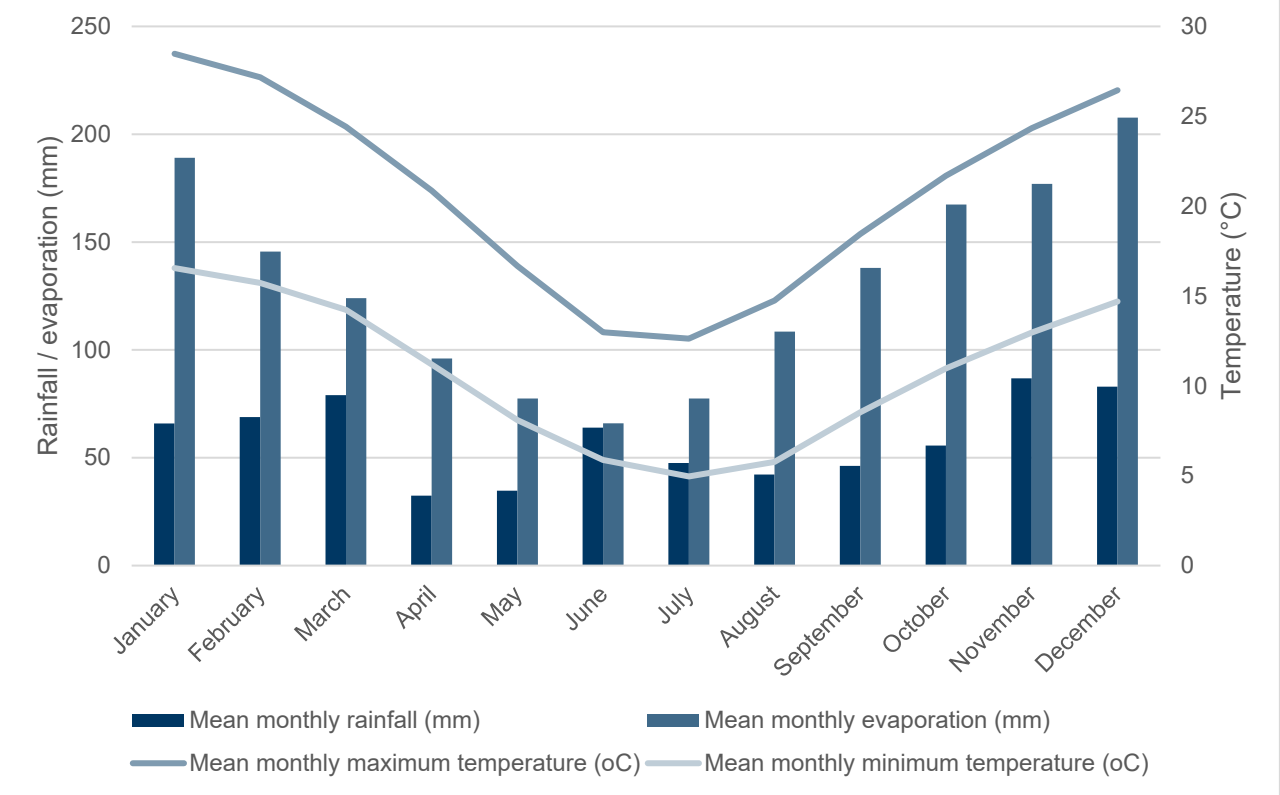


Figure 2.4 Climate statistics

The data shown above indicates the following:

- Mean monthly maximum and minimum temperatures are lowest during winter months (June - August) and highest during the summer months (December - February).
- Mean monthly rainfall varies across the year with the lowest during autumn and spring (April-May and July-October) and highest during summer and early autumn months (November-March).
- Estimated monthly evaporation is lowest during the late autumn and early winter months (May-July) and highest during late spring and summer months (September-February).
- Estimated monthly evaporation exceeds mean monthly rainfall for all months and estimated annual evaporation exceeds the estimated annual rainfall.

3. Regulatory guidance and compliance

3.1 General

The following key regulatory guidance documents have been considered in preparing this plan:

– Conditions of the Development Consent.
– Site Environment Protection Licence (EPL).
– NSW EPA (2016), Environmental Guidelines: Solid Waste Landfills, Second Edition (Landfill Guidelines).

These documents are discussed further below.

3.2 Conditions of consent

This section will be updated to consider the conditions of the Development Consent once issued following approval of the development application.

3.3 Environment Protection Licence

This section will be updated to consider the conditions of the site EPL once issued following approval of the development application.

3.4 Landfill Guidelines

The Landfill Guidelines provide guidance for the environmental management of landfills in NSW by specifying a series of 'Minimum Standards'. They involve a mix of design and construction techniques, effective site operations, monitoring and reporting protocols, and post-closure management. These guidelines have been considered with reference to the design and operation of the WTWMF, including the relevant environmental management measures.

4. Roles and responsibilities

The roles and responsibilities of key personnel are identified below in Table 4.1, in the context of this LEMP. If required, the same personnel may be utilised for multiple roles.

Table 4.1 Roles and responsibilities

Title	Role
Site manager	Overall responsibility for the management of the site and implementation of this LEMP.
Site supervisor	Supervision of site-based operational activities in accordance with this LEMP.
Site staff, including contractors	Day-to-day implementation of site-based operational activities in accordance with this LEMP.
Environmental management representative (EMR)	The EMR is responsible for overseeing the environmental management for the site and supervision of environmental activities. The EMR has the authority to stop work if an adverse impact on the environment has occurred or is likely to occur. The EMR will: - Be responsible for the presentation or certification of all environmental management plans and procedures. - Be responsible for considering and advising on matters specified in the conditions of this consent and compliance with such matters. - Oversee the receipt and response to complaints about the environmental performance of the site. - Facilitate an introduction and training program for all persons involved with operational activities.
Compliance officer	Council will employ or nominate a compliance officer for the WTWMF. The compliance officer will: - Be in charge of establishment and management of environmental monitoring contracts, wet weather monitoring and ad-hoc sampling as required and interpretation and management of monitoring data. - Report on results to relevant stakeholders, such as the site manager and NSW EPA if required.

5. Risk analysis

5.1 General

To guide the content of this LEMP, a risk analysis was completed for the operation of the landfill site, as guided by the EIS. It is noted that this is an overall risk analysis for the site operations rather than every specific activity that may occur. Risk assessments on a task/project level will be required for each operational activity, building on the guidance provided in this LEMP, as described in Section 5.2.

The key risks identified as part of this risk analysis, and the relevant section of the LEMP which addresses these risks are covered in Table 5.1.

5.2 Project or site-based risk assessment

Risk assessments on a task/project level will be required for each operational activity in terms of:

– Safe work methods: Safe work method statements shall be prepared for each operational activity. This should include a risk assessment to identify the relevant risks and guide the development of appropriate mitigation measures.
– Other: Project or site-based risk assessments may be carried out to assist in identifying additional environmental risks that may not have been assessed in the preparation of this LEMP. Examples include:
    - A change in legislation requires a change in operational practices and processes
    - Additional processes or activities are introduced that may increase the level of environmental risk.
    - When new and additional information concerning an environmental hazard becomes available.
    - When required by existing legislative requirements/

Table 5.1 Operational risk analysis

Hazard/s	Risk	Key mitigation measures
Poor air quality from dust and odour generated from vehicles and waste	Loss of amenity for neighbouring properties and sensitive receptors, fines	Maintenance of plant and equipment in good condition, dust suppression measures, minimise the size of the active landfill face, cover odorous waste, training. Refer to Sections 8.7 and 8.10 .
Noise levels above project noise trigger levels	Complaints from sensitive receptors, injury to on-site workers	Noise levels are predicted to be below the project noise trigger levels and within 2 dB of current levels with relevant precautionary measures in place. Refer to Section 8.11.
Native vegetation loss	Long-term impacts to habitat	None. Insignificant impacts expected to species or communities listed under the EPBC Act, with allowance for offsetting if required to be completed separate to this LEMP.
Contamination of surface water and groundwater receptors	Impaired surface water and groundwater receptors and associated ecosystems	Regular monitoring of surface water, discharges and groundwater, appropriate erosion controls, sediment pond management including discharges, leachate management controls. Refer to Sections 8.1, 8.3, 8.4 and 9.
Loss of culturally valuable items	Impacts to understanding/conservation of Aboriginal cultural heritage	None. No Aboriginal sites, no areas of potential archaeological deposit, low scientific significance of the site. Unexpected finds protocol to consider this item in separate construction environmental management plan documentation.
Loss of culturally valuable items	Impacts to understanding/conservation of non-Aboriginal cultural heritage	None. No archaeological features, low archaeological potential of the study area. Unexpected finds protocol to consider this item in separate construction environmental management plan documentation.
Poor traffic, transport and access management	Injury to on-site workers due to vehicle collision	Operational traffic management plan, speed limits, signage, separation of light and heavy vehicles. Refer to Sections 6.2 and 7.2.2.
Various safety risks from working at a landfill site, including working nearby quarry walls, shared traffic routes, working near water bodies, working with waste materials.	Injury due to fall/collision/exposure	Project or site-based risk assessments to be completed to generate suitable SWMS for the various site activities. Refer to Sections 5.2 and 7.5.
Modified landscape and impacts to visual amenity	Loss of amenity and complaints from nearby sensitive receptors	None. Low to negligible impacts on landscape character and visual amenity of the area
Storage and disposal of hazardous materials	Injury to on-site workers, environmental contamination and fines	Maintenance of hazardous material register, appropriate storage and labelling of hazardous materials. Refer to Section 8.12.

Hazard/s	Risk	Key mitigation measures
Bushfire or fire	Injury to on-site workers, loss of assets	Maintenance of vegetation, preparation of emergency preparedness and response management procedure, training, load inspections, waste separation, stockpile limits, fuel free zones, water supply, emergency access. Refer to Sections 6.2, 8.13 and 8.14.
Litter, residual waste	Environmental contamination, loss of amenity and fines	Routine checks, maintenance of equipment, covering of loads, litter collection. Refer to Sections 7.9 and 8.6.
Negative socio-economic impacts	Complaints from community	None. Expected positive impact on the local economy, social impacts are minimised due to distance from near neighbours.

6. Facility design

6.1 Facility layout

Table 6.1 summarises the various facilities that comprise the landfill expansion.

Table 6.1 Landfill facilities summary

Facility	Summary
Weighbridge, site office and amenities	Single weighbridge for vehicles entering and exiting the facility, including gatehouse for use as a site office and associated amenities, plus staff and visitor parking.
Resource recovery area	General area for resource recovery, may be utilised for community recycling, and drop-off locations for domestic customers for tyres, concrete, steel, green waste, bulky wastes, etc.
Small vehicles transfer station	Area for waste disposal by domestic customers, for transfer by the site operator or collections contractor to the landfill cells.
Landfill cells	Engineered landfill cells for waste disposal.
Landfill supporting infrastructure	Infrastructure to support the landfill cell operations, specifically the leachate pond and sediment pond.

The traffic and facility layout will be arranged such that the domestic customers can conduct their activities in a single traffic loop, and commercial vehicles can conduct their activities with safe delineation. It allows site users to drive-by and stop at the individual drop-off facilities, and to park their vehicles in designated areas where required. A domestic vehicle traffic route has been adopted to maximise waste diversion and recycling prior to domestic access to waste drop-off areas for landfilling. A conceptual arrangement for this is shown in Figure 6.1, noting this may evolve over time based on the recycling and drop off requirements of the community.

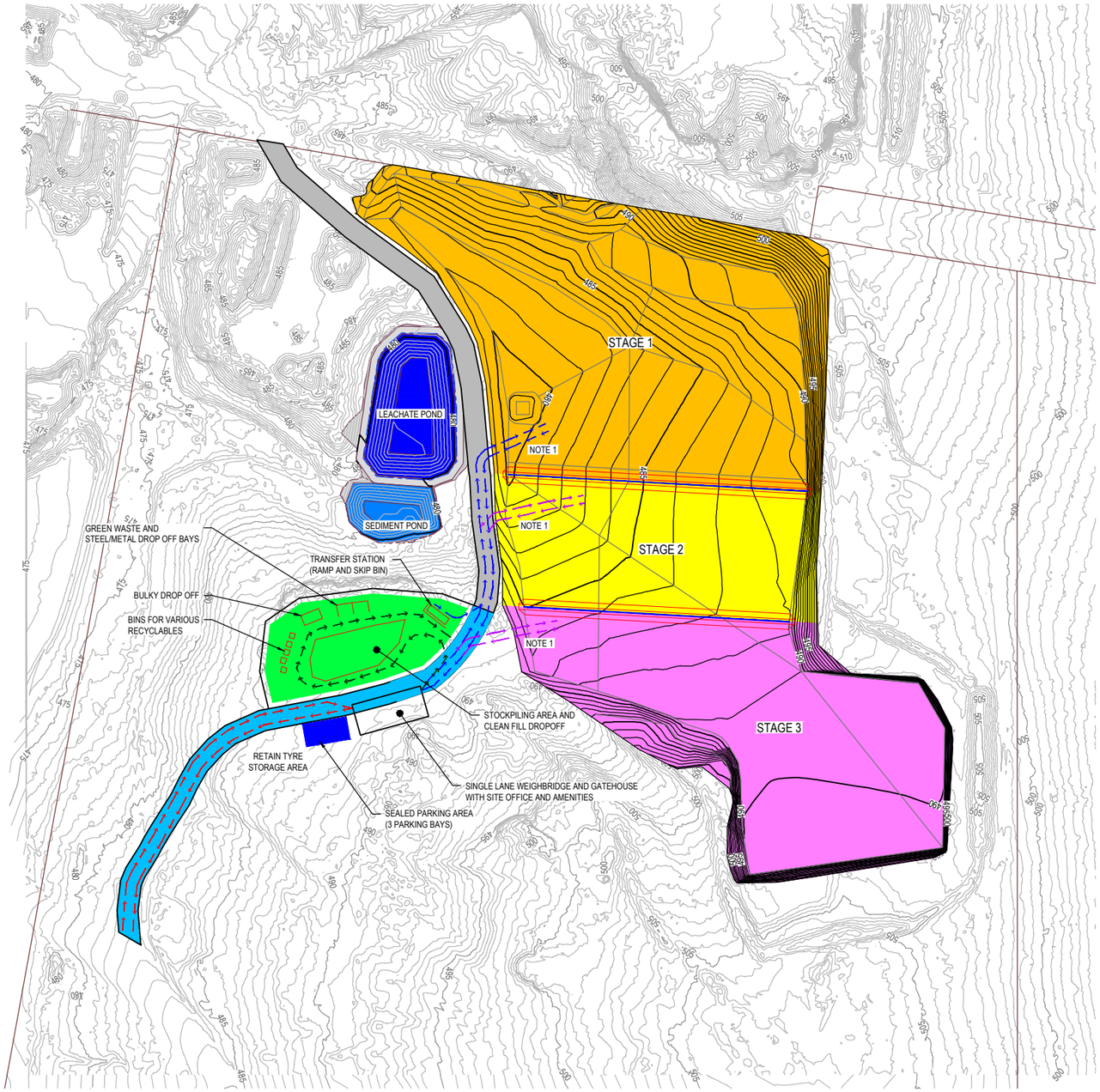
Provision has also been made for sufficient parking space for site staff, with safe access to the office and amenities buildings.

6.2 Access

Access arrangements would comprise the following:

– Access from the Merriwa Road via formalisation of the existing access track running through the site for both domestic and commercial vehicles.
– Combined access to the weighbridge for domestic and commercial vehicles, followed by delineation of these vehicles to separate routes.
– Access road for domestic vehicles to the resource recovery areas (to promote resource recovery in the first instance), followed by access to the small vehicles transfer station for residual waste disposal, and then access to the site exit route.
– Access road for commercial vehicles directly to the landfill cells, and then access to the site exit route. Safety measures to be implemented where commercial vehicles re-join and share domestic vehicle routes. Additional access for commercial vehicles to the small vehicles transfer station for waste transfer to the landfill cells.
– Access to the landfill cells will change as the different stages are brought online, shown in Figure 6.1. All three stages will utilise the existing unsealed access road, but will require a temporary road to the active tipping face, where the vehicles will utilise the landfill area as a turnaround bay.
– The access arrangements can also be utilised by emergency response vehicles to facilitate quick access in the event of an emergency, with additional access points via the adjacent quarry and directly to the south from Merriwa Road if needed.

A traffic management plan will be developed and implemented based on the above and included in the final LEMP, including safety measures such as vehicle route delineation, signage, speed limits, etc.



N

LEGEND:

- EXISTING CONTOURS
- DESIGN SUBGRADE CONTOURS
- CADASTRE
- DOMESTIC VEHICLES
- COMMERCIAL VEHICLES
- SHARED ROUTE
- FUTURE COMMERCIAL ACCESS TO STAGE 2/3
- UNSEALED ACCESS ROAD
- NEW SEALED ROAD

NOTES:

1. COMMERCIAL VEHICLES WILL UTILISE THE LANDFILL STAGE AREA FOR MANOEUVRING AND TURNAROUND DURING LANDFILL OPERATIONS.
2. SUITABLE RAMP TO BE INSTALLED FOR ACCESS INTO LANDFILL STAGE AT THE INITIATION OF EACH STAGE.
3. CONCEPTUAL ARRANGEMENT ONLY, SUBJECT TO DETAILED DESIGN.
4. ALL LOCATIONS ARE APPROXIMATE.

FACILITY LAYOUT

SCALE 1:1000

Rev	Description		Checked	Approved	Date
A	FOR APPROVAL		CN	JR	19/01/24
Author	R. LOPEZ	Drafting Check			
Designer	M. LE	Design Check			

0 10 20 30 40 50m

SCALE 1:1000 AT ORIGINAL SIZE

GHD Tower, Level 3 24 Honeysuckle Drive
Newcastle NSW 2300 Australia
PO Box 5403 Hunter Rgn Mail Cent. NSW 2310
T 61 2 4979 9999 F 61 2 4979 9988
E ntlmail@ghd.com W www.ghd.com
www.ghd.com

Project No. 12534581

Client: LIVERPOOL PLAINS SHIRE COUNCIL

Project: WILLOW TREE WASTE MANAGEMENT FACILITY

Status: FOR APPROVAL — Status Code: S0

Drawing Title: FACILITY LAYOUT

Drawing No.: 12534581-FIG 6.1

Size: A1

Rev: A

Plot Date: 19 January 2024 - 4:31 PM Plotted by: Chris Nivison-Smith File Name: \\ghdnet\ghd\PH\Cebu\Projects\21\12534581\CADD\Drawings\FOR CONSTRUCTION\12534581-FIG 6.1.dwg

6.3 Landfill staging

The expansion will occur in three stages that have been developed to facilitate ongoing access, leachate management and surface water management. The overall staging is shown in the Cell Arrangement Plan (Drawing No. 12534581-C003), with details on Stage 1 and 2 shown on Drawings C005 and C006 (see Appendix A).

6.4 Final landform

The final landform will be assumed to contain maximum approximately 1V:4H slopes with a minimum of 5% batters. As there is no specified future land use at present, the design sought to maximise landfill capacity across the expansion area. The final landform is shown in Drawing 12534581-C004 (see Appendix A).

6.5 Landfill design

For the landfill expansion, three leachate barrier systems will be utilised. Details are summarised in the following sections.

6.5.1 Basal liner

The basal liner is to be used for the cell base area which has minimum 1% grade toward the leachate sump. The basal liner profile is shown in Figure 6.2.

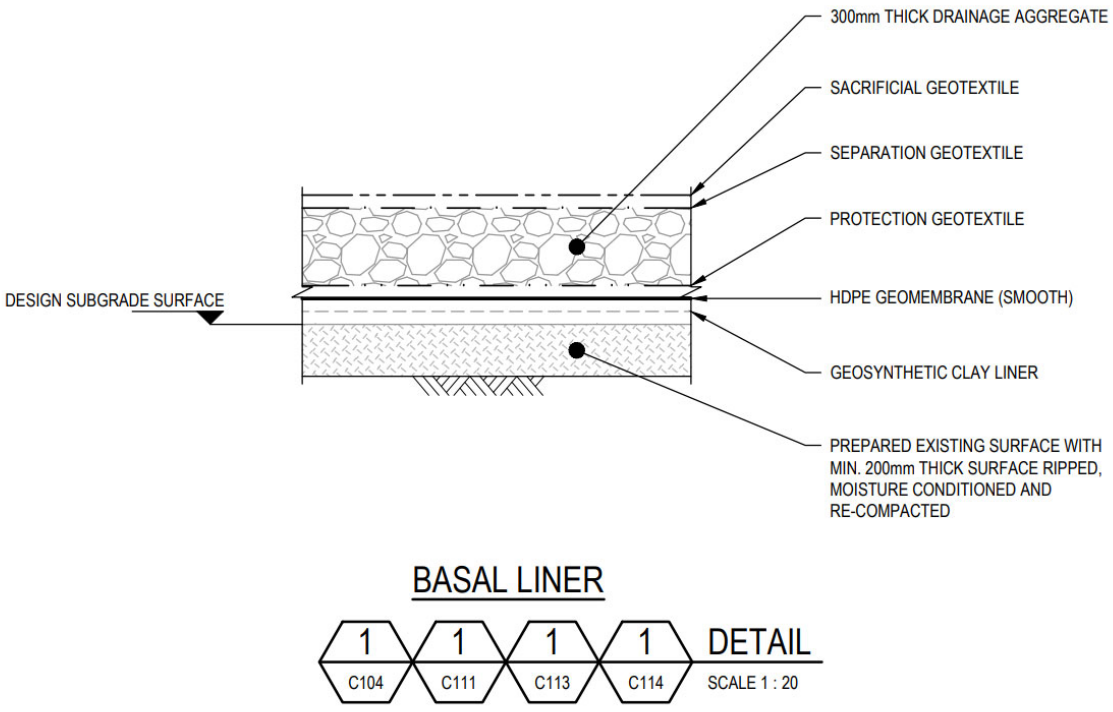


Figure 6.2 Proposed base area liner

The leachate barrier and collection system for the cell base area consists of a composite geosynthetic liner comprised of (from top to bottom):

- Sacrificial geotextile: A woven polyester geotextile will be utilised to prevent UV damage to the underlying geotextile.
- Separation geotextile: A non-woven polyester geotextile will be utilised between the drainage aggregate and waste layer.

– Drainage aggregate: A 300 mm thick layer of aggregate with PE pipework collects and conveys leachate to the leachate management system.
– Protection geotextile: A non-woven polyester geotextile will be utilised to protect the HDPE geomembrane sealing layer.
– HDPE geomembrane: A smooth HDPE geomembrane will be utilised for the base liner geomembrane. Smooth HDPE is preferred for use where strains allow, as it provides maximum durability and resistance to chemical degradation.
– Geosynthetic clay liner: A layer of sodium bentonite clay encapsulated between two geotextiles that are needle punched together for having consistent, very low permeability.

6.5.2 Batter liner

The batter liner is to be used for the cell area which has typically 1V:3V slope, connecting the basal and sidewall line systems. The batter area liner profile is shown in Figure 6.3.

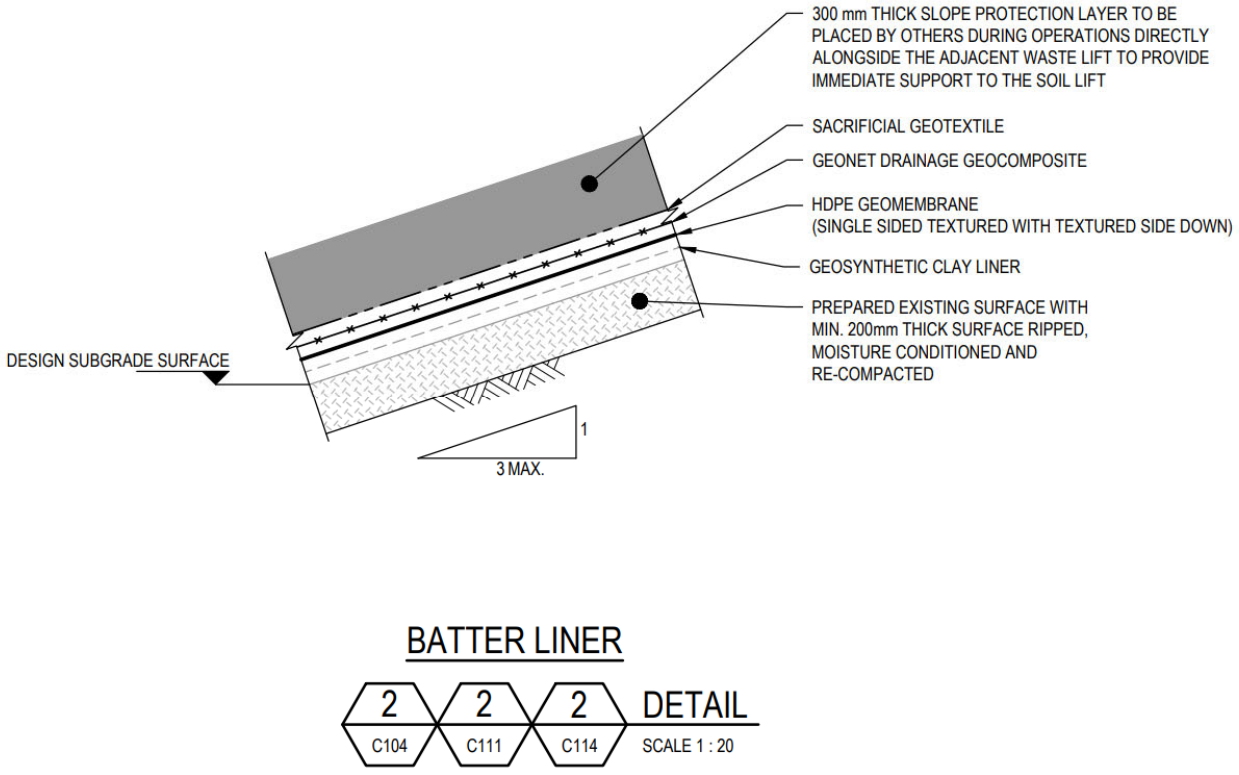


Figure 6.3 Proposed batter area liner

The leachate barrier and collection system consists of a composite geosynthetic liner comprised of (from top to bottom):

– Slope protection layer: A 300 mm thick layer sourced from off-site or the excess excavated material.
– Sacrificial geotextile: Same material as proposed for the basal liner.
– Geonet drainage geocomposite: A bi-planar geonet drainage geocomposite will be utilised as an alternative to drainage aggregate for improved constructability.
– HDPE geomembrane (single sided textured): A textured HDPE geomembrane will be utilised for the batter liner for additional slope stability.
– Geosynthetic clay liner: A layer of sodium bentonite clay encapsulated between two geotextiles that are needle punched together for having consistent, very low permeability.

6.5.3 Sidewall liner

The sidewall liner consists of progressively installed compacted clay berms. This provides a minimum 1 m thick clay liner across the steep existing quarry walls.

The proposed sidewall area liner is shown in Figure 6.4.

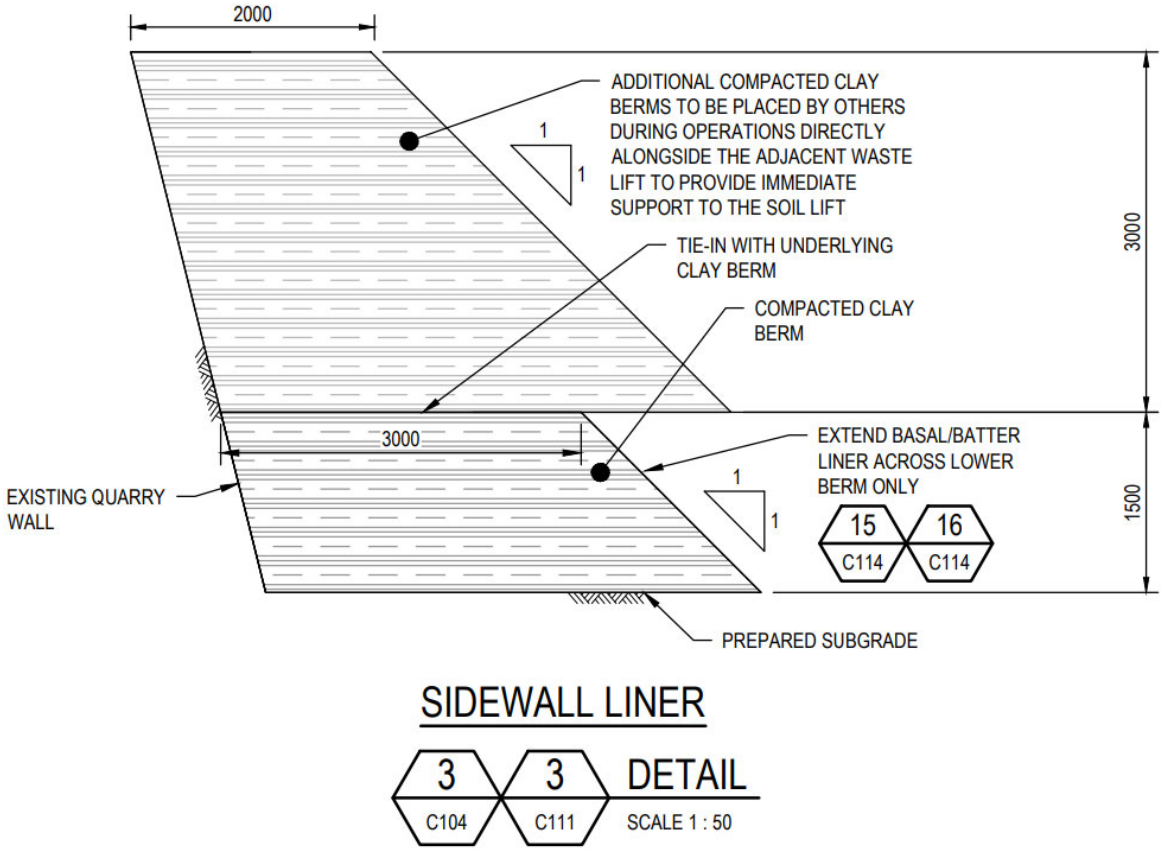


Figure 6.4 Proposed sidewall area liner

6.6 Surface water management

Incoming clean surface water flowing from surrounding terrain will be diverted around the landfill expansion area via diversion drains/banks.

Where possible, rainfall falling onto the footprint of the landfill cell would be prevented from coming into contact with waste via the application of soil (or other inert) cover materials. Sediment laden water would be opportunistically collected and/or diverted to the sediment pond for storage and settling prior to discharge.

The existing pond to be augmented to a sediment basin with a volume of 1,400 kL, based on the proposed landfill staging and sized in accordance with Landcom (2004), Manual Managing Urban Stormwater: Soils and Construction (Volume 1 and 2B). The basin naturally overflows to the west, via an open channel and would eventually discharge to Warrah Creek as the receiving water. Discharges will only occur in accordance with the site EPL, with consideration to the appropriate design storm event from Landcom (2004), including monitoring in accordance with Section 9.1.2. The water intercepted by the sediment pond will be reused for dust suppression where possible as part of site operations.

6.7 Leachate management

A leachate collection layer was included as part of the liner profile described above, including collection pipework in line with the Landfill Guidelines.

Leachate will be collected and transferred to the leachate pond for disposal via a sump riser and pump system. The leachate pond will be formed from an existing pond, with a leachate storage capacity of 3,200 kL based on infiltration and water balance modelling with consideration to the proposed landfill staging.

The leachate pond will be lined with a single sealing layer. Given potential issues with ongoing confinement and limited clay availability, a HDPE geomembrane sealing layer is utilised, with a geonet drainage geocomposite to allow for underdrainage and mitigate uplift. The pond liner profile is as follows (from top to bottom):

– HDPE geomembrane.
– Geonet drainage geocomposite.
– Prepared existing surface with min. 200 mm thick surface ripped, moisture conditioned and re-compacted.

6.8 Landfill gas management

Once sufficient waste is emplaced at the site, an assessment (pumping trial or similar) will be made as to whether landfill gas extraction is viable and relevant measures implemented, such as extraction pipework and flaring and/or LFG engines.

7. Facility operations

7.1 Hours of operation

The facility would operate from 7 am to 6 pm, 7 days per week.

7.2 Management, supervision and staffing

7.2.1 Staff structure

The site will be operated by suitably trained and experienced personnel as necessary to manage, supervise, operate and maintain the facility. Up to 5 staff would be employed at the site at any given time.

This shall include provision of staff to undertake the following activities:

- Provision of safe access and work areas.
- Planning of the staging of the landfilling operation.
- Overall management, supervision, operation and maintenance of the site and its waste management operations. This shall include personnel experienced in the operation of a solid waste management facility/landfilling operation.
- Maintenance of all site roads.
- Supervision of the active tipping face of any waste disposal area.
- Managing cover material at the site, including separation from incoming waste materials. Stockpiling, and transporting on-site using appropriate landfilling/earthworks equipment.
- Spreading, compacting and covering of the deposited waste using appropriate landfilling equipment/earthmoving equipment.
- Management, supervision, operation and maintenance of the recycling area/facilities.
- Management, operation and maintenance of all environmental management measures/controls at the site.
- Management, operation and maintenance of all other facilities and structures at the site including monitoring boreholes, fencing, gatehouse etc.
- Reporting of incoming vehicles including waste quantity, type and source.
- Securing the site to prevent unauthorised access.
- Maintaining signage.
- Responding to emergency situations.
- Reporting, as required by the EPL and to Council as required.

7.2.2 Traffic management

The site supervisor will maintain effective control of traffic at the site, and in particular in the active waste disposal area. The site supervisor will ensure that the equipment engaged in the movement, spreading, compaction and covering of deposited waste in the vicinity of any active tipping face is not operated in such a way as to constitute a risk to persons disposing of waste. Waste delivery vehicles and other contractor vehicles will be appropriately separated from operational traffic.

7.2.3 Logbook

An operator's daily logbook will be maintained for recording activities and incidents that occur during the operation of the site.

The activities and occurrences to be recorded should include, but are not limited to:

– Breaches of the site boundary fence, or any other incidents related to site security.
– Rejection of unacceptable wastes or waste loads.
– Incidents relating to health and safety of staff, visitors, contractors or customers.
– Incidents resulting in, or with the potential to cause environmental impacts.
– Malfunction or failure of plant and machinery.
– Malfunction or failure of controls and equipment for environmental management and monitoring.
– Complaints relating to site activities.
– Adverse weather conditions.
– Any failure of power supply or other utilities.

7.2.4 Training

Training will be undertaken to ensure that site staff operate the site in accordance with this LEMP, the EPL and other relevant guidelines and legislation, and will include training to ensure the following:

– All operators of plant and equipment are skilled in undertaking all required tasks.
– All staff inspecting incoming wastes are skilled in recording data accurately, and identifying unacceptable wastes.

In addition, regular training to all operative and managerial staff will be provided on the following topics:

– Waste identification and classification.
– Waste management / landfill practices.
– Waste management legislation and guidelines.
– Environmental requirements for landfilling, garden waste processing and recycling operations.
– Work health and safety regulations and practices.
– Fire control and management.
– First aid.

7.3 Equipment

Appropriate machinery, plant and equipment that is required for operation of this facility, in accordance with the requirements of this LEMP, will be maintained and/or engaged. This will include, but is not limited to, equipment for:

– Spreading, compaction and covering of deposited waste.
– Compacting, trimming, shaping, grading and levelling of cover layers.
– Any other operation required for the proper and efficient operation of the site, including managing the recycling wall.

All machinery, equipment, and plant will be operated in a proper and efficient manner and maintained in a proper and efficient working condition. In the event of equipment or plant failure, replacement plant or equipment will occur as soon as practical to ensure the requirements of the development consent and licence are fully complied with at all times.

7.4 Security

Outside operating hours the access gates will be locked by the site supervisor. Coded locks and/or keys will be provided by the site supervisor to contractors as required, and only Council provided locks will be used for access gates.

Keys to gates and buildings will only be kept by site employees and contractors required to access the site outside of normal working hours. Approval will be required from the site manager for issue of new keys to any party.

7.5 Health and safety procedures

All necessary precautions will be undertaken to ensure the safety of all personnel, users and visitors to the site. The supervising staff at the landfill will undergo a full induction prior to commencing work at the site. Inductions for operational staff or contractors conducting site works may be conducted by the inducted site supervisor.

The site manager will ensure that all employees are instructed concerning potential hazards at the landfill and that safe working practices are observed by all contractor staff.

First aid treatment facilities will be provided and maintained at the landfill and the site will have a person trained in first aid on site during all operating times.

It is Council's and its contractor's responsibility to be familiar with the provisions of the *Work Health and Safety Act 2011* ("the WHS Act") and regulations. The duties and all other obligations that the WHS Act places on an employer will be properly discharged by Council and its contractors, so that all employees are aware of their responsibilities under the WHS Act.

All necessary protective clothing and safety equipment will be made available and/or issued to all employees, is maintained in good condition, and is used where necessary.

Site infrastructure will be maintained such that it is adequate to meet the WHS requirements of Council and contractor personnel, as well as the general public. This includes ensuring large drops in ground level are appropriately barricaded.

All contractors employed at the site comply with applicable insurance and health & safety requirements. These companies include (but are not limited to) waste collection contractors, revegetation & landscaping companies, recycling contractors and environmental consultants.

Signage relating to safety on site will be clearly displayed for the public, staff and contractors visiting the site ensuring that safety precautions are adhered to. The types of signage include but not limited to:

– The types of wastes not accepted on site, e.g. combustible materials, unauthorised chemical drums.
– Location of first aid and fire extinguishers.
– Excluded or barricaded areas, e.g. around active tipping areas and basins.

7.6 Waste acceptance

The expanded WTWMF would receive a range of wastes, including:

– Landfill waste from LPSC 'red bin' garbage collection.
– 'Clean fill' (such as soil, sand, gravel, bricks or other excavated or hard material).
– Solid or liquid organic materials.

7.7 Waste screening program

All material accepted at the site for disposal or recovery are to be inspected and identified by site staff at the site entrance. All staff involved in acceptance of waste at the site entrance or in the relevant operational areas shall be appropriately trained in the identification and classification of solid waste.

Waste screening activities will typically comprise the following:

– Daily inspection of vehicles entering the landfill. Any consignments suspected to contain unacceptable wastes will be refused permission to deposit waste until the waste is verified as being acceptable. If applicable site staff shall require and collect appropriate evidence from the driver of the vehicle as verification that the waste is acceptable. This may include test certificates or approvals.
– Directing vehicles with unacceptable wastes to an appropriate disposal facility.
– Monitoring and inspection of wastes as they are discharged from vehicles at the waste disposal areas. Any waste suspected of being unacceptable shall be segregated and inspected closely to verify whether or not it is acceptable.
– Recording all incidents of identification of unacceptable wastes in the daily log, including:
    - Details of the waste e.g., type.
    - Source of the waste e.g., vehicle identification, driver identification and generator of the waste.
    - Recommended waste management facility(s).
    - Result(s) of contacting the waste management facility.
    - Date contacted EPA.

7.8 Unacceptable waste procedure

In the event that unacceptable waste is identified in an incoming vehicle, the vehicle will be refused entry, re-directed, and details of the incident recorded as described below. Site personnel will advise the driver of the vehicle of appropriate waste management facilities, or to contact the EPA for advice on appropriate management of the unacceptable waste.

In the event that unacceptable waste is identified during deposition by a vehicle, staff will immediately segregate and contain the waste away from the active landfilling area or recycling area. Site personnel will record the details of the waste, such as type, the source, and the vehicle and driver identification. Site personnel will advise the driver of the vehicle that the waste is not acceptable and may load the waste back onto the vehicle where practical and safe to do so. The vehicle will then be escorted from the landfill by site personnel. Site personnel will advise the driver of the vehicle to contact the EPA for advice on the appropriate management of the unacceptable waste.

In the event that unacceptable waste is identified during the spreading and compacting of deposited waste or stockpiling at the site, site personnel will segregate and contain the waste away from the active waste disposal or recycling areas. Site personnel will make all practical efforts to identify the source of the waste, including:

– Inspecting the waste for possible identification labels on containers.
– Identifying the type of waste and consequently the possible sources.

Site personnel will contact the EPA to confirm appropriate management options and will document the final disposition of the unacceptable waste in accordance with the EPA's requirements.

7.9 Waste handling, deposition and compaction

7.9.1 Waste handling

All handling of waste at the site will be in a safe manner and will be carried out with waste handling equipment where possible. Manual handling will be limited to a necessary minimum.

Site staff will be observant with regard to wastes that might be on fire or smouldering during all waste handling activities, in particular during unloading of waste consignments.

7.9.2 Waste deposition

Waste delivered by domestic customers in small vehicles will be deposited in the appropriate bunkers at the transfer station. From here the waste will be transferred to the landfill working area by internal Council vehicles. Loads in large trucks will by-pass the transfer station and access the working area of the landfill directly.

The waste is ideally placed in lifts not exceeding 3,000 mm in uncompacted depth, in a working face with a slope between 1V:3H and 1V:4H, which allows for optimum compaction effect.

During placement, the machine operators will be alert to any potentially dangerous objects that may not have been detected during screening. This may include gas bottles and pressurised spray containers, or any other objects or containers that may potentially explode or ignite when compacted. Any such objects will be removed from the working area prior to compaction of the waste, as well as any unsuitably large or hollow bulky items that may cause voids within the waste mass.

7.10 Daily and intermediate cover

The following measures will be implemented during placement of daily and intermediate cover:

– Daily cover will be placed on the active landfill area to a minimum thickness of 150 mm or application of approved alternative cover material.
– Intermediate cover will be placed in any waste-filled areas that have not been landfilled for more than 90 days to a minimum of 300 mm thickness.

7.11 Wet weather operation

Council will ensure that the landfill is able to accept solid waste under all reasonable weather conditions without compromising the environmental management of the site. This may include placing adequate broken rocks, bricks, concrete or road-base type materials at the filling area to facilitate access. If access issues are encountered during wet weather, waste may be deposited near the front of the waste disposal area and pushed to the back of this area by waste handling equipment.

7.12 Waste recording and reporting

All vehicles leaving the site will have a receipt completed and issued by the weighbridge operator using the proprietary weighbridge software. The receipt will include the vehicle registration and waste classification, and destination of the material exported. The weighbridge at the site will be manned by Council at all times during operating hours to ensure that all vehicles are recorded.

The following records should be kept and retained at the landfill operations office:

– A copy of this LEMP, and its various attachments and addendums.
– Logbook.
– Operator procedures manual.
– Worksite WHS manual.
– Copies of all licences, approvals and permits.

8. Environmental management measures

8.1 General

The following section describes environmental management measures for the operational environmental risks identified in the EIS and the risk analysis in Section 5. Should specific management plans be required in additional to the management strategies described below, these will be prepared and included in the final version of this LEMP.

8.2 Surface water

8.2.1 Environmental goals and principles

The environmental goals for surface water management on site are:

– To minimise erosion.
– Reduce the sediment load of stormwater discharge from site.

8.2.2 Management strategy

The following mitigation and management measures would be implemented:

– Erosion and sediment control measures and planning.
– Appropriate sediment pond management, including controlled discharges where warranted.
– Ongoing monitoring of surface water quality.

In addition, other management measures stipulated in this LEMP will support surface water management, including:

– Leachate minimisation, containment, collection, storage and disposal measures.

8.2.3 Performance indicators/targets

– Meet the requirements of Section 120 of the POEO Act 1997
– Surface water will be monitored as required in Section 9.1.2, to ensure water discharged offsite meets the license limits and does not cause environmental harm.

8.2.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

8.3 Groundwater

8.3.1 Environmental goals and principles

The environmental goals for groundwater management on site are:

– No significant impacts on groundwater quality.
– No significant impacts to groundwater users.

8.3.2 Management strategy

The following mitigation and management measures would be implemented:

– Ongoing monitoring of groundwater quality.

In addition, other management measures stipulated in this LEMP will support groundwater management, including:

– Leachate minimisation, containment, collection, storage and disposal measures.

8.3.3 Performance indicators/targets

– Meet the requirements of Section 120 of the POEO Act 1997
– Groundwater will be monitored as required in Section 9.1.1, to ensure no environmental harm is being evidenced in the nearby groundwater table.

8.3.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

8.4 Leachate

8.4.1 Environmental goals and principles

The environmental goals for leachate management on site are:

– To prevent the contamination of surface water and groundwater over the life of the landfill
– Prevention of the degradation of local amenity

8.4.2 Management strategy

The following mitigation and management measures would be implemented:

– Lining of the landfill cells to prevent contamination of water resources.
– Collection infrastructure within the landfill cells to transfer leachate to the evaporation pond.
– Covering and capping of waste to minimise leachate generation.
– Storage of leachate in a lined evaporation pond with sufficient freeboard prior to disposal via evaporation.
– Routine monitoring.

8.4.3 Performance indicators/targets

– Meet the requirements of Section 120 of the POEO Act 1997.
– Leachate will be monitored as required in Section 9.1, to ensure leachate complies with the licence and is not impacting the quality of surface water and groundwater.

8.4.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Daily logs.

8.5 Landfill gas

8.5.1 Environmental goals and principles

The environmental goals for landfill gas on site are:

– Minimise emissions of untreated landfill gas to air and through sub-surface strata and services.
– Minimise greenhouse gas emissions.
– Minimise emissions of offensive odour.
– Minimise the explosive risk to humans from gas build-up in confined spaces.
– Ensure that, wherever feasible, landfill gas is sustainably utilised for energy recovery.
– Minimise emissions of air pollutants from the combustion of landfill gas in flaring or electricity-generating equipment.

8.5.2 Management strategy

The following mitigation and management measures would be implemented:

– Surface, sub-surface and building monitoring as required.
– Installing infrastructure to contain, collect and treat landfill gas, depending on a site-specific assessment.

8.5.3 Performance indicators/targets

– No detectable sub-surface off-site migration of landfill gas.
– No detectable surface emissions of landfill gas or accumulation in enclosed structures above assessment criteria.

8.5.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

8.6 Litter

8.6.1 Environmental goals and principles

Based on the Landfill Guidelines, litter control aims to:

– Prevent degradation of local amenities by litter from the landfill or by mud and litter attached to vehicles leaving the landfill.
– Prevent contamination of on-site water bodies.

8.6.2 Management strategy

The following mitigation and management measures would be implemented:

– Regular application of daily cover in accordance with Section 7.10.
– Routine checks at waste sorting and storage areas for cleanliness, hygiene and WHS issues and contaminated waste materials.
– Weekly inspection of perimeter fences and clearing of litter as required.
– Avoiding servicing bulk bins from the transfer station during periods of high wind.
– Regular litter collection by site staff / labour hire.

– Covering all loads entering the site and during transit within the WTWMF.
– Prompt, efficient placement, continuous compaction and covering of waste when unloading.
– Proper management, transportation and disposal of rejects and other contaminated waste (including contaminated materials, hazardous materials and liquid wastes if any) in accordance with licensing requirements.

8.6.3 Performance indicators/targets

– No litter arising from the landfill operations.
– No litter arising from the transportation of waste to and from the WTWMF.

8.6.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any incidents.
– Annual reporting to the NSW EPA as part of EPL requirements.

8.7 Dust

8.7.1 Environmental goals and principles

Based on the Landfill Guidelines, dust control is aimed at:

– Prevention of dust and other particulate matter beyond landfill boundaries.
– Prevention of the degradation of local amenity.

8.7.2 Management strategy

The following mitigation and management measures would be implemented:

– On days with forecast and actual high winds (i.e over 10 m/s) reduce work effort accordingly if wind-blown dust is observed to be leaving the site boundary.
– Plant and equipment should be maintained in good condition to minimise ignition risk, spills and air emissions that may cause nuisance.
– Dust suppression should be undertaken as required using water sprays, water extension agents, soil stabilising polymers or other media on:
  - Unpaved work areas subject to traffic or wind.
  - During the loading and unloading of dust generating materials.
  - Unpaved access tracks.
– If the works are creating levels of dust which may significantly impact on residential amenity, the works should be modified or stopped until the dust hazard is reduced to an acceptable level.
– On days with high background dust levels (due to fire or offsite dust events for example), increase dust mitigation in the form of watering or reduce dusty construction activities.
– Vehicles with potential for loss of loads (such as dust or litter) should be covered when using public roads.
– Wetting down unsealed trafficable areas.

In addition, other management measures stipulated in this LEMP will support dust control, including:

– Waste handling and deposition in accordance with Section 7.9.1 and 7.9.2.
– Enforced site speed limits.
– Regular maintenance of site plant and equipment (including washdowns).

8.7.3 Performance indicators/targets

– Meet the requirements of Sections 124, 125 or 126 of the POEO Act 1997.
– No visible dust from the site beyond the boundary of the site.
– All on site staff adequately trained in dust minimisation procedures and techniques.
– No complaints from neighbouring landholders.

8.7.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

Additionally, a site environmental checklist will be maintained.

8.8 Pests and vermin

8.8.1 Environmental goals and principles

Based on the Landfill Guidelines, pest and vermin control aims:

– To minimise the sources of food and habitat,
– To employ professional exterminators if an outbreak is detected,

8.8.2 Management strategy

The following mitigation and management measures would be implemented:

– Compaction and covering of deposited waste.
– The site will be maintained in a clean and tidy condition at all times.
– The use of insecticides and pesticides, as required. Where chemicals are used, site staff will ensure that these do not enter the surface water management system and/or present a significant risk of environmental pollution.

8.8.3 Performance indicators/targets

– No pest and vermin on the site.
– No domestic customer complaints.

8.8.4 Reporting and review

Issues should be reported at site meetings and a site environmental checklist should be maintained.

8.9 Weed management

8.9.1 Environmental goals and principles

Based on the Landfill Guidelines, weed control aims to achieve:

– No spread of weeds off site to surrounding areas.

8.9.2 Management strategy

Weed and pathogen management will be undertaken in accordance with a Weed and Pathogen Management Plan (to be developed as part of the finalisation of this LEMP). It is likely to include the use of pesticides, as required.

Where chemicals are used, site staff will ensure that these do not enter the surface water management system and/or present a significant risk of environmental pollution.

8.9.3 Performance indicators/targets

– No weeds on the site.
– No evidence of high nutrient sediment runoff.

8.9.4 Reporting and review

Issues should be reported at site meetings and a site environmental checklist should be maintained.

8.10 Odour

8.10.1 Environmental goals and principles

Based on the NSW EPA Landfill Guidelines, odour control on site is aimed at:

– Prevention of degradation of local amenity.
– Prevention of landfill gas emissions.
– Achieving no detectable odours at the nearest residential receptor.
– If warranted, gas capture and destruction.

8.10.2 Management strategy

The following mitigation and management measures would be implemented:

– Minimising the size of the active landfill face.
– Establishing 24 hour emergency maintenance agreements with equipment manufacturers to limit the impact of equipment failures.
– Priority compaction and covering of any wastes with significantly odorous potential.
– Staff training.

8.10.3 Performance indicators/targets

– Meet the requirements of Section 129 of the POEO Act 1997.
– Achieving no detectable odours at the nearest residential receptor.
– No odour complaints.

8.10.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

8.11 Noise

8.11.1 Environmental goals and principles

Based on the Landfill Guidelines, noise control aims to:

– Prevent noise pollution.
– Avoid significant impacts on the community or environment.

8.11.2 Management strategy

The following mitigation and management measures would be implemented:

– Maintaining all landfill plant and machinery in proper working order.
– Ensuring all vehicles accessing the site use the designated access roadways.
– Operating plant and equipment within specified working hours.
– If required, plant and equipment shall be fitted with silencers.

8.11.3 Performance indicators/targets

– Within noise criteria in the NSW Industrial Noise Policy, NSW Road Noise Policy and Assessing Vibration: A Technical Guide as applicable.
– No noise complaints from surrounding landholders.

8.11.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any exceedances.
– Annual reporting to the NSW EPA as part of licence requirements.

8.12 Hazardous materials and substances

8.12.1 Environmental goals and principles

Hazardous material management aims to:

– Prevent injury to on-site staff and the public.
– Prevent environmental contamination.

8.12.2 Management strategy

The following mitigation and management measures would be implemented:

– All hazardous substances that may be required for operation would be stored, managed, maintained and handled in accordance with the *Code of practice for the storage and handling of dangerous goods (WorkCover NSW, 2005)* and the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (DoP, 2011), Safe Working Method Statement.*
– The storage and disposal of hazardous materials, and refuelling/maintenance of construction plant and equipment, would consider the following:
    - Storage and disposal would be undertaken in clearly marked designated areas that are designed to contain spills and leaks.
    - The storage and disposal of hazardous materials and dangerous goods would be undertaken in accordance with all relevant Australian Standards and regulatory requirements.
    - Fuels, chemicals and liquids would be appropriately stored on an impervious base that must be able to withstand fuel or chemical spills without degradation.
    - The fuels and chemicals stored must be compatible (i.e. will not react with each other). The safety data sheets would be consulted in this regard.
    - For liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume, within the bund.
    - The storage facility would be undercover.
    - All containers would be labelled with the details of the contents.
    - Safety data sheets would be available at the site.

- The fuel/ oil storage facility would be inspected for compliance to the above requirements.
- Spill kits would be kept at fuel, oil and chemical storage locations.

8.12.3 Performance indicators/targets

– No spills beyond the boundary of the site.
– All on site staff adequately trained in clean-up procedures.

8.12.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any incidents.
– Annual reporting to the NSW EPA as part of licence requirements.

8.13 Fire control and emergency preparedness

8.13.1 Environmental goals and principles

Fire control and emergency preparedness on site aims to:

– Minimise risk to any on-site staff and the public.
– Controlling any incidents to minimise injury and damage to equipment, property and the environment.

8.13.2 Management strategy

The following mitigation and management measures would be implemented:

– Preparation of an emergency preparedness and response management procedure (to be included in the final LEMP). This will include procedures, training, emergency services notifications and evacuation plans to ensure site personnel and equipment is incident ready.
– Provision of suitable firefighting equipment, including automatic fire sprinkler systems, fire hoses and/or fire extinguishers in buildings and other nominated areas.
– Monitoring, testing and maintenance of firefighting equipment on a regular and programmed basis.
– Provision of full capacity water tanks dedicated to firefighting purposes. Based on the facility layout, these would be located at the site entrance and nearby the active landfill cell based on the filling stage.
– Weekly visual inspection and six-monthly certification of fire response supplies.
– Training of site personnel to extinguish small fires and fire suppression.
– Education and understanding of site fire drills by employees.
– No lighting of fires or burning of materials will be allowed, with fire ban warning signs displayed on site.
– Inspection of incoming loads for potential fire sources.
– Separation of combustible materials include tyres, wood and vegetation.
– Storage of processed materials in dedicated areas/stockpiles and limited in height to 3 metres.
– Daily cover materials used onsite are to be non-combustible.
– Restrictions to smoking on site.
– Where possible, maintaining water within basins on-site for use in emergency fire suppression if required.
– Accessibility for emergency response vehicles to the site.

In addition, other management measures stipulated in this LEMP will support fire control and emergency preparedness, including:

– Regular application of daily or intermediate cover in accordance with Section 7.10.
– Having suitable earthmoving machinery on-site to facilitate fire control. Earthmoving machinery (and operators) such as site excavators, compactors, tractors and a 10 m^3 water cart (and driver/operator) can be

utilised to attend to fires in emergency situations. Fire suppression using earthmoving machinery and a mobile water cart is successful in extinguishing most surface landfill fires if fires are detected and responded to early, while they are small. The water cart with a fire water hose dispersion system should be able to project water at least 50 m in distance from the truck. Installation of fire suppression systems for plant should be implemented.

8.13.3 Performance indicators/targets

– All on site staff adequately trained in emergency procedures.
– Adequate control of an emergency situation by on-site staff.

8.13.4 Reporting and review

Reporting will be as per the EPL, which is likely to include:

– Reporting in the event of any incident.
– Annual reporting to the NSW EPA as part of licence requirements.

8.14 Bushfire

8.14.1 Environmental goals and principles

Bushfire control on and adjacent to the site aims to:

– Minimise risk to any on-site staff and the public.
– Controlling any incidents to minimise injury and damage to equipment, property and the environment.

8.14.2 Management strategy

The following mitigation and management measures would be implemented:

– Asset Protection Zones (APZ) and fuel breaks (i.e. a fuel free zone) are to be provided where warranted and APZ landscaping is to be managed by the site staff.
– Static water supplies are to be accessible, in the form of water storage tanks at the site entrance and nearby the active landfill cell.

In addition, other management measures stipulated in this LEMP will support bushfire control, including:

– Preparation of an emergency preparedness and response management procedure (to be included in the final LEMP) in accordance with Section 8.13. This will include procedures, training, emergency services notifications and evacuation plans to ensure site personnel and equipment is incident ready. It will also include evacuation plans and consider multiple access routes for evacuation and/or emergency response vehicles.
– Stockpile management as per Section 8.13.

9. Environmental monitoring

9.1 Groundwater, surface water and leachate monitoring

9.1.1 Groundwater

Groundwater monitoring will be undertaken in accordance with the requirements of the site EPL and any relevant consent conditions to ensure the site's operation is not causing a detrimental environmental impact. This section will be updated to reflect those documents once issued. It is expected that these will largely reflect the commitments of the EIS (GHD, 2023), which was derived from the NSW Landfill Guidelines (EPA, 2016).

A minimum of three groundwater monitoring wells will be installed (one upgradient and two downgradient of the landfill) and for monitored for the parameters listed in Table 9.1. Relevant assessment criteria will be established as part of the finalisation of this LEMP.

Table 9.1 Groundwater monitoring program

Parameter	Units	Frequency	Sampling method
pH, Redox potential, temperature	various	Quarterly	Probe
Standing water level	m AHD		In situ
Electrical conductivity, total dissolved solids	various		Grab sample
Major cations and anions	mg/L		
Alkalinity	mg/L		
Total organic carbon	mg/L		
Ammonia and nutrients	mg/L		
Dissolved metals	mg/L	Annually	
Organic contaminants	mg/L		

9.1.2 Surface water

Surface water monitoring will be undertaken in accordance with the requirements of the site EPL and any relevant consent conditions to ensure the site's operation is not causing a detrimental environmental impact. This section will be updated to reflect those documents once issued. It is expected that these will largely reflect the commitments of the EIS (GHD, 2023), which was derived from the NSW Landfill Guidelines (EPA, 2016).

Monitoring locations will include the sediment basin, upstream on Warrah Creek, and downstream on Warrah Creek. Warrah Creek surface water monitoring locations will be determined on suitability and access requirements. These will be monitored on a quarterly basis for the parameters listed in Table 9.2. Relevant assessment criteria will be established as part of the finalisation of this LEMP.

Table 9.2 Surface water monitoring program

Parameter	Units	Sampling method
pH	pH units	Probe
Dissolved oxygen	mg/L	Probe
Electrical conductivity	µS/cm	Probe
Turbidity	NTU	Onsite meter or grab sample
Total suspended solids	mg/L	Grab sample
Total dissolved solids	mg/L	

Major cations (calcium, magnesium, sodium, potassium)	mg/L	
Bicarbonate as $CaCO_3$	mg/L	
Sulfate (filtered)	mg/L	
Chloride	mg/L	
Total organic carbon	mg/L	
Thermotolerant coliforms	cfu/100 mL	
Nitrogen – ammonia	mg/L	
Nitrate as N	mg/L	
Total Kjeldahl nitrogen as N	mg/L	
Total phosphorus as P	mg/L	
Reactive phosphorus as P	mg/L	

In addition to the above, surface water will be monitored at the wet weather overflow point for the sediment pond following a discharge event for the parameters set out in Table 9.3. Leachate indicators have been included to identify if any leachate enters the surface water system such that any relevant issues can be identified and rectified. The frequency of monitoring and assessment criteria will be agreed as part of the EPL application process and reflected in the finalised LEMP.

Table 9.3 Wet weather overflow monitoring program

Parameter	Units	Sampling method
pH	pH units	Probe
Dissolved oxygen	mg/L	Probe
Electrical conductivity	µS/cm	Probe
Oil and grease	mg/L	Grab sample
Total suspended solids	mg/L	Grab sample
Nitrogen – ammonia	mg/L	Grab sample

9.1.3 Leachate

Leachate monitoring will be undertaken in accordance with the requirements of the site EPL and any relevant consent conditions to assess leachate quality/quantity over time. This section will be updated to reflect those documents once issued. It is expected that these will largely reflect the recommendations from the NSW Landfill Guidelines (EPA, 2016).

Monitoring locations will include the leachate pond and landfill cell sumps. These will be monitored for the parameters listed in Table 9.4. Relevant assessment criteria will be established as part of the finalisation of this LEMP.

Table 9.4 Leachate monitoring program

Parameter	Units	Frequency	Sampling method
Electrical conductivity	µS/cm	Quarterly	Probe
pH	pH units		Probe
Standing water level (leachate head in sump)	m AHD		In situ
Volume	m^3	Continuous	Via flow meters or pumping records
Total dissolved solids	mg/L	Yearly	Grab sample
Total suspended solids	mg/L		Grab sample

Parameter	Units	Frequency	Sampling method
Major cations and anions (calcium, magnesium, potassium, sodium, chloride, fluoride and sulfate)	mg/L		Grab sample
Alkalinity (bicarbonate and carbonate)	mg/L		Grab sample
Dissolved organic matter (total organic carbon, biochemical oxygen demand, chemical oxygen demand)	mg/L		Grab sample
Ammonia and nutrients (nitrate, nitrite, and phosphorus)	mg/L		Grab sample
Metals (aluminium, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, zinc)	mg/L		Grab sample
Organic contaminants: – phenols – petroleum hydrocarbons – monoaromatic hydrocarbons (in particular benzene, toluene, ethylbenzene and xylene) – organochlorine and organophosphate pesticides – polycyclic aromatic hydrocarbons	mg/L		Grab sample

9.2 Landfill gas monitoring

9.2.1 Surface emissions monitoring

LFG surface emissions monitoring will be undertaken on a frequency as required by the site EPL. As the site does not currently operate under an EPL, monitoring is expected to be in line with the requirements in the NSW Landfill Guidelines (EPA, 2016), which includes monthly testing for methane in the atmosphere 5 centimetres above the landfill surface in areas with intermediate or final cover/capping, conducted in a grid pattern at 25-metre spacings. Depressions in the cover material, or surface fissures away from the sampling grid, should also be investigated.

9.2.2 Subsurface monitoring

The need for LFG subsurface monitoring will be confirmed via a landfill gas risk assessment for the site, in accordance with the NSW Landfill Guidelines (EPA, 2016). This will be prepared and refined as part of the site operations once suitable data is available to inform this assessment.

9.2.3 Gas accumulation monitoring

LFG accumulation monitoring will be undertaken on a frequency as required by the site EPL. As the site does not currently operate under an EPL, monitoring is expected to be in line with the requirements in the NSW Landfill Guidelines (EPA, 2016), which includes monthly methane monitoring in all buildings and other enclosed structures within 250 metres of deposited waste or leachate storage, or at frequencies and locations justified by a site-specific landfill gas risk assessment that is regularly reviewed and updated

9.3 Recording of pollution complaints

Council must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

The record must include details of the following:

– Name of complainant.

– Contact details of complainant.
– Date and time of complainant.
– Name of person receiving the complainant.
– Nature and details of the complainant.
– Names of other relevant project people advised and instruction given.
– Details of investigation and proposed corrective action.
– Details of action taken and any other comments.
– The relevant details of each complaint should also be included in the complaints register.

The register of all complaint must be kept on site. Further recording requirements may be required as part of the site EPL, and this will be captured as part of the finalisation of the LEMP.

9.4 Record keeping

The results of all monitoring will be recorded and retained as required by the site EPL. Further details will be provided in the finalised LEMP.

10. Site closure and rehabilitation

10.1 Landfill closure plan

As per the NSW Landfill Guidelines (EPA, 2016), a landfill closure plan is usually required to be submitted to the EPA no later than 12 months before the completion of a landfill's waste receipt operations.

The closure plan will address the following in detail:

– Final landform, land use and landscaping / revegetation.
– Final capping.
– Post closure management and maintenance.
– Post closure environmental management e.g., leachate, stormwater and landfill gas.
– Post closure environmental reporting and monitoring.

10.2 Site capping and revegetation

As final levels are reached, the landfill will be progressively capped and revegetated. The final site contours and landscaping are outlined in Section 6.4. Further details on final capping and revegetation requirements will be captured in the landfill closure plan (refer Section 10.1).

10.3 Post closure environmental monitoring

Council will ensure that all leachate and stormwater collection and monitoring, gas monitoring and existing controls will be maintained after the operational life of the landfill until such time as agreed with NSW EPA that there is no likelihood of environmental harm. Post closure environmental monitoring and maintenance measures will be captured in the landfill closure plan (refer Section 10.1).

11. Reporting

11.1 Annual reporting

Council will prepare an Annual Return for each required reporting period in accordance with the site EPL. Further details will be provided in the finalised LEMP.

11.2 Incident reporting

Incident reporting will be in accordance with the site EPL. This is expected to include:

– The cause, time and duration of the incident.
– The type, volume and concentration of every pollutant discharged as a result of the incident.
– The name, address and business hours telephone number of employees of WTWMF or other witnesses.
– Actions taken by the WTWMF in relation to the incident.
– Details of any measure taken or proposed to be taken to prevent, or mitigate the likelihood for, a recurrence of such an incident.
– Any additional reporting obligations as required.

Further details will be provided in the finalised LEMP.

12. References

Bureau of Meteorology [BOM] (2023) Climate data online. Retrieved from http://www.bom.gov.au/climate/data/index.shtml

GHD (2021). Willow Tree Waste Management Facility – Landfill Expansion Masterplan.

GHD (2022). Willow Tree Regional Landfill Facility –Landfill Extension Concept Design Report.

GHD (2023). Willow Tree Waste Management Facility Expansion – Environmental Impact Statement

NSW EPA (2016). Environmental Guidelines: Solid Waste Landfills, Second Edition

Appendices

Appendix A

Drawings

LEGEND

- EXISTING CONTOURS
- FINAL LANDFORM DESIGN CONTOURS
- APPROXIMATE LANDFILL BOUNDARY
- CADASTRE
- LEACHATE POND LINER
- SEDIMENT POND

NOTES:

1. SURFACE WATER DIVERSION MEASURES AROUND LANDFORM AND COLLECTION MEASURES ON LANDFORM SURFACE NOT SHOWN, TO BE CONFIRMED IN DETAILED DESIGN.
2. ALL LOCATIONS ARE APPROXIMATE.

FINAL LANDFORM PLAN
SCALE 1:1500

Rev	Description	Checked	Approved	Date
B	FOR APPROVAL			09/12/22
A	INITIAL ISSUE			09/09/22

Author R. LOPEZ **Drafting Check**
Designer M. LE **Design Check**

0 20 40 60m
SCALE 1:1500 AT ORIGINAL SIZE

GHD
Level 15, 133 Castlereagh Street, Sydney NSW 2000
T 61 2 9239 7100 **F** 61 2 9239 7199
E sydmail@ghd.com **W** www.ghd.com
www.ghd.com

Project No. 12534581

Client LIVERPOOL PLAINS SHIRE COUNCIL

Project WILLOW TREE WASTE MANAGEMENT FACILITY

Status FOR APPROVAL Status Code S4

Drawing Title LANDFILL EXTENSION CONCEPT DESIGN
FINAL LANDFORM PLAN

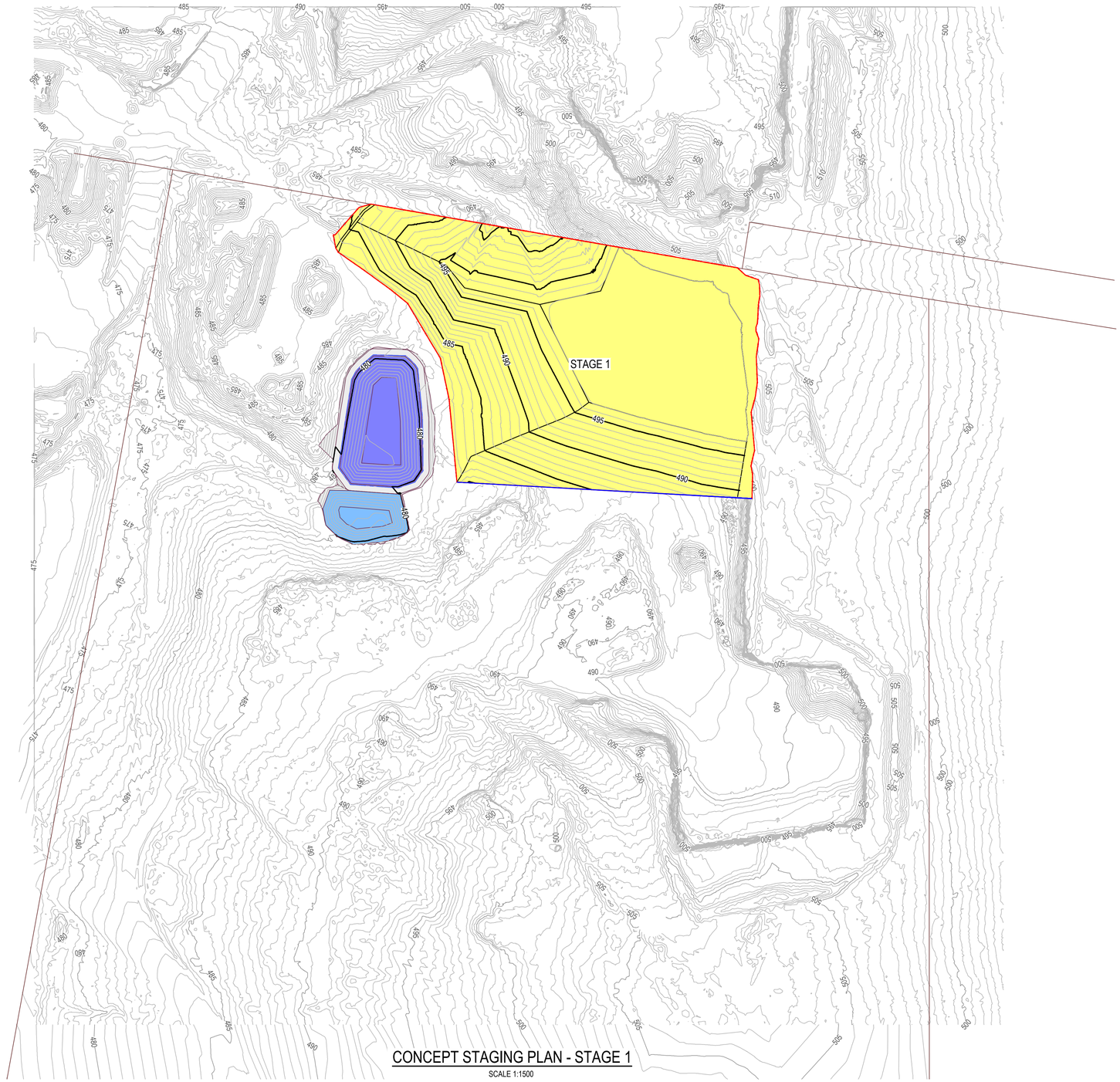
Size A1

Drawing No. 12534581-C004

Rev B

Plot Date: 9 December 2022 - 5:49 PM Plotted by: Chris Nivison-Smith File Name: \\ghdnet\ghd\AU\Newcastle\Projects\22\12534581\CADD\Drawings\12534581-C004.dwg

N



LEGEND

- EXISTING CONTOURS
- FINAL LANDFORM DESIGN CONTOURS
- APPROXIMATE LANDFILL BOUNDARY
- STAGING BOUNDARY
- CADASTRE
- LEACHATE POND LINER
- SEDIMENT POND

NOTES:

1. SURFACE WATER DIVERSION MEASURES AROUND LANDFORM AND COLLECTION MEASURES ON LANDFORM SURFACE NOT SHOWN, TO BE CONFIRMED IN DETAILED DESIGN.
2. INTERIM WASTE BATTERS TO BE ESTABLISHED AT 1V:3H AT STAGE INTERFACE LOCATIONS.
3. ALL LOCATIONS ARE APPROXIMATE.

CONCEPT STAGING PLAN - STAGE 1

SCALE 1:1500

Rev	Description	Checked	Approved	Date
B	FOR APPROVAL			09/12/22
A	INITIAL ISSUE			09/09/22

Author R. LOPEZ **Drafting Check**

Designer M. LE **Design Check**

0 20 40 60m

SCALE 1:1500 AT ORIGINAL SIZE

GHD
Level 15, 133 Castlereagh Street, Sydney NSW 2000
T 61 2 9239 7100 **F** 61 2 9239 7199
E sydmail@ghd.com **W** www.ghd.com
www.ghd.com

Project No. 12534581

Client LIVERPOOL PLAINS SHIRE COUNCIL

Project WILLOW TREE WASTE MANAGEMENT FACILITY

Status FOR APPROVAL Status Code S4

Drawing Title LANDFILL EXTENSION CONCEPT DESIGN
CONCEPT STAGING PLAN
SHEET 1 OF 2

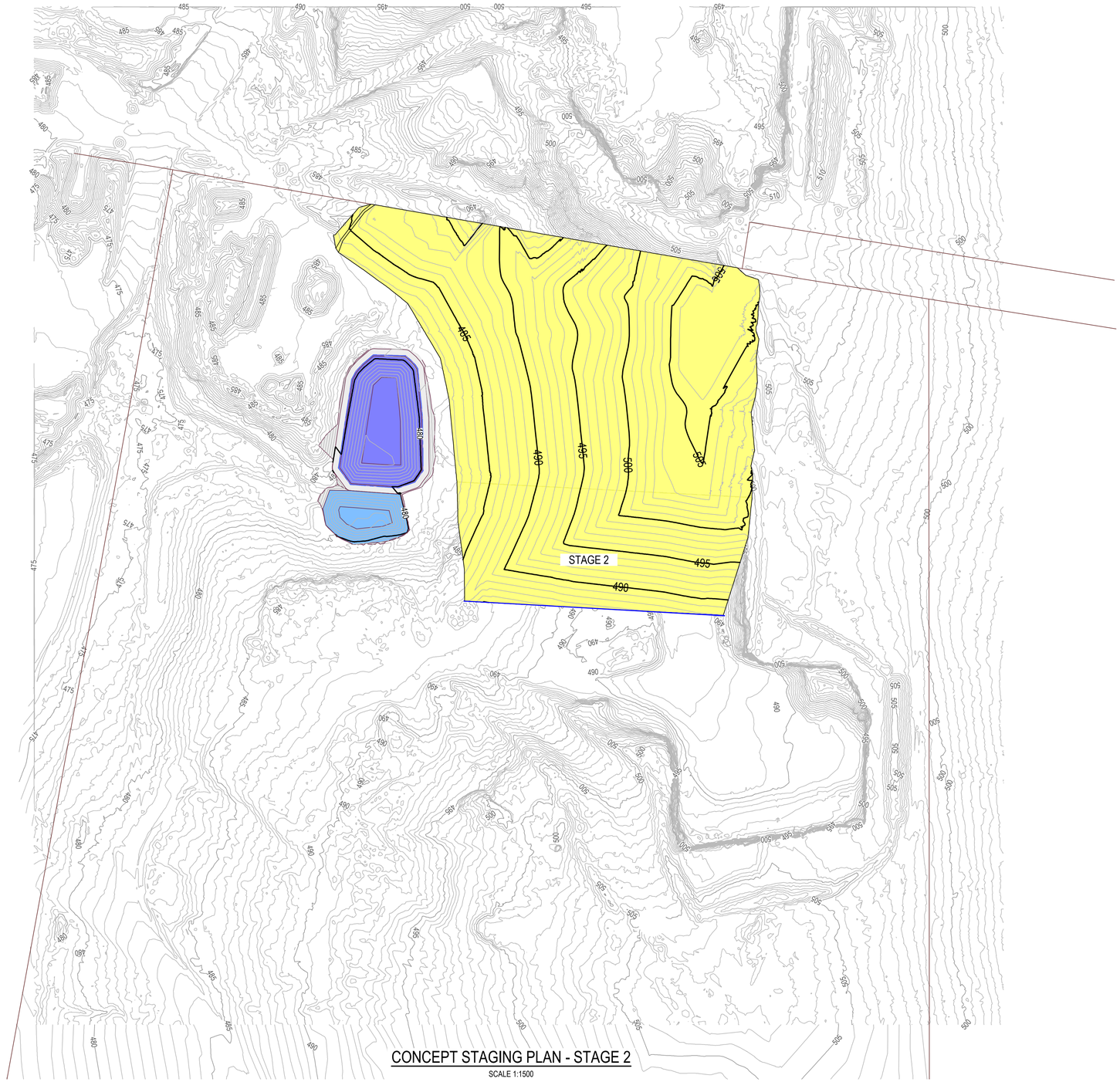
Size A1

Drawing No. 12534581-C005

Rev B

Plot Date: 9 December 2022 - 6:18 PM Plotted by: Chris Nivison-Smith File Name: \\ghdnet\ghd\AU\Newcastle\Projects\22\12534581\CADD\Drawings\12534581-C005.dwg

N



CONCEPT STAGING PLAN - STAGE 2

SCALE 1:1500

LEGEND

- EXISTING CONTOURS
- FINAL LANDFORM DESIGN CONTOURS
- APPROXIMATE LANDFILL BOUNDARY
- STAGING BOUNDARY
- CADASTRE
- LEACHATE POND LINER
- SEDIMENT POND

NOTES:

1. SURFACE WATER DIVERSION MEASURES AROUND LANDFORM AND COLLECTION MEASURES ON LANDFORM SURFACE NOT SHOWN, TO BE CONFIRMED IN DETAILED DESIGN.
2. INTERIM WASTE BATTERS TO BE ESTABLISHED AT 1V:3H AT STAGE INTERFACE LOCATIONS.
3. ALL LOCATIONS ARE APPROXIMATE.

Rev	Description	Checked	Approved	Date
B	FOR APPROVAL			09/12/22
A	INITIAL ISSUE			09/09/22

Author R. LOPEZ **Drafting Check**

Designer M. LE **Design Check**

0 20 40 60m

SCALE 1:1500 AT ORIGINAL SIZE

GHD
Level 15, 133 Castlereagh Street, Sydney NSW 2000
T 61 2 9239 7100 **F** 61 2 9239 7199
E sydmail@ghd.com **W** www.ghd.com
www.ghd.com

Project No. 12534581

Client LIVERPOOL PLAINS SHIRE COUNCIL

Project WILLOW TREE WASTE MANAGEMENT FACILITY

Status FOR APPROVAL Status Code S4

Drawing Title LANDFILL EXTENSION CONCEPT DESIGN
CONCEPT STAGING PLAN
SHEET 2 OF 2

Size A1

Drawing No. 12534581-C006

Rev B

Plot Date: 9 December 2022 - 6:17 PM Plotted by: Chris Nivison-Smith File Name: \\ghdnet\ghd\AU\Newcastle\Projects\22\12534581\CADD\Drawings\12534581-C006.dwg

ghd.com

The Power of Commitment