

Buronga Landfill Expansion

Environmental Impact Statement

Wentworth Shire Council

SSD-10096818
7 October 2021
Ref: 202597R04



Document History and Status

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Declaration

This Environmental Impact Statement was:

prepared by: Dr Melissa Salt, BScAgr (Hons), PhD, CPSS, FSSA,

on behalf of: Mr Ken Ross, General Manager, Wentworth Shire Council

with respect to: Buronga Landfill, 258 Arumpo Road, Buronga (Lot 197 & 212 DP756946 and Lot 1 DP1037845).

I certify that I have prepared the contents of this Environmental Impact Statement, and to the best of my knowledge:

- the statement is in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (Current version in force from 12 February 2021),
- the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and
- the information contained in the statement is neither false nor misleading.

Dr Melissa SALT, BScAgr, PhD, CPSS, FSSA

DATE 6th October 2021





Contents

Project: Buronga Landfill Expansion | Environmental Impact Statement
Client: Wentworth Shire Council
Ref: 202597R04

Declaration	i
Glossary and Abbreviations	1
1 Executive Summary	4
2 Introduction	8
2.1 Project Overview	8
2.2 Project Objectives	12
2.3 Project History	12
2.4 Feasible Alternatives	13
2.4.1 Project Need	13
2.4.2 Available Waste Management Facilities	15
2.4.3 Benefits of Buronga Landfill Expansion	16
2.5 SEARs	16
3 Project Description	22
3.1 Summary	22
3.2 Existing Site and Surroundings	23
3.3 Siting Restrictions	24
3.4 Proposed Waste Acceptance	25
3.4.1 Waste Types and Receiving	25
3.4.2 Waste Control Program	29
3.5 Proposed Landfill Design	30
3.5.1 Basis of Design	30
3.5.2 Landfill Extent	30
3.5.3 Landfill Cell Layout	31
3.5.4 Leachate Management	33
3.5.5 Stormwater Management	34
3.5.6 Landfill Gas Management	37
3.6 Operations	37
3.6.1 Typical Operations	37
3.6.2 Power Requirements	38



3.6.3	Water Requirements	38
3.6.4	Emergency Response.....	38
3.7	Environmental Monitoring.....	41
3.7.1	Groundwater Monitoring	41
3.7.2	Leachate Monitoring	42
3.7.3	Stormwater Monitoring	43
3.7.4	Landfill Gas Monitoring.....	43
3.7.5	Landfill Cap Condition and Integrity Monitoring	43
3.8	Final Landform and Rehabilitation	43
3.8.1	Final Landform.....	43
3.8.2	Landfill Rehabilitation.....	44
3.9	Estimation of Capital Investment Value.....	46
4	Strategic and Statutory Context	47
4.1	Strategic Context	47
4.1.1	Policy Direction	47
4.1.2	Environmental Planning Instruments.....	49
4.2	Statutory Context	53
4.2.1	Project Approval.....	53
4.2.2	NSW Statutory Legislation	53
4.2.3	Commonwealth Policy and Legislation	54
4.3	Interaction with Existing and Future development	55
4.4	Summary of Project Approval Requirements	56
4.4.1	State legislation	56
4.4.2	Commonwealth legislation	56
5	Engagement.....	57
5.1	Community Engagement	57
5.2	Regulator Engagement	57
5.3	Potential Issues Raised	57
5.4	Further Consultation Proposed	60
6	Environment Impact Assessment	61
6.1	Air Quality and Odour	61
6.1.1	Methodology	61
6.1.2	Existing Environment.....	62
6.1.3	Assessment	64
6.1.4	Mitigation Measures.....	66



6.2	Traffic and Access	67
6.2.1	Methodology	67
6.2.2	Existing Environment	68
6.2.3	Assessment	70
6.2.4	Mitigation Measures	73
6.3	Soil and Water	73
6.3.1	Methodology	73
6.3.2	Existing Environment	75
6.3.3	Impact Summary	79
6.3.4	Mitigation Measures	80
6.4	Hazard Analysis	80
6.4.1	Method	80
6.4.2	Existing Environment	84
6.4.3	Impact Assessment	85
6.4.4	Mitigation Measures	86
6.5	Bushfire Assessment	86
6.5.1	Methodology	86
6.5.2	Existing Environment	87
6.5.3	Assessment	87
6.5.4	Mitigation Measures	88
6.6	Biodiversity	89
6.6.1	Methodology	89
6.6.2	Existing Environment	90
6.6.3	Assessment	92
6.6.4	Mitigation Measures	95
6.7	Aboriginal Cultural Heritage	97
6.7.1	Methodology	97
6.7.2	Existing Environment	98
6.7.3	Assessment	101
6.7.4	Mitigation Measures	101
6.8	Noise and Vibration	102
6.8.1	Methodology	102
6.8.2	Existing Environment	103
6.8.3	Assessment	104
6.8.4	Mitigation Measures	105



6.9	Social and Economic.....	105
6.9.1	Current Environment	105
6.9.2	Assessment	106
6.9.3	Mitigation Measures	106
6.10	Visual and Design.....	109
6.10.1	Exiting Environment	109
6.10.2	Mitigation Measures	110
7	Mitigation Measures.....	111
8	Evaluation and Conclusion	116
9	References.....	117

Tables

Table 1.1	Summary of Potential Impacts and Main Mitigation Measures	5
Table 1.2	Expected Life of Landfill Substages	7
Table 2.1	SEARs Environmental Impact Assessment	17
Table 3.1	Summary of Proposed Development.....	22
Table 3.2	Site Identification Details.....	23
Table 3.3	Assessment of Project Against Landfill Guideline Siting Restrictions	24
Table 3.4	Waste Tonnages Received and Recycled in 2020/21	26
Table 3.5	Estimated Airspace for Each Substage and Expected Life	33
Table 3.6	Stormwater Basins for Buronga Landfill	34
Table 3.7	Groundwater, Leachate Quality Monitoring Parameters	42
Table 3.8	Estimated Capital Costs Excluding Vegetation Offsets.....	46
Table 4.1	Summary of Regulatory Requirements	47
Table 5.1	Summary of Stakeholder Issues and Proponent Responses	57
Table 6.1	Adopted Air Quality Goals for Particulate Matter	61
Table 6.2	Assessment Criteria for Odour (1 second average, 99 th percentile).....	62
Table 6.3	Assigned Background Concentrations	63
Table 6.4	Particulate Emission Rates	64
Table 6.5	Odour Emission Rates	65
Table 6.6	Greenhouse Gas Emission Rates with No Mitigation	65
Table 6.7	Predicted Particulate and Odour Concentrations at Receptors	65
Table 6.8	Daily Traffic Types Generated by the Project.....	70
Table 6.9	Daily Traffic from Regions Generated by the Project.....	71
Table 6.10	Current and projected construction and operational traffic (vehicles/day).....	71
Table 6.11	Future Daily Intersection Volumes	72
Table 6.12	Select Soil Properties	77
Table 6.13	Qualitative Measures of Probability of the Event Occurring	82
Table 6.14	Qualitative Measures of Credible Consequence of Unwanted Event.....	82
Table 6.15	Risk Ranking Table	83
Table 6.16	Compliance with Aims and Objectives of Planning for Bushfire Protection.....	88
Table 6.17	Plant Communities Types (PCT) Described in Project Area.....	91



Table 6.18 Vegetation Zones and Integrity Within and Outside existing Consent Area	93
Table 6.19 Species Credit Species Requiring Further Assessment	94
Table 6.20 Mitigation Measures Summary for Construction and Operational Phases	95
Table 6.21 Ecosystem Credits for Plant Community Types.....	96
Table 6.22 Site Predictive Model Summary	98
Table 6.23 Artefacts Identified at the Project Site	99
Table 6.24 Impact summary for Aboriginal object discovered at Buronga Landfill.	101
Table 6.25 Noise Assessment Criteria and Prediction	104
Table 6.26 Summary of Vibration Assessment.....	105
Table 6.27 2016 Census Data for Local Government Areas (LGA) and State Suburbs near the Project.	107
Table 7.1 Summary of Environmental Risk and Mitigation Measures	112

Figures

Figure 1 Buronga Landfill Expansion Location Plan.....	9
Figure 2 Buronga Landfill Expansion Site Plan	10
Figure 3 Buronga Landfill Expansion Current Site Layout	11
Figure 4 Circular Economy defined by NSW Waste and Sustainable Materials Strategy 2041 (DPIE, 2021)	14
Figure 5 Concept Design of Upgraded Recycling and Resource Recovery Areas	28
Figure 6 Schematic of Cell Liner System (NSW EPA, 2016)	31
Figure 7 Proposed Stages and Substages Layout.....	32
Figure 8 Stormwater Management Stage 1	35
Figure 9 Stormwater Management Stage 2.....	36
Figure 10 Schematic of water balance in a phytocap showing inputs (blue arrows) and losses (red arrows). Arrow thickness indicates relative percentage.	44
Figure 11 Proposed Top of Cap Contours	45
Figure 12 Proposed Developments, Concepts and Planning Proposal (Source: Buronga Gol Gol Structure Plan Report 2020).....	49
Figure 13 Land Zoning Map (Source: NSW Government)	52
Figure 14 Borehole Location Plan	74
Figure 15 Preliminary Hazard Analysis Process from AS/NZ ISO 31000:2018 Risk Management – Guidelines.....	81
Figure 16 Development Consent and Subject Areas Native and Non-Native Vegetation (extracted from Pinion, 2021)	90
Figure 17 Vegetation Integrity Zones (extracted from Pinion, 2021)	92
Figure 18 Location of Aboriginal Artefacts.....	100
Figure 19 Buronga Landfill Mining Leases.....	108
Figure 20 View from Landfill Entrance looking north (top) and North-West Boundary Looking South (bottom).....	109

Appendices

Appendix A. EPA Licence 20209

Appendix B. Secretary's Environmental Assessment Requirements (SEARS) for SSD-10096818

Appendix C. Buronga Landfill Concept Design – Basis of Design Report (Tonkin, 2021)

Appendix D. Quantity Survey



Appendix E. Community and Stakeholder Participation Report (PlanCom Consulting, 2021)

Appendix F. Air Quality Assessment (Vipac Engineers & Scientist, 2021)

Appendix G. Stage 3 - Traffic Assessment (Tonkin, 2021)

Appendix H. Geotechnical Investigation (Tonkin, 2021)

Appendix I. Groundwater Impact Assessment (Tonkin, 2021)

Appendix J. Hazard Assessment

Appendix K. Bushfire Assessment (Building Code and Bushfire Hazard Solutions, 2021)

Appendix L. Biodiversity Development Assessment Report (Pinion Advisory, 2021)

Appendix M. Aboriginal Cultural Heritage Assessment (Landskape, 2021)

Appendix N. Noise and Vibration Assessment (Sonus, 2021)



Glossary and Abbreviations

Abbreviation/terms	Definition
AADT	Annual Average Daily Traffic
ACHAR	Aboriginal Cultural Heritage Assessment Report
AHD	Australian Height Datum
Air NEPM	<i>National Environment Protection (Ambient Air Quality) Measure 1998</i> prepared by the National Environment Protection Council
APZ	Asset protection zone is the buffer zone between bushfire hazards and buildings
BAL	Bushfire Attack Level
BAM	Biodiversity Assessment Method
BDAR	Biodiversity Development Assessment Report
Community and other stakeholders	All those with a stake in a project including community members that may be impacted by or interested in the project
Cth	Commonwealth of Australia
DPIE	NSW Department of Planning Industry and Environment
Environmental Impact Assessment (EIA)	Environmental Impact Assessment (EIA) is the process of identifying, predicting, evaluating and mitigating the environmental, social, economic and other relevant effects of development proposals. It includes scoping of the project, consultation with the community and other stakeholders, preparation and exhibition of the EIS, assessment and determination of the project
Environmental Impact Statement (EIS)	This document. The primary document prepared by the proponent which includes assessment of all relevant matters and impacts associated with a State significant project
EPA or NSW EPA	New South Wales Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPL	Environment Protection Licence
FERF	Front End Recycling Facility
GIA	Groundwater Impact Assessment
Landfill Guideline	Refers to the Environmental Guidelines: Solid Waste Landfills (EPA, 2016)



Abbreviation/terms	Definition
LEMP	Landfill Environmental Management Plan. This document details the operations of the landfill and presents the management and monitoring requirements based on the site's risk
LFG	Landfill Gas
m AHD	Metres Australian Height Datum
m bgl	Metres below ground level
NCC	National Construction Code
NEPM	<i>National Environment Protection (Assessment of Site Contamination) Measure 1999</i> , National Environment Protection Council
Non-putrescible Waste	Waste that is not defined as other waste types (special waste, liquid, waste, restricted solid waste or putrescible). It includes glass, plastic rubber, bricks, metal, street sweepings, wood waste, soil, etc. Refer to EPA Waste Classification Guidelines for further details
OU	Odour units which represent the dilution factor required to decrease the concentration of an odorant to a predetermined detection threshold
PCT	Plant Community Types
PM10	Particulate matter less than 10 microns in diameter
PM2.5	Particulate matter less than 2.5 microns in diameter
Project	The Buronga Landfill Expansion Project which comprises the upgrade of recycling and resource recovery activities, the increase in annual waste tonnage limit from 30,000 t/yr to 100,000 tonnes/yr and expansion of the landfill footprint to the north
Proponent	The person or entity seeking approval for a State significant project or acting on an approval for a State significant project, including any associated entities that have been engaged to assist with project delivery
Putrescible Waste	Waste characterised by materials that readily decay under standard conditions, emit offensive odours and attract vermin or other vectors . It includes household waste containing putrescible organics, food waste, animal waste, manure, etc. Refer to EPA Waste Classification Guidelines for further details
RAPs	Registered Aboriginal Parties
RMS	NSW Roads and Maritime Services
Scoping Report	A publicly available document which provides preliminary information on a project and its potential impacts to support a request for Secretary's Environmental Assessment Requirements (SEARs)



Abbreviation/terms	Definition
SEARs	The SEARs (Secretary's Environmental Assessment Requirements) set out clear expectations on the level of assessment required for each relevant matter which must be addressed by the proponent in the EIS
SEPP	State Environment Planning Policy
SISD	Safe intersection sight distance
State significant development (SSD)	Development projects which have State significance due to their size, economic value or potential impacts assessed and approved under part 4.1 of the EP&A Act
TfNSW	Transport for New South Wales
TIA	Traffic Impact Assessment
tpa	Tonnes per annum
Tonkin	Tonkin Consulting PTY LTD
TSP	Total Suspended Particles
V:H	Vertical (V):horizontal (H) ratio used as a measure of grade. May also be expressed as H:V
WSC	Wentworth Shire Council



1 Executive Summary

This Environmental Impact Statement (EIS) has been prepared by Tonkin on behalf of Wentworth Shire Council (WSC) in support of a proposed expansion to the Buronga Landfill (the site); owned and operated by WSC. The proposed development (the Project) is to expand the waste management services provided by WSC at the Buronga Landfill. The Project is to be staged over the next 120 years and comprises:

- upgrading the existing recycling infrastructure to provide a dedicated recycling facility, community resource recovery area and bulking up areas to improve recycling rates and economics of recycling;
- constructing new landfill cells to the north of the existing landfill area, increasing the landfill footprint from 19 ha to approximately 40 ha. The expansion is proposed to be undertaken in eleven stages with each stage providing 3-5 landfill cells;
- increasing maximum waste volumes from 30,000 tonnes per annum to 100,000 tonnes per annum. Current waste acceptance from within WSC is nearing the limit of 30,000 tonnes per annum. It is also proposed to offer these services to the surrounding local government areas, such as Balranald, Central Darling and Murray River and potentially interstate;

The proposed activity is declared as State significant development as specified under Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011 (NSW).

WSC operates several waste management facilities throughout its local government area but most are waste transfer stations and are located on relatively small land parcels and located close to towns. The existing Buronga landfill is the largest site and is located near to the major towns of Wentworth, Dareton, Gol Gol and Buronga. By co-locating the recycling and disposal facilities, WSC aims to increase current recycling rates to meet NSW Government targets, provide secure waste management facilities for rate payers into the future and provide better economies of scale for managing these facilities.

The expansion of the Buronga landfill meets a fundamental need for waste management facilities in the region. With the existing facility likely to consume all available airspace by 2024, the extension of the site is required regardless of the volume of material to be received at the site. WSC's investigations into local disposal alternatives has identified limited options with significant local impacts anticipated should the expansion not be approved.

In addition to the expansion of the physical footprint of the site, WSC is looking to work with Mildura City Council as they face ongoing challenges with their existing disposal facility. Should the Mildura site close, this material will to be appropriately disposed to a facility meeting best management practices; the Buronga Landfill site is suitably sited to facilitate its receipt. Disposal of these additional tonnes requires WSC to increase approved annual tonnage limits and will help WSC in the delivery of best practice waste management practices for the region.

The landfill meets the EPA requirements for siting major landfills, as defined in the Landfill Guidelines. In addition, the design, operation and rehabilitation of the landfill is proposed to be undertaken in compliance with the best management practices within the Landfill Guideline, including:

- constructing landfill cells with geocomposite liners and leachate collection to control the movement of leachate and landfill gas;
- placing and compacting waste in small tip area with daily covering of waste;
- staging cell development to minimise the active area at any one time thereby minimising the potential impacts to the environment;
- rehabilitating using phytocap techniques which enables endemic vegetation ecosystems to be reinstated following cell closure.

The assessment of the potential impacts to the surrounding community and environment has identified that there is a low potential for impact for most aspects, with the exception of ecology, where clearing of land is required for the development to proceed (Table 1.1). It is also noted that targeted fauna



surveys are scheduled to be undertaken in October 2021 to determine any further impacts. The majority of the impacts are able to be adequately managed through standard landfill practice as contained within the POEO licence and embodied in the Landfill Environment Management Plan (LEMP).

Table 1.1 Summary of Potential Impacts and Main Mitigation Measures

Aspect	Potential Impacts	Assessment	Main Mitigation
Air	Dust, odour, greenhouse gas (landfill gas)	Minor increases from background Predicted emissions from the project are not predicted to adversely impact upon the sensitive receptors Greenhouse gas requires NGERS and NPI reporting	Standard landfill practices to be embodied in LEMP
Traffic	Increased traffic resulting in inappropriate road function, geometry, condition or safety	Traffic increases on George Chaffey Bridge and Silver City Highway < 5%. Increased traffic on Arumpo Road Road improvements required	Improvements to turns into and out of landfill Consultation shoulder sealing along Arumpo Road Signage and training on restricted use on Mourquong Road
Soil and Water	Reduce quality or contamination	Soil is sand over clay or clay and currently low fertility Groundwater is likely to be > 6 m below ground level and saline Overall risk to soil and groundwater is low	Dedicated stockpiles for excavated soil Groundwater quality monitoring
Hazards	Dust, wastes, landfill gas, fuel storage	Potentially hazardous as the possibility of harm to the off-site environment in the absence of controls could not be discounted Hazard assessment did not identify any controls which could not be controlled by best management practices	Compliance with POEO Licence and LEMP
Bushfire	Bushfire from on-site or off-site	The site is potentially susceptible. Existing buffers exceed requirements for asset protection for BAL29	Preparation of Emergency Management and Evacuation Plan Additional measures as project progresses northward Buildings to be constructed with non-combustible cladding
Ecology	Loss of flora and fauna	No Threatened Ecological Flora communities	Targetted survey to be undertaken in October to



Aspect	Potential Impacts	Assessment	Main Mitigation
		<p>Good quality black box community in the east. Moderate to poor quality black oak-rosewood community to the north and west with areas of moderate quality chenopod sandplain mallee community and sugarwood community</p> <p>Regrowth and bare ground comprise 45% of Project area.</p> <p>An existing consent exists for 15 ha of the remnant vegetation</p>	<p>understand potential impact to fauna species</p> <p>Protection of remnant vegetation</p> <p>Rehabilitation using endemic plant communities</p> <p>Payment of offset</p>
Heritage	Damage to Aboriginal cultural heritage including places and objects	<p>Three single artefacts identified</p> <p>Consultation with the RAPs, particularly during the field survey, did not uncover any specific information pertaining to the Project area and suggested that the Project area was unlikely to contain abundant physical remains of past Aboriginal occupation due to the past disturbance by sand quarrying</p> <p>The value of the objects to science was rated as low overall as the artefacts were small, few and not unique and affected by to the disturbance and erosion</p> <p>Aesthetic and historical values were also considered to be low</p>	<p>Protect remaining items</p> <p>Develop Heritage Management Plan, including staff training</p>
Noise and vibration	Adverse impacts on sensitive receptors	<p>The predicted noise levels comply with EPA's Noise Policy for Industry</p> <p>No vibration impacts at > 100 m and hence no impact to residence who are > 900 m away</p>	Operations undertaken during standard working hours
Social and economic	Impacts to demographics or reduction in economy	<p>Rural location with industrial neighbours. No impact to specific demographic</p> <p>Increased recycling and expanded operations have potential to increase employment from 6 full-time direct employed to 36 full-time direct employees and 66 full-time equivalent indirect employees</p>	Project likely to be beneficial to community



Aspect	Potential Impacts	Assessment	Main Mitigation
Visual amenity	Low of visual amenity	Project is at distance from receptors and screened by existing vegetation and 200 m site buffer as well as topography	Use of dull-coloured exterior for recycling facilities Staged development Rehabilitation using endemic vegetation

The main aspects of the project which have been designed to avoid or minimise impacts are:

- improved recycling to reduce reliance on disposal;
- staged development to reduce impacted area at any one time. With the front end recycling facility and resource recovery area expected to be completed within 5 years and the landfill cell development as shown in Table 1.1.

Table 1.2 Expected Life of Landfill Substages

Stage 1			Stage 2		
Substage	Life (years)	Cell number	Substage	Life (years)	Cell number
1A	14.2	3-5	2A	10.6	3
1B	11.9	3-4	2B	11.4	3
1C	11.8	3-4	2C	11.3	3
1D	11.4	3-4	2D	11.1	3
1E	11.4	3-4	2E	9.9	3
1F	11.4	3-4			
TOTAL	72.2			54.2	

- staging to start with impact to already cleared area and area within existing consent
- development moves landfill areas further away from most residents
- Project is sited to maximise use of already disturbed areas and reduce impacts to plant communities and prevent impact to aboriginal heritage items
- using best practice cell designs to minimise impacts to the environment and potentially offset impact to existing vegetation by restoring plant communities to rehabilitated landfill cells

Expansion of the Buronga Landfill poses a best solution response for WSC as other waste management facilities in the area are nearing closure due to a lack of space or are smaller and at significant distance from Buronga. Given the site is already in use as a waste management facility, expansion of Buronga Landfill represents best value for money and least impact on the community.

This EIS demonstrates that the Project has been designed to minimise impacts and in accordance with best management practices. We recommend the Project is supported to proceed.



2 Introduction

2.1 Project Overview

Wentworth Shire Council (WSC) is in the Far South West of New South Wales and covers 26,000 sq km and a population of 8,000 people. The Shire is 1075 km from Sydney and 585 km from Melbourne and bounds the border with Victoria as defined by the Murray River. The Shire Office is located in Wentworth (1437 people¹) with other large towns being Gol Gol (1,523 people¹), Buronga (1,212 people¹) and Dareton (501 people¹), which are located in the south near the Murray River (Figure 1). Mildura Rural City Council, with a population of 32,738¹, is located on the Victorian side of the Murray River, Balranald Sire Council (2,287 people) to the east and Central Darling (1,833 people) and the unincorporated area (including Broken Hill) to the north.

WSC provides waste collection and management services to its population with its waste facilities comprising the Buronga Landfill, Wentworth Transfer Station, Dareton Transfer Station and three small rural facilities at Elerslie, Pomona and Pooncarie. The Buronga Landfill (the site) at 258 Arumpo Road, Buronga is located 4.75 km north of the town of Buronga and over 2.5 km north-west of the Murray River (Figure 2). The site occupies Lot 197 and 212 of DP756946 and Lot 1 DP1037845 and is zoned SP2 (Infrastructure) for the purpose of waste or resource management facility. Environment Protection Licence 20209 (the Licence) issued by NSW Environment Protection Authority (Appendix A) for the scheduled activity of waste disposal currently allows the site to accept up to 30,000 tonnes of general solid waste per year. The site infrastructure currently consists of

- Entrance gates and fencing;
- Weighbridge and site office;
- Community recycling centre for concrete, oil, paint, gas bottle, green waste, scrap metal, cardboard, glass, batteries, plastic bottles, fluoro globes and tubes;
- Public waste acceptance area;
- Access roads;
- Landfill;
- Leachate management ponds.

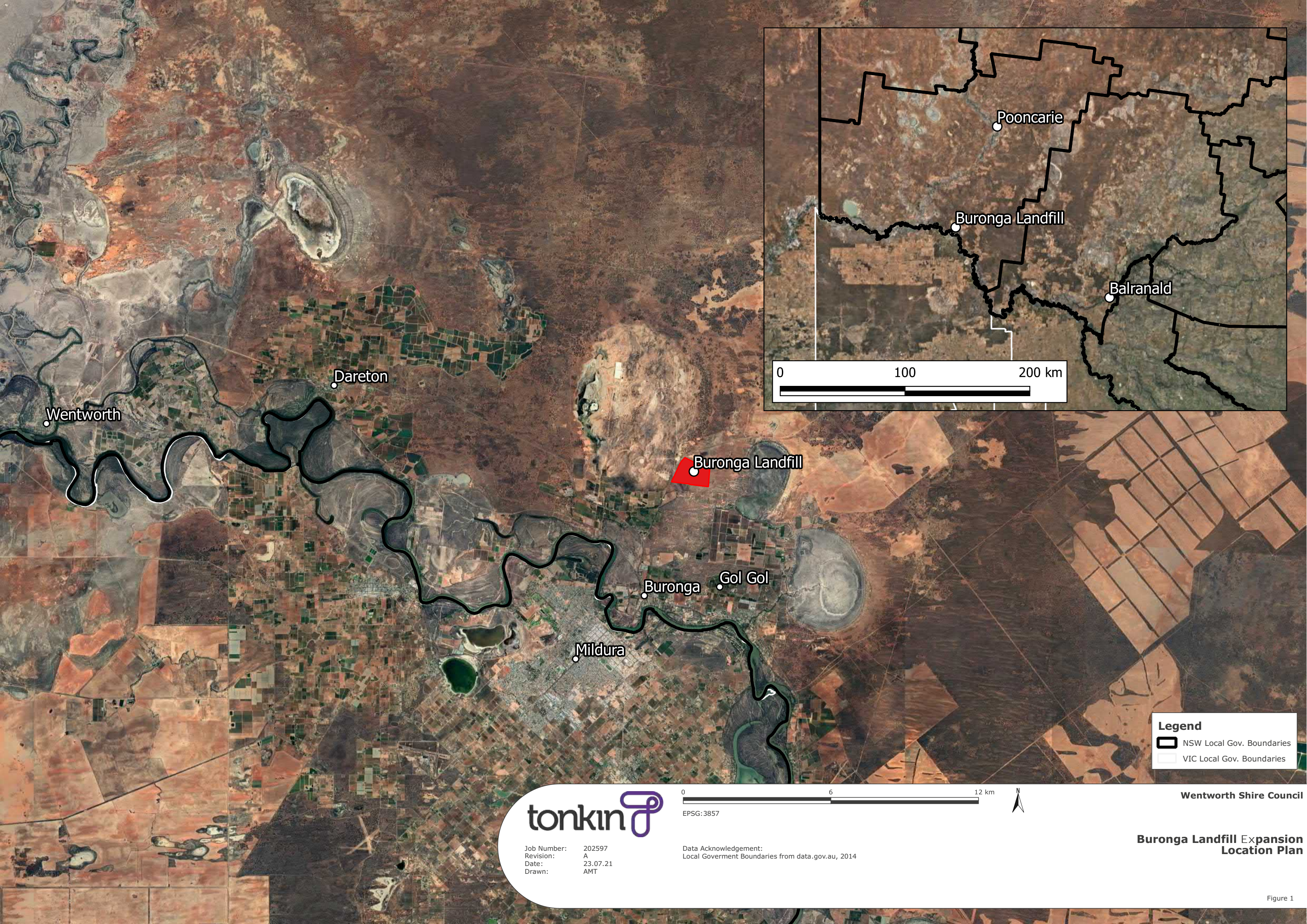
The site layout is shown in Figure 3.

The proposed development (the Project) is to expand the waste management services provided by WSC at the Buronga Landfill. The development is proposed to include:

- upgrading the existing recycling infrastructure to provide a dedicated recycling facility, community resource recovery area and bulking up areas to improve recycling rates and economics of recycling;
- constructing new landfill cells to the north of the existing landfill area, increasing the landfill footprint from 19 ha to approximately 40 ha. The expansion is proposed to be undertaken in eleven stages with each stage providing 3-5 landfill cells;
- increasing maximum waste volumes from 30,000 tonnes per annum to 100,000 tonnes per annum. Current waste acceptance from within WSC is nearing the limit of 30,000 tonnes per annum. It is also proposed to offer these services to the surrounding local government areas, such as Balranald, Central Darling and Murray River and potentially interstate.

This Project is proposed to be staged and is anticipated to result in the life of the landfill site extending for over 100 years. Additional details of the Project can be reviewed in Section 3.

¹ Based on the 2016 Census data from Australian Bureau of Statistics



Wentworth

Dareton

Buronga Landfill

Buronga

Gol Gol



Mildura

Pooncarie

Buronga Landfill

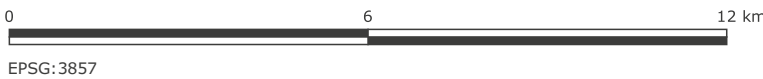
Balranald

Legend

-  NSW Local Gov. Boundaries
-  VIC Local Gov. Boundaries

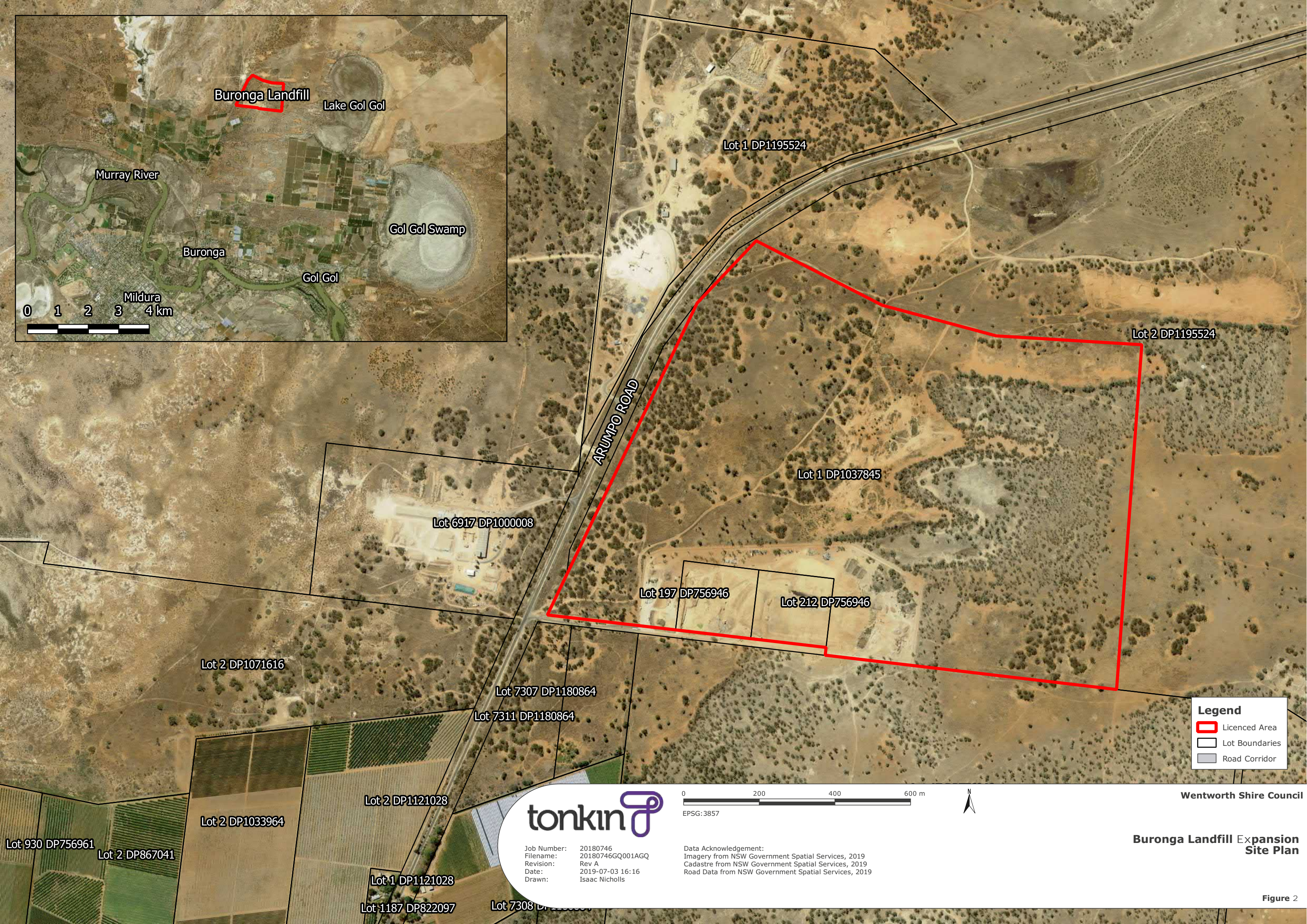


Job Number: 202597
Revision: A
Date: 23.07.21
Drawn: AMT



Wentworth Shire Council

**Buronga Landfill Expansion
Location Plan**



Legend

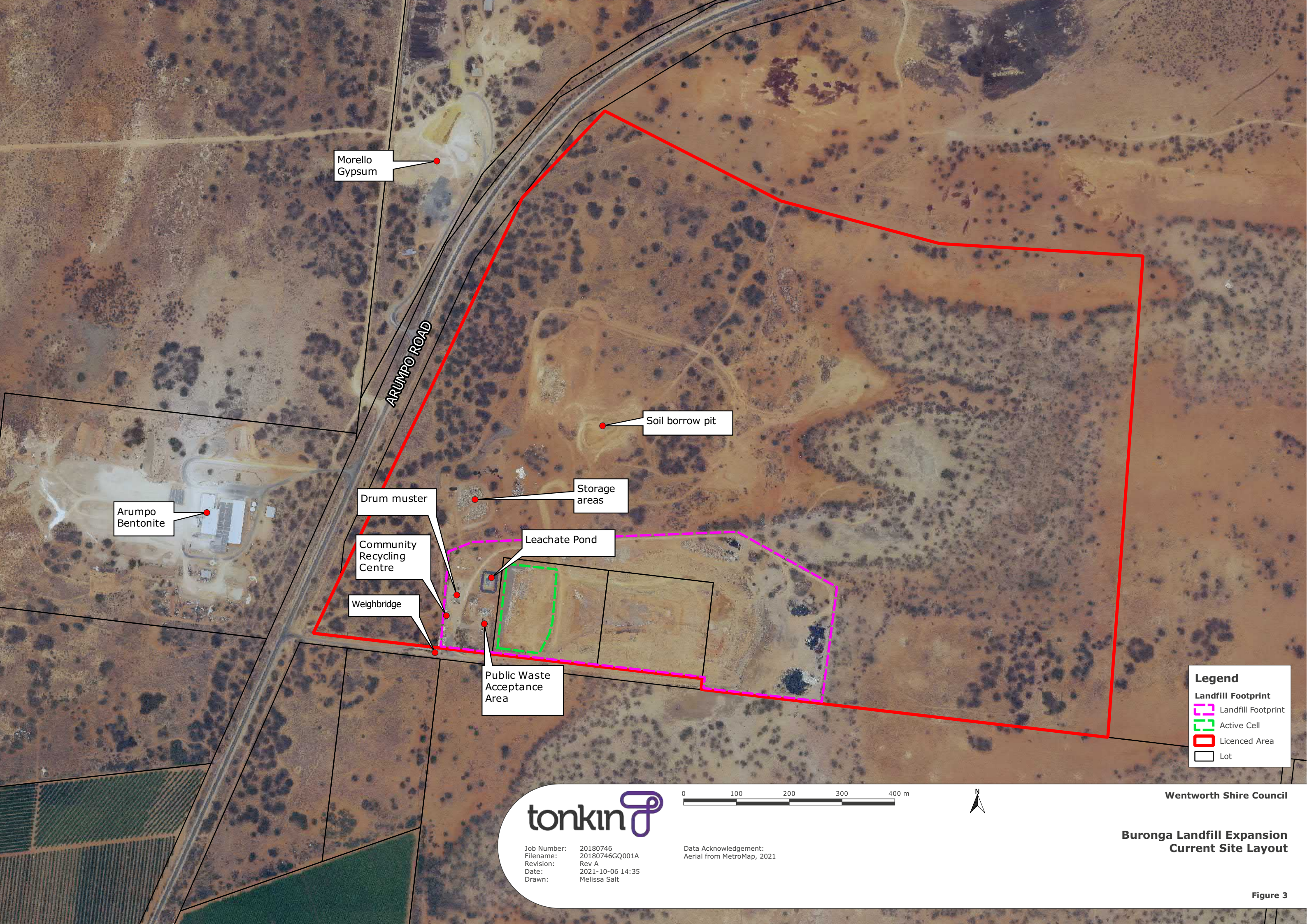
- Licenced Area
- Lot Boundaries
- Road Corridor

Job Number: 20180746
Filename: 20180746GQ001AGQ
Revision: Rev A
Date: 2019-07-03 16:16
Drawn: Isaac Nicholls

Data Acknowledgement:
Imagery from NSW Government Spatial Services, 2019
Cadastre from NSW Government Spatial Services, 2019
Road Data from NSW Government Spatial Services, 2019

0 200 400 600 m

EPSG:3857



Morello
Gypsum

ARUMPO ROAD

Arumpo
Bentonite

Drum muster

Community
Recycling
Centre

Weighbridge

Leachate Pond

Storage
areas

Soil borrow pit

Public Waste
Acceptance
Area

Legend

Landfill Footprint

- Landfill Footprint
- Active Cell
- Licenced Area
- Lot

tonkin

Job Number: 20180746
Filename: 20180746GQ001A
Revision: Rev A
Date: 2021-10-06 14:35
Drawn: Melissa Salt

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Wentworth Shire Council

**Buronga Landfill Expansion
Current Site Layout**

Figure 3



2.2 Project Objectives

The aims of the project are to:

- Improve recycling in the region to assist in achieving the NSW Waste and Sustainable Materials Strategy 2041 (DPIE, 2021) targets of 80% average recovery rate from all waste streams and tripling plastics recycling by 2030;
- Provide best practice facilities for the local residents which comply with the requirements of NSW EPA, as described in Environmental Guidelines: Solid Waste Landfills (NSW EPA, 2016) and consider the recommendations in the Handbook for Design and Operation of the Rural and Regional transfer Stations (NSW DEC, 2006);
- Safeguard provision of waste management service for the region into the future;
- Provide a service to surrounding local government areas to improve recycling and environmentally responsible waste management throughout the region.

2.3 Project History

The site was first used for waste disposal in 1934. In 1967, the Local Government Gazettal notes Reserve No. 86496 (which contains the site) was trusted to the Wentworth Shire Council under the *Public Trusts Act 1897* (NSW) for use in landfilling. Since 2015 the facility has been operated by the Wentworth Shire Council, from 2011-2015 the waste facility was operated by a private contractor. The site was operational for many years before the private contractor took over management of the site. The site is licenced by the NSW EPA under the *Protection of the Environment Operations Act 1997*, with Wentworth Shire Council holding Licence number 20209. The current licence was issued 5 April 2013 and was most recently varied on 24 November 2017. The site is operated under the conditions required by this licence, as well as by the Landfill Environmental Management Plan (LEMP) (WSC, 2015). The LEMP sets out operational procedures protecting human health and the environment from impact by the operations at the Buronga Landfill.

Historically landfilling was undertaken on the eastern portion of the site, mainly above ground with waste being burnt in trenches. The first lined landfill cell was completed in 2017 and designed and constructed in accordance with the NSW EPA Environmental Guidelines for Solid Waste Landfills (NSW EPA, 2016) hereafter referred to as the NSW Landfill Guidelines. EPA approval of this cell was received in November 2017, following this approval landfilling commenced in the new lined cell. A community recycling centre (CRC) operates at the site, constructed in accordance with the NSW Environmental Trust Community Recycling Centre Grants Program.

The area of the site that is not currently used as part of the waste disposal facility consists of unused areas, areas of former quarrying activity (Landskape, 2016) or areas used as a borrow source for the landfill operation. A strategic review of the Buronga Landfill facility (Geolyse, 2015) described WSC's intentions for the future of the landfill, including high-level concept design of the proposed expansion, operations and closure of the landfill cells.

Previous investigations undertaken on site include a geotechnical investigation undertaken by GHD in 2012, with 4 boreholes drilled in the footprint of the existing waste facility. Groundwater and geotechnical data were analysed from this investigation as part of the design of the new landfill cell. An aboriginal Cultural Heritage Assessment was undertaken across the area of the site not currently occupied by the waste facility by Landskape in October 2016. This assessment found that there is one previously recorded Aboriginal object on the site, however the survey in 2016 failed to re-identify that object, and no new objects were found.

In 2018, Tonkin proposed to develop an Environmental Impact Statement for the increase in waste disposal volumes as the areas to the north of the existing footprint were likely to have existing use rights. Environment Protection Licence (EPL) 20209 limits landfilling to 30,000 tonnes per annum at the



site. Varying the EPL to permit the receipt to 100,000 tonnes per annum will trigger requirements for an Environmental Impact Assessment (EIA) and referral of the Environmental Impact Statement (EIS) to relevant government agencies for input. It has since been determined that a Development Application is required for the proposed expansion for both the increased annual volumes as well as the increased area and it has been confirmed that the landfill will include waste from areas outside the Council's local government area and hence the development is a State Significant Development.

A pre-lodgement scoping meeting between NSW Department of Planning, Industry and Environment (DPIE), WSC, Tonkin and Waste and Management Services (WAM) on 8 September 2020. Following this an application, including a Preliminary Scoping Document (Tonkin, 2020), was lodged on the Major Projects website on 13 October 2020 and on 15 October 2020, DPIE advised that the development was State Significant Development (SSD) identified as SSD-10096818. The request for the Secretary's Environmental Assessment Requirements was made on 16 October 2020 and were received on 11 November 2020 (Appendix B). The SEARS identified by DPIE are required to be addressed within this EIS.

2.4 Feasible Alternatives

2.4.1 Project Need

Waste Avoidance and Resource Recovery Act 2001 (NSW) promotes waste avoidance and resource recovery in NSW and defines a resource management hierarchy of avoidance, resource recovery and disposal. The *NSW Waste and Sustainable Material Strategy 2014 Stage 1: 2021-2027* (DPIE, 2021) supports this act by setting targets to address waste reduction, resource recovery and diversion of waste from landfill and placing the hierarchy into the circular economy (Figure 4). The targets set within the Strategy are:

- Reduce total waste generated by 10% per person by 2030;
- 80% average recovery rate from all waste streams by 2030;
- Significantly increase the use of recycled content by government and industry;
- Phase out problematic and unnecessary plastic by 2025;
- Halve the amount of organic waste sent to landfill by 2030.

WSC supports the principles of the waste hierarchy and with the operation of the Buronga landfill continuing to support and promote diversionary activities. WSC has implemented various strategies across the region to move toward these targets including:

- multiple transfer station facilities that promote the diversion and consolidation of recyclable materials (refer to Section 2.4.2);
- pricing structure that encourages diversionary activities;
- areas for waste separation at Buronga Landfill including the existing Community Recycling Centre for collection of waste oil, batteries and other problematic wastes; the drum muster for used chemical drums and the community waste drop off to separate green waste or other recyclable materials.

WSC is considering options for the introduction of multi-bin kerbside collection, community education strategies and other drivers towards sustainability. Some wastes cannot be cost-effectively diverted from landfill and WSC is committed to disposing of these materials in a manner that minimises the environmental impacts of their landfilling activities.

As part of the development, WSC is proposing to establish a new 'front end' facility where small and medium size vehicles can deposit their load and have the material sorted to reduce material going to landfill. In addition to this, recyclable streams received at the site (e.g. green waste) will be diverted from landfill and treated as per current operating practice. Improved separation of wastes will also



assist in increasing the recovery rate and reducing the organic waste to landfill, in line with the *Waste and Sustainable Material Strategy 2048*.

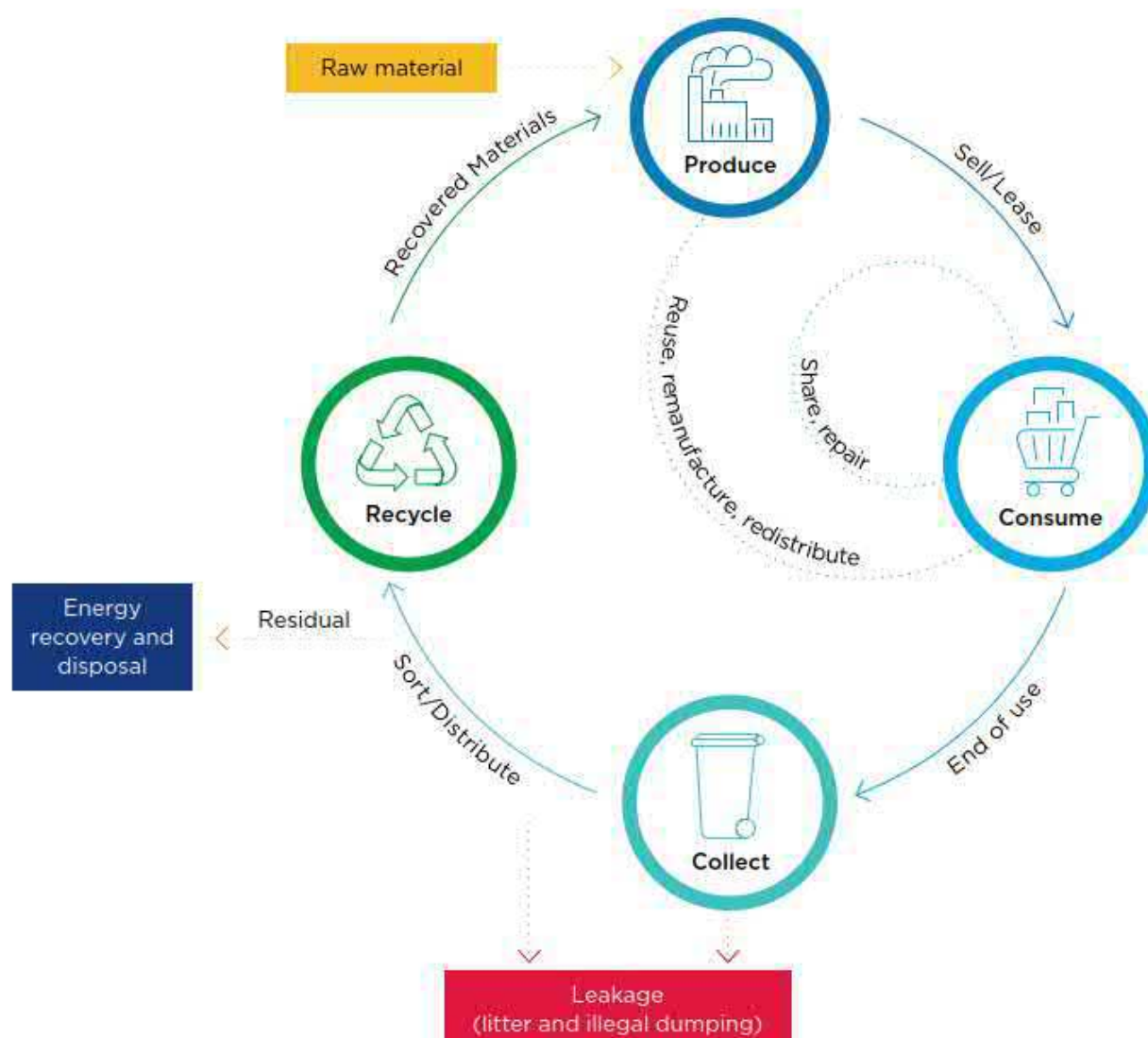


Figure 4 Circular Economy defined by NSW Waste and Sustainable Materials Strategy 2041 (DPIE, 2021)

The proposed development also includes expansion of existing landfill facility and an increase in the annual tonnage of waste that WSC is licensed to accept. This increased annual tonnage allows for consolidation of waste management infrastructure, providing better monitoring and regulation through a larger facility. Consolidation of landfill facilities is supported by the NSW Government, as demonstrated by the Waste Less, Recycle More Grants Program which previously supported grants to consolidate landfills and improve waste management facilities.

Population growth in WSC towns was almost 3% for Wentworth and Buronga whilst Mildura has consistently grown at 8 – 15% per annum for the last eight years, effectively doubling the population over this period (Population Australia, 2019). Mildura is also being challenged with their waste disposal facilities nearing the end of their operating life. This growth combined with reducing alternatives within



the region, provides WSC with an opportunity to provide improved waste management facilities for its constituents as well as providing a regional service. By developing a regional facility, WSC will potentially attract economies of scale to better facilitate recycling which can be challenging in communities at distance from capital cities.

2.4.2 Available Waste Management Facilities

WSC is committed to serving its community in a sustainable manner both financially and environmentally with several minor facilities established within the Council area that provide not only just options but also promote the diversion of recyclables from landfill. Each site provides facilities for the separation of green waste, inert construction demolition products and other recyclables such as cardboard and paper to promote sustainable activities within the region. Only residual materials are sent to landfill with other products actively managed to prevent their disposal. The facilities and their locations are as follows:

- Buronga Landfill;
- Wentworth Waste Transfer Station
- Dareton Waste Transfer Station;
- Pomona Tip;
- Ellerslie Tip (for local Ellerslie ratepayers and residents only);
- Pooncarie Landfill.

The Buronga Landfill is the largest facility and has no sensitive receptors within 1 km of the site with neighbours undertaking industrial activities for bentonite and gypsum supply. The site is currently used as a landfill in the south and is expected to reach capacity within the next 5 years or less. The northern area is currently part of the EPA Licence and is disturbed through previous use as a quarry and current used as a soil borrow pit for landfill operations, such as cell construction and daily cover. The semi-arid climate naturally leads to lower leachate and LFG generation than more temperate environments. The current licence as reflected in the LEMP, requires best management practices at the landfill and its ownership by a local Council authority ensures the interests of the community are well represented. The site has sufficient area to expand the current recycling facilities and provide for reuse of zero waste items and bulking of recyclables for transport to major centres.

The other landfills owned by Wentworth Shire Council are smaller than Buronga. They are provided to service the local community, with Ellerslie Tip for local Ellerslie ratepayers and residents only and is closed to other public. Pooncarie Landfill is 120 km north of Wentworth, Buronga, Gol Gol and increases the haulage distance to the closest recycling markets in Victoria and South Australia. Pomona Tip is less 4 ha area and is within 500 m of the Darling River. As a result, the Buronga Landfill is the only available existing waste facility owned by WSC that is close to the largest population and markets for recyclables, has additional remaining capacity to expand to improve facilities and is over 900 m from surface water bodies and residents.

An alternative site in Wentworth Shire is unlikely to be found with no other areas currently appropriately zoned. The nearest landfill in Mildura (Vic) is understood to be nearing its current capacity and other nearby landfills are unlicensed or closed. The closest licenced landfills in NSW are at Broken Hill (300 km north of Buronga) or Deniliquin (350 km south east of Buronga) showing significant distances would need to be travelled to dispose of non-recyclable waste.

Should both the WSC and Mildura disposal facilities close without a clear continuation plan in place, the broader region will experience a significant level of disruption and significant financial burden. The expansion of the Buronga landfill will provide security both now and into the future for the broader



region as the continued challenges in the waste management sector are managed across multiple waste and recycling streams.

2.4.3 Benefits of Buronga Landfill Expansion

Overall, the project aims to provide better solution for the environment through economies of scale allowing increased recycling opportunities and the construction, operation and closure of landfill cells in accordance with industry best practices. The expansion of Buronga Landfill is the optimal solution as:

- Aggregation of waste improves recycling opportunities;
- Large available land area safeguards waste management into the future and enable planning to maintain adequate buffers;
- Consolidation of landfill facilities improves management and utilisation of best management practices;
- The site is an existing landfill meets the siting requirements for a landfill in this region;
- No other facilities in NSW are available within economic distances from Wentworth, Gol Gol and Buronga;
- Prevents waste from leaving NSW and being transported across into neighbouring states;
- Improved economies of scale should reduce cost to current rate payers;
- The EPA licencing requirements under the POEA are rigorous and addresses off-site amenity impacts (including potential noise, dust, odour, surface water and ground water impacts).

2.5 SEARs

Table 2.1 summarises the requirements identified by DPIE to be investigated in this EIS, and where they have been addressed in the document. The complete SEARs are included as Appendix B.



Table 2.1 SEARs Environmental Impact Assessment

Required Assessment (SEARs)	Location in EIS
<p>Statutory and Strategic Context</p> <p>Demonstrate that the development is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. The following documents must be addressed:</p> <ul style="list-style-type: none">• State Environmental Planning Policy No. 33 – Hazardous and Offensive Development;• State Environmental Planning Policy No. 55 – Remediation of Land;• State Environmental Planning Policy (Infrastructure) 2007;• State Environmental Planning Policy (State and Regional Development) 2011;• State Environmental Planning Policy (Koala Habitat Protection) 2019;• Wentworth Local Environmental Plan 2011.	Section 4
<p>Suitability of Site - including</p> <p>A detailed justification the site can accommodate the proposed landfill, having regard to the scope of the operations of the existing facility and its environmental impacts and relevant mitigation measures</p>	Section 3.3, Figure 7 Section 8
<p>Community and Stakeholder Engagement</p> <ul style="list-style-type: none">• A community and stakeholder participation strategy identifying key community members and other stakeholders and details and justification for the proposed consultation approach(s);• clear evidence of how each stakeholder identified in the community and stakeholder participation strategy has been consulted;• issues raised by the community and surrounding landowners and occupiers;• clear details of how issues raised during consultation have been addressed and whether they have resulted in changes to the development; and• details of the proposed approach to future community and stakeholder engagement based on the results of consultation.	Section 5



Required Assessment (SEARs)	Location in EIS
<p>Landfill Design - including</p> <ul style="list-style-type: none">• details of the consistency of the proposal with the <i>Environmental Guidelines: Solid Waste Landfills</i>, Second edition (NSW EPA, 2016);• Description of the proposed cell design and integrity;• Details around proposed leachate and gas management and monitoring;• Consideration of proposed water quality control and monitoring;• Description and justification of proposed daily waste covering; and• Justification for the proposed final capping, closure measures and rehabilitation of the site, including its final land use.	Section Proposed Landfill Design 3.5 and 3.8
<p>Waste Management - including</p> <ul style="list-style-type: none">• identification, classification and quantification of the likely waste streams that would be handled/stored/disposed of at the facility in accordance with the EPA's Waste Classification Guidelines (2014);• details of how waste would be treated, stored (including the maximum daily storage capacity of the site), used, disposed and handled on site, and transported to and from the site and the potential impacts associated with these issues. This shall include details of how the receipt of non-conforming waste would be dealt with; and• a description of all reasonable and feasible measures that have been or would be implemented to maximise resource recovery from the waste stream and reduce the disposal of waste to landfill in line with the aim, objectives and guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-21 and other relevant government policy.	Section 3.4
<p>Air Quality and Odour – including:</p> <ul style="list-style-type: none">• a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant EPA guidelines;• the details of any buildings and air handling systems and justification for any material handling, processing or stockpiling external to buildings;• a greenhouse gas assessment of the operation of the development, including, but not limited to emissions generated from the waste management cells; and	Section 6.1 and Appendix A



Required Assessment (SEARs)	Location in EIS
<ul style="list-style-type: none">• details of proposed mitigation, management and monitoring measures.	
Rehabilitation	Section 3.8
<ul style="list-style-type: none">• A detailed description of how the site would be progressively rehabilitated, revegetated and integrated into the surrounding landscape, including measures to ensure that the final landform is free draining;• A justification for the proposed final landform and use, taking into consideration any relevant strategic land use planning or resource management plans or policies; and• A detailed description of the measures that would be put into place to ensure sufficient resources are available to implement the proposed rehabilitation measures, and the ongoing management of the site following the cessation of landfilling activities.	
Traffic and Access – including:	Section 6.2 and Appendix G
<ul style="list-style-type: none">• a quantitative Traffic Impact Assessment prepared in accordance with the relevant Council, Austroads and RMS guidelines;• details of all daily and peak traffic and transport movements likely to be generated by the development (vehicle type, public transport) during construction and indicative operation, including cumulative impacts;• details and a justification of access to, from and within the site (vehicular and pedestrian);• impacts on the safety and capacity of the surrounding road network and access points, using SIDRA modelling or similar to assess impacts from current traffic counts and cumulative traffic from existing and proposed developments;• demonstrate that sufficient loading/unloading, car parking and pedestrian and cyclist facilities have been provided for the development; and• details of road upgrades, new roads or access points required for the development, if necessary.	
Soil and Water – including:	
<ul style="list-style-type: none">• characterisation and consideration of potential, salinity and soil contamination;	Section 6.3.2.1
<ul style="list-style-type: none">• a description of water demands of the development and a breakdown of water supplies;	Section 3.6.3
<ul style="list-style-type: none">• identify any water licensing requirements under the Water Act 1912 or Water Management Act 2000;	
<ul style="list-style-type: none">• details of proposed erosion and sediment controls during construction;	Section



Required Assessment (SEARs)	Location in EIS
<ul style="list-style-type: none">• detailed plans and a description of the surface and stormwater management system, including on-site detention, designed in accordance with Water Sensitive Urban Design principles;	Section 3.5.5
<ul style="list-style-type: none">• details of the proposed leachate management system including the capacity of the system to treat and dispose of leachate;	Section 3.5.4
<ul style="list-style-type: none">• an assessment of potential surface water, flooding and groundwater impacts, including impacts on nearby waterbodies, surrounding properties, any licensed water users, landholder rights or groundwater dependent ecosystems;	Section 6.3.3.2 and Appendix I
<ul style="list-style-type: none">• a detailed and contemporary hydrogeological impact assessment that documents local and regional groundwater features for all sites and includes a comprehensive description of the potential impacts and mitigation measures that will be implemented at the site to protect groundwater; and	As above
<ul style="list-style-type: none">• a description and appraisal of impact mitigation, management, maintenance and monitoring measures.	Section 7
Hazards and Risks – including: <ul style="list-style-type: none">• a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the development is “potentially hazardous” a preliminary hazard analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011); and	Section 6.4
<ul style="list-style-type: none">• an assessment on the potential risk of onsite fire generation from the landfill facility and a description of management and mitigation measures to alleviate any identified risks.	Section 3.6.4.2, Section 6.5 and Appendix J
Biodiversity – including:	Section 6.6 and Appendix L
<ul style="list-style-type: none">• details of the number of trees to be removed and the number of trees to be planted on the site; and	Section 3.8.2
<ul style="list-style-type: none">• including an assessment of the proposal’s biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.	
Heritage – including:	Section 6.7 and Appendix M
<ul style="list-style-type: none">• consideration of heritage items within the vicinity of the site and any potential heritage impacts associated with the development; and	



Required Assessment (SEARs)	Location in EIS
<ul style="list-style-type: none"> • identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). 	
<p>Noise and Vibration – including:</p> <ul style="list-style-type: none"> • a quantitative noise and vibration impact assessment in accordance with the relevant EPA guidelines; • consideration of annoying characteristics of noise and prevailing meteorological conditions in the study area; • cumulative impact assessment, inclusive of impacts from other existing and proposed developments; and • details and analysis of the effectiveness of proposed mitigation measures to adequately manage identified impacts, including a clear identification of residual noise and vibration following application of mitigation measures, and monitoring measures. 	<p>Section 6.8, Section 7 and Appendix N</p>
<p>Social and Economic – including:</p> <ul style="list-style-type: none"> • identifying and analysing the potential social impacts of the development from the point of view of the affected community and other relevant stakeholders; • assessment of the significance of positive, negative and cumulative social impacts; • mitigation measures and monitoring of likely negative social impacts; and • an analysis of potential economic impacts of the development, including a discussion of any potential economic benefits. 	<p>Section 6.9</p> <p>And Section 7 And Appendix D</p>
<p>Visual and Design</p> <p>Measures to minimise the visual impacts of the development, including:</p> <ul style="list-style-type: none"> • a detailed assessment of any buildings associated with the proposal including height, colour, scale, building materials and finishes, signage and lighting, particularly from nearby residential receivers; and • detailed plans showing suitable landscaping. 	<p>Section 6.10</p>



3 Project Description

3.1 Summary

Table 3.1 Summary of Proposed Development

Project Element	Summary of Project
Site Description	Lot 197 & 212 DP756946 and Lot 1 DP1037845
Project Site Area	Total Area: 124 ha Landfill Area: 40 ha
Waste Types	As per EPA licence
Waste Receival	<p>Waste receival will be as follows:</p> <ul style="list-style-type: none">• Residents: Front end recycling facility (FERF) for no-cost waste items; mixed wastes to resource recovery area (RRA) for sorting into recyclables and waste for disposal• Commercial: To FERG and RRA for mixed loads requiring sorting into recyclables and waste for disposal• Waste Transporters: Directly to landfill <p>On-site operations will include:</p> <ul style="list-style-type: none">• Front End Recycling Facility (FERF) for drop off of segregated recyclables with zero cost (e.g. cardboard, steel, non-ferrous metals)• Weigh Bridge• Resource and Recovery Area (RRA) for co-mingled wastes or materials requiring reprocessing for resource recovery• Landfill Cells• Recycling Handling and Bulking Area• Ancillary Infrastructure: including haul roads, leachate ponds, stormwater infrastructure (detention ponds and drains), LFG management system
Maximum Throughput for Disposal	Annual: 100,000 t/yr of mixed waste
Landfill Cell Construction and Life	<p>Construction of liner as per NSW Landfill Guideline and maintain at least 2 m separation from groundwater.</p> <p>Operational life for Stage 1 is estimated to be over 70 years and for Stage 2 over 50 years.</p>
Operating Hours	<p>All works will be conducted between:</p> <ul style="list-style-type: none">• 7 am – 7 pm Monday to Saturday• 9 am – 7 pm Sunday• CLOSED Public holidays
Cell Operations	<p>Placement of received waste in 500 mm lifts and compacted</p> <p>Daily cover of waste using 200 mm of soil or equivalent cover</p>
Rehabilitation	Capping to be undertaken within 2 years of cell completion.



Project Element	Summary of Project
	Cap design to be compliant with EPA Landfill Guideline current at the time of cell completion. Soil to be sourced from upper 2 metres of natural profile excavated during cell construction and/or imported clean fill suitable for use. Vegetation is to comprise a mixture endemic grasses and forbs as a minimum. Localised areas of endemic shrubs and/or trees consistent with current vegetation type
Capital Investment	FERF and RRA: \$ 1,486,894 Stage 1: \$ 46,382,157 Stage 2: \$ 30,988,203 Capping: \$ 21,292,938 Other costs: \$ 22,676,107 TOTAL: \$122,826,299 Based on current rates as detailed in Appendix D

3.2 Existing Site and Surroundings

Buronga Landfill, located at 258 Arumpo Road, Buronga (Lot 1 DP 1037845, Lot 197 DP756946 and Lot 212 DP 756946), approximately 4.5 km north northeast of the township of Buronga, NSW and approximately 10 km North East of the City of Mildura, VIC. Access to the Landfill is via Arumpo Road with most landfill operations occurring in an area of approximately 19 ha, with the landfill footprint covering approximately 5 Ha. The Landfill is zoned SP2 (Waste or Resource Management Facility) and is surrounded by agricultural activities and remnant vegetation. A summary of the site details is shown in Table 3.2.

Table 3.2 Site Identification Details

Aspect	Detail
Site Name	Buronga Landfill
Site Location	258 Arumpo Road, Wentworth, NSW, 2739
Landfill Area (ha)	Currently 19 ha of a total 124 ha licenced area
Site Owner	Wentworth Shire Council
Site Occupier	Wentworth Shire Council
Certificate of Title	Lot 197 & 212 DP756946 and Lot 1 DP1037845
Current Zoning	Site - SP2 (Waste or Resource Management Facility) Surrounding Areas – RU1 (Primary Production)
Current Use	Solid Waste Landfill / Resource Recovery Centre
EPA Licence	Environmental Protection Licence (EPL) No. 20209



Aspect	Detail
Regional Setting	Rural, Industrial, Agricultural
Surrounding Land Uses	NORTH: Broadscale agriculture (grazing), Arumpo Road EAST: Remnant vegetation, irrigated agriculture to SE, Lake Gol Gol SOUTH: Remnant vegetation, irrigated agriculture to SW (grapevines, orchards) WEST: Arumpo Road, Industry including bentonite and gypsum suppliers, Mourquong saltwater disposal basin

3.3 Siting Restrictions

The Landfill Guideline provide a list of inappropriate locations for a landfill. Although Buronga is an existing landfill, this Project proposes to increase the footprint and extend works to the north of the existing landfill, thereby potentially impacting on the suitability of the landfill location. The suitability of the Project has been assessed against these requirements and considers the supporting information in Section 6 and the specialist studies presented in Appendices. Pending completion of the targeted fauna surveys, the Project is likely to meet all the guideline requirements and is therefore potentially a suitable site for a large putrescible waste landfill (Table 3.3).

Table 3.3 Assessment of Project Against Landfill Guideline Siting Restrictions

Guideline Requirement	Project Area	Suitable (Y/N)
Within 250 m of an area of significant environmental or conservation value identified under relevant legislation or environmental planning instruments, including national parks, historic and heritage area, conservation area, wilderness areas, wetlands, littoral rainforests, critical habitat, scenic areas, scientific and cultural area	The Project site is zone for use as a waste management facility and does not contain any significant environmental or conservation values identified under legislation. The Project incorporates a 200 m buffer of no landfilling from the boundary. The closest conservation areas are Murray River Reserve 3.7 km south; Kings Billabong Park , including Kings Billabong Wetlands, 9.8 km south.	Y
Within specially reserved drinking water catchments, such as special areas identified by the Sydney Catchment Authority, Sydney Water and local water supply authorities	The Project area is not within a drinking water catchment. There are no defined waterways on site and no direct links to Gol Gol Lake or the Murray River. On-site stormwater management will ensure stormwater is detained on-site	Y
Within 250 metres of a residential zone or dwelling, school or hospital not associated with the facility. For large putrescible landfills, buffers of at least 1000 metres should be provided where practicable to residential zones, schools and hospitals to protect the	The closest house is over 900 m from the boundary and the closest residential zone (Buronga) is over 4 km from the southern boundary of the Site. When combined with the 200 m buffer from the proposed landfill area to the boundary, there are no sensitive receivers within 1km of the Project	Y



Guideline Requirement	Project Area	Suitable (Y/N)
amenity of these land uses from odour, noise and other impacts.		
In or within 40 metres of a permanent or intermittent water body or in an area overlying an aquifer that contains drinking water quality groundwater that is vulnerable to pollution;	The closest water body is Gol Gol Lake and there are no direct waterways linking the project area with this Lake or to the Murray River. The underlying groundwater is not potable quality and likely to be saline.	Y
Within a karst region or with substrata that are prone to land slip or subsidence	The geology is not karstic. Geotechnical investigations suggest the materials encountered are likely to be stable	Y
Within a floodway that may be subject to washout during a major flood event (a 1-in-100-year event).	There are no defined waterways on-site with the nearest being the Murray River. The Project area is not located on flood prone land	Y
Land identified in an environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance	Field investigations and consultation with local register aboriginal parties has determined the Project area is of low cultural significance. The biodiversity assessment did not identify any Commonwealth or State significant flora with the fauna assessment pending targeted survey.	Y, pending survey

3.4 Proposed Waste Acceptance

3.4.1 Waste Types and Reveal

Much of the waste generated in the WSC LGA is diverted from landfill by the waste transfer stations or by reuse/recycling via other means, e.g. composting of agricultural wastes by Morello Gypsum and Organic Manures. Only a small proportion of waste (145 tonnes in 2020/21) is diverted from the transfer stations to the Buronga Landfill. In addition to kerbside waste, currently the Buronga landfill receives several waste types which are all recorded at the weighbridge. A summary of the waste tonnages received 2020/21 is presented in Table 3.4 and waste types include:

- Municipal solid waste including domestic solid waste (putrescible & non-putrescible), Council waste, other domestic waste (delivered direct to the site by residents);
- Commercial and industrial solid waste;
- Construction and demolition solid waste;
- Contaminated soil (meeting the definition of general solid waste);
- Recyclable waste materials (separated) including garden organics, wood waste, glass, paper and cardboard, concrete, scrap metal, tyres,
- Special wastes including asbestos, waste tyres
- Liquid wastes, such as grease trap waste and waste oil.



Table 3.4 Waste Tonnages Received and Recycled in 2020/21

Type of Waste 2020-21	Quantity (tonnes @ weighbridge)	Units Received	Total Quantity (tonnes)
Municipal Solid Waste	2,356.62	+3489 trailers	3274.46
Commercial and Industrial	20,495.60		20,495.60
Construction and Demolition	2,526.59		2,526.59
Comingled Recycling	24.28		24.28
Cardboard/Paper	61.50		61.50
Mattresses		303	7.70
Asbestos	217.98		217.98
Tyres		293	2.85
TOTAL WASTE RECEIVED			26,610.96
Waste Oil		3,007 L	2405.60
Scrap Metal	40.98		40.98
Clean Fill -All Areas of Tip Total	5,723.00		5,723.00
Garden Organics/Municipal	476.70		476.70
Plastic Recycle In	63.58		63.58
Batteries		40	0.80
COMMUNITY FACILITY WASTE RECEIVED			6,329.12
Scrap Metal Out	140.20		140.20
Waste Oil Out		6,700	5,360.00
Cardboard Out	63.91		63.91
Plastic Out	63.58		63.58
Comingled Out	24.28		24.28
TOTAL WASTE OUT			5,651.97

Recent improvements have increased the recycling from the facility but further improvements are required to increase recycling to achieve higher diversion rates. In order to promote the waste hierarchy, WSC has integrated several key elements into the material receipt and handling process covering both design and operational elements that aim to reduce the quantity of material going to landfill. A concept design of these upgrades is shown in Figure 5 and include:



- Dedicated car and trailer area established at the Front End Recycling Facility, including drum muster recycling compound, located at the start of site for all cars and trailers where, under the guidance of Council staff, customers can dispose of the following targeted recyclable materials at no cost:
 - Scrap metal;
 - Cardboard;
 - Container Deposit items
 - Batteries;
 - Plastic bottles; and
 - Other materials that may be determined by Council.
- Pricing mechanisms at the weighbridge whereby customers who sort their loads and remove recyclable pay less for the disposal of residual waste;
- Resource Recovery Area with:
 - Provision of recycling bins for cars and trailers for further recycling to occur;
 - Dedicated area for green waste recycling
 - Dedicated area for concrete and brick recycling
 - Waste oil recycling facility
 - E-waste disposal area
 - Detox facility for the receipt of household hazardous waste
 - Room within the transfer station building to remove recyclables from the residual waste stream.
- Residual Drop off Area with bins for further recycling and space for Council staff to further sort wastes prior to transport to landfill. A 4-bay drop off area with undercover area for cars with trailers is proposed as the final point for domestic drop off. Waste will be disposed to the rear of the trailers and well-labelled recycling bins provided separating the bays to facilitate further sorting by residents;
- Storage and bulking up areas to provide economies of scale for transport of recyclables to markets in Adelaide/Melbourne

3.4.1.1 Front End Recycling Facility

Prior to entry into the site, site customers will be able to divert into the Front End Recycling Facility (FERF) - double bay shed structure that is dedicated for the disposal, temporary storage/handling and out loading of household recyclable items that typically do not incur a disposal charge or fee.

The FERF is to be designed as an enclosed, flat floor shed structure, which is located and/or accessed before the weighbridge and gatehouse infrastructure on-site. To ensure best practice vehicle access arrangements are retained, the drive-through drop-off zone of the FERF must remain on the western end of the structure and the Resale Shop on the eastern end with the back of house area directly in between these two functions. A drum muster compound of minimum 12 m x 12 m x 2.4 m will provide capacity for 6,000 drums; a net roof will prevent dumping and 3 m gate for ease of access.

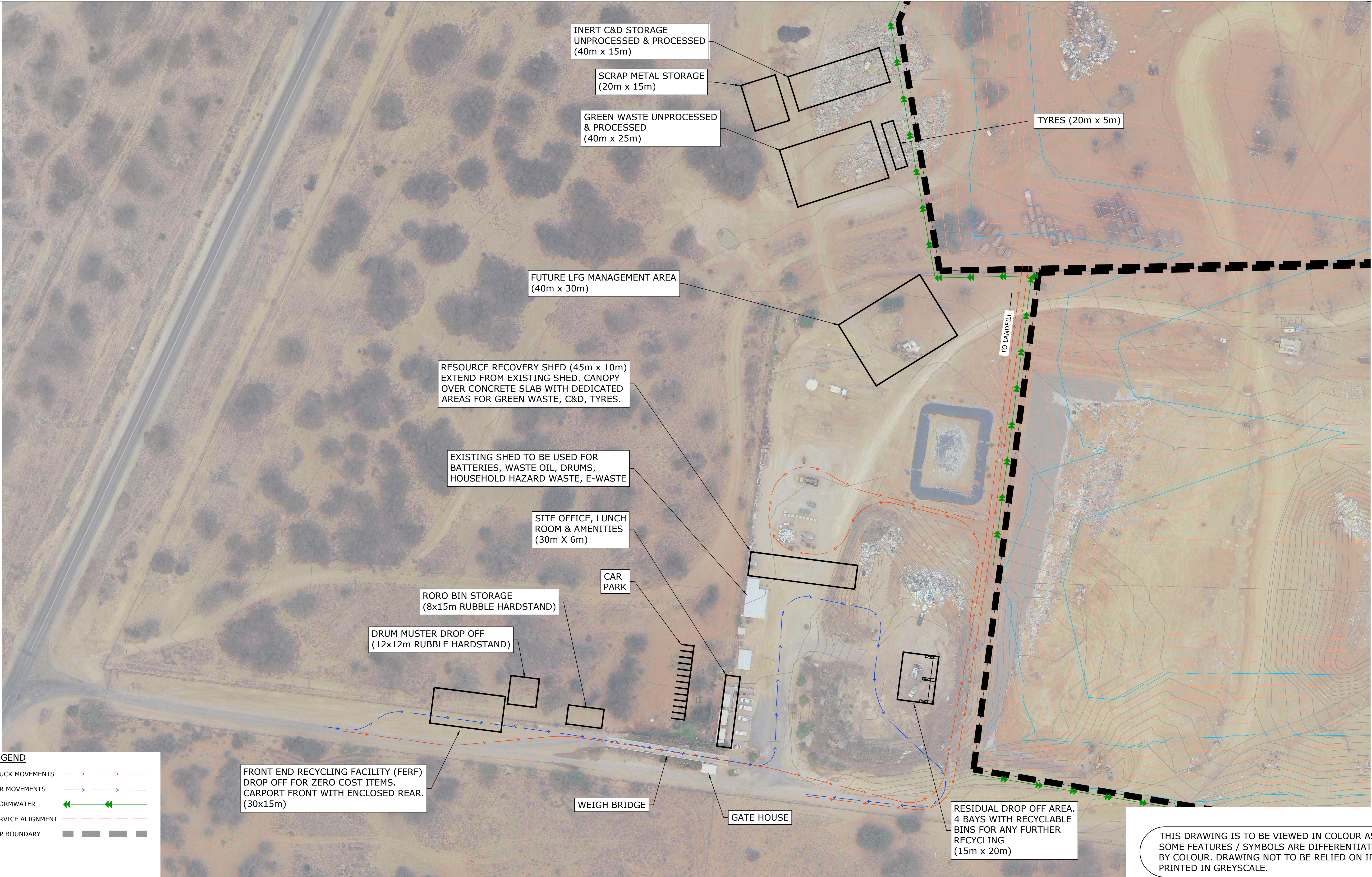
Materials received in this area would be unloaded from stillages into 'bulk containers' (e.g. 30 m³ RORO bins for steel, wrapped pallets for batteries, etc.) prior to transport off site.

3.4.1.2 Scrap Metal Storage Area

The scrap metal recycling area to the north east of the site and consolidates metal items for subsequent collection by recycling contractors. The stockpile is periodically pushed up into heaps to reduce the stockpile footprint. This material is regularly cleared when volumes stockpiled approach 200 tonnes. This enables efficiencies with material handling equipment and transport to occur.

3.4.1.3 Concrete Stockpile and Processing Area

Concrete is stockpiled in an area at the east of the site. This material is subsequently crushed by a contractor approximately once a month and is either used for on-site purposes (primarily site roads) or sold off site.



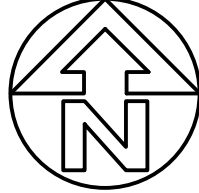
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FIGURE 5 - CONCEPT DESIGN OF UPGRADED
RECYCLING & RESOURCE RECOVERY AREAS

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A	FOR INFORMATION		14.09.21		

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3.4.1.4 Garden Waste and Wood Waste Stockpile and Processing Area

The garden waste area is located to the north of the existing landfilling area and comprises an open area upon which garden waste and associated woody material is stockpiled. This material is currently shredded by a contractor and removed from site approximately once a month. In future, the green waste is proposed to be shredded and used in landfill final capping. The dimensions of each stockpile of shredded green waste will be:

- Maximum height: 4 m
- Maximum length: 20 m
- Maximum width: 8 m
- Minimum width between stockpiles: 8 m

This material is regularly shredded when volumes stockpiled approach 200 tonnes.

3.4.1.5 Tyre Stockpile Area

Tyres are stockpiled to the south east of the site for subsequent collection by recycling contractors or shredding prior to disposal. Dimensions of each tyre stockpile must not exceed:

- 6 metres as the maximum base width;
- 20 metres as the maximum base length;
- 3 metres as the maximum stockpile height

Less than 50 tonnes of tyres are proposed to be stored on site at any time.

3.4.2 Waste Control Program

All materials to be disposed at the landfill or recycled shall be inspected, weighed and identified at the site weighbridge by Council personnel. This information will be recorded in the site weighbridge software system and used to supply information for any reporting requirements. All staff members that monitor the site entrance shall be trained in the identification and classification of waste. Vehicles with unacceptable loads of waste will be refused entry to the site.

Council shall facilitate the implementation of a Waste Control Program to ensure that only permitted wastes are accepted for disposal or processing at the site. The Waste Control Program shall comprise the following:

- Prominent signage at the entrance to the landfill defining acceptable wastes and directing users to contact the weighbridge for information regarding disposal of other wastes;
- Random daily inspection of vehicles entering the landfill. All vehicles suspected of containing unacceptable waste are refused permission to deposit waste until the waste is verified as being acceptable. Council shall require and collect appropriate evidence from the driver of the vehicle, e.g. test certificate, approvals, etc, as appropriate, as verification that the waste is acceptable;
- Directing vehicles with unacceptable wastes to an appropriate disposal facility;
- Random monitoring and inspection of wastes as they are discharged from vehicles at the waste disposal areas by Council personnel. All waste suspected of being unacceptable will be segregated and checked as to its acceptability, e.g. by detailed inspection and/or testing, as deemed appropriate by Council;
- Monitoring of the deposited waste during spreading, compaction and covering at the landfill. All waste suspected of being unacceptable will be segregated and checked to determine its acceptability e.g. by detailed inspection and/or testing, as deemed appropriate by Council; and
- Recording of all incidences of identification of unacceptable wastes in the site's daily log. The record will include:
 - 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; and
- Date contacted EPA.

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 above. WSC 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, WSC will immediately segregate and contain the waste away from the active tipping face or processing area. WSC personnel will record the details of the waste, such as type, the source, and the vehicle and driver identification. WSC 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 WSC personnel. WSC 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 compaction of deposited waste, Council personnel will segregate and contain the waste away from the active waste disposal or processing areas. Council personnel will make all practical efforts to identify the source of the waste, including:

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

Council 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. Further discussion on site practices associated with the receipt of unauthorised waste streams is included in Section 3.5.6.

3.5 Proposed Landfill Design

3.5.1 Basis of Design

A concept design for the landfill facility has been produced. This design includes a conceptual layout for the landfill cells and associated infrastructure including stormwater and leachate controls. The concept design has been prepared in accordance with the *Environmental Guidelines: Solid Waste Landfills*, Second Edition (NSW EPA, 2016) (the Landfill Guideline) and the design basis set out in *Buronga Landfill Concept Design – Basis of Design Report* (Appendix C).

3.5.2 Landfill Extent

The landfill extent has been designed to ensure that 200 m minimum separation will be provided from the proposed landfill cells to the site boundary to attenuate noise, odour and dust impacts from surrounding receptors. This separation distance also allows for supporting infrastructure to be located outside of the landfill footprint. This supporting infrastructure includes waste drop off facilities, stormwater management infrastructure and leachate management infrastructure. The separation also allows for existing vegetation around the perimeter of the site to be retained, including vegetation along Arumpo Road to provide a visual screen between the road and the site. A services alignment has been provided along the edges of the landfill extent to allow for pipework to transfer leachate and landfill gas from the cells to the leachate ponds or landfill gas flare.



3.5.3 Landfill Cell Layout

All landfill cells will be constructed with an engineered lining and leachate collection system consistent with the requirements of the Landfill Guideline and as represented in Figure 6. This lining system is provided to contain the waste and prevent environmental harm from occurring due to the landfill operation by forming a barrier between the waste and the environment. The specific lining system profile will be determined during detailed design of the landfill cells prior to construction. It is anticipated that the first landfill cells and the basal liner will “piggyback” over the northern batter of the existing waste mass to allow for a continuous final landform to be developed sympathetic with other regional landforms. Utilising a “piggyback” lining system over the existing waste mass also allows the existing landfill footprint to be further utilised, minimising the footprint of the new landfill areas.

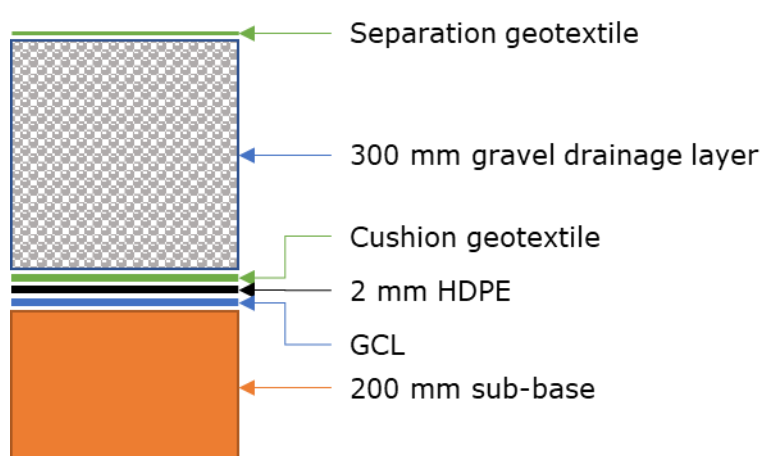
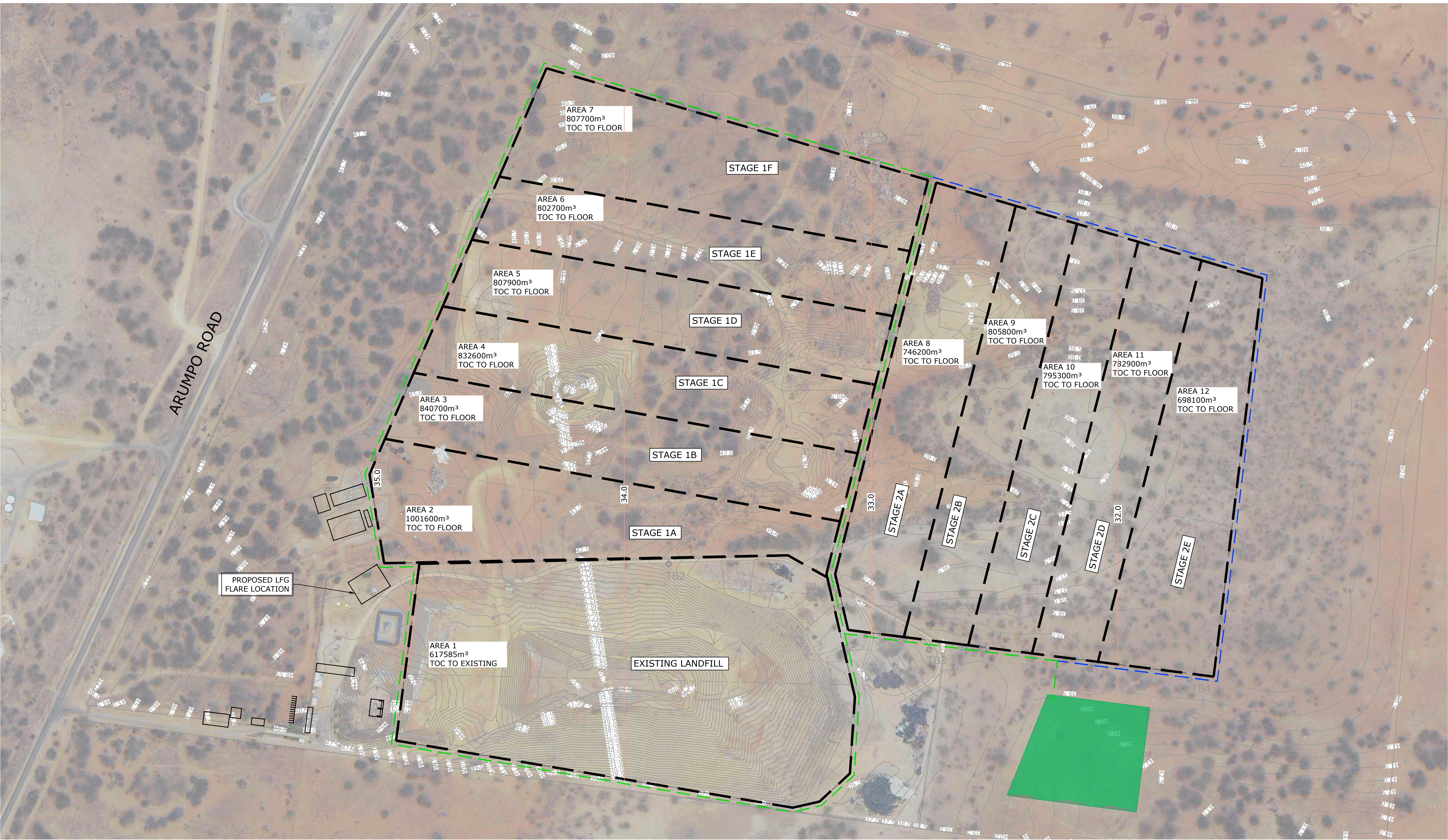


Figure 6 Schematic of Cell Liner System (NSW EPA, 2016)

Cells extend to approximately 5 to 8 m below ground level (m bgl), with final baseliner levels to be determined during detailed design of each cell. This cell depth has been selected to provide a minimum of 2 m separation between the groundwater levels recorded at the site and the lowest point of the cell floor. Groundwater levels were set as the highest groundwater levels observed in monitoring wells BH02 and BH04 located to the west and east of the existing landfill respectively. These wells were installed in 2010 and 2012 respectively (GHD, 2012) and have been monitored regularly since, with the highest observed groundwater levels being 30.2 mAHD in BH02 and 32.7 mAHD in BH04 based upon data provided by WSC. These groundwater levels are consistent with those as described in the Groundwater Impact Assessment (Section 6.3). This separation is provided to ensure there is an unsaturated zone between the base liner to prevent contaminants reaching groundwater and to prevent groundwater impacting on the stability of the liner. Leachate sumps will be 300 mm below the lowest point of the floor to facilitate collection.

Best practice management is that each landfill cell should be designed for a short filling life to ensure that waste can be safely filled and promptly covered and rehabilitated. This minimises the exposed footprint at any one time, allows for progressive rehabilitation and minimises the potential environmental impacts from leachate and landfill gas. The project has been divided into two main Stages, being Stage 1 in the west and Stage 2 in the east with each stage divided into several sub-stages, with 6 sub-stages in Stage 1 and 5 sub-stages in Stage 2 (Figure 7). Sub-stages will progress from south to north on the western side of the site (Stage 1), followed by progress from west to east on the eastern side of the site (Stage 2). Each sub-stage will be developed into individual landfill cells each with approximately 4 to 5 year filling lives; this results in one to four cells per sub-stage and depending on the rate of waste receipt. The estimated airspace and life based on 60,000 t/annum receipt for each sub-stage is provided in Table 3.5. The size of these sub-stages will be adjusted as required during detailed design based upon waste receipt rates expected during each cell's operation.



LEGEND

40.0

EXISTING CONTOUR (0.5m INTERVAL)

STAGE BOUNDARY

CELL BOUNDARY

STAGE 1 SERVICE ALIGNMENT

STAGE 2 SERVICE ALIGNMENT

33.0

PROPOSED FLOOR CONTOURS

LEACHATE POND

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FIGURE 7

PROPOSED STAGES AND SUBSTAGES LAYOUT

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202597

DRAWING NUMBER
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REVISION
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**Table 3.5 Estimated Airspace for Each Substage and Expected Life**

Stage 1			Stage 2		
Substage	Airspace (m ³)	Life (years)	Substage	Airspace (m ³)	Life (years)
1A	1,001,600	14.2	2A	746,200	10.6
1B	840,700	11.9	2B	805,800	11.4
1C	832,600	11.8	2C	795,300	11.3
1D	807,900	11.4	2D	782,900	11.1
1E	802,700	11.4	2E	698,100	9.9
1F	807,700	11.4			
TOTAL	5,093,200	72.2		3,828,300	54.2

Notes: Life is based on 60,000 t waste/annum at a density of 0.85 t/m³

3.5.4 Leachate Management

As identified in Section 3.5.3 all landfill cells will be constructed with engineered lining and leachate containment systems. Landfill leachate can cause environment harm if allowed to infiltrate to groundwater. Each cell will drain to a leachate collection sump which will contain a leachate pump and riser to facilitate the extraction of leachate from the landfill cells. It is proposed that leachate will be extracted from the cells and pumped to a leachate pond or ponds where the leachate will be disposed of via evaporation. Minor accumulation of salts from the leachate remains within the ponds and does not affect its operation over the longer term. Leachate will be transferred from the landfill cells to the leachate pond/s by a site leachate ring main that will be progressively extended as the landfill operation extends.

The existing leachate evaporation basin at the site is lined and is used for disposal of leachate from the existing lined landfill cell. This pond will initially be retained to dispose of leachate during the early period of the landfill operation. Once additional leachate ponds are required, new leachate evaporation ponds will be designed and constructed to dispose of leachate from both the new and existing landfill cells. The leachate ponds will be progressively constructed as the landfill expands and the volume of leachate generated increases.

A high-level leachate balance has been undertaken to establish a footprint for the leachate basin area. This leachate balance model was developed using leachate generation volumes established using the *Hydrologic Evaluation of Landfill Performance* (HELP) model (Berger & Schroeder, 2013). The modelling was undertaken using the following inputs:

- Climate data obtained from SILO.
- Clayey sand daily and interim cover soils with an assumed cap infiltration of 1% of rainfall.
- Pond evaporation is equal to 80% of the daily pan evaporation.
- Waste absorptive capacity of 0.057 m³/t with a filling rate of 60,000 tpa.
- Landfill sub-stages are capped during the operation of the following sub-stage, being under interim cover until that time.

A maximum area of 13,000 m² was estimated for leachate evaporation during Stage 2 (Appendix C). Provision for leachate ponds of this surface area has been provided in the south eastern corner of the site



(Figure 8 and Figure 9); however these sizes will be recalculated during site operations as an uncalibrated HELP model provides indicative sizing only, particularly in semi-arid environments where it is likely to overestimate leachate generation. The location for the ponds was selected following the vegetation survey to minimise vegetation clearance whilst maintaining separation from public areas and offices.

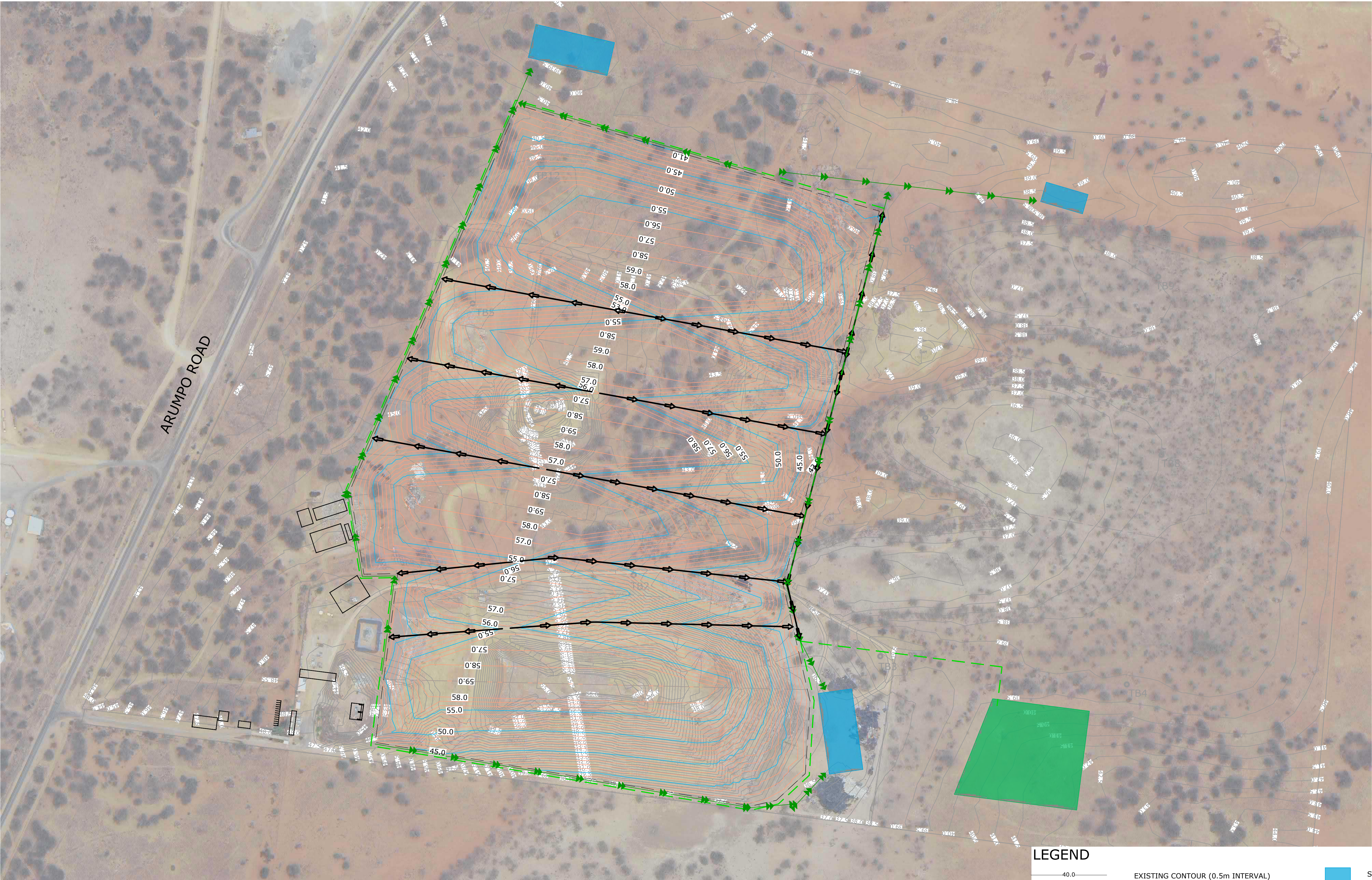
Leachate ponds will be progressively constructed as the site is developed. Leachate basins will be designed in accordance with the requirements of the Landfill Guideline and will be sized with adequate freeboard to accept rainfall from a 1 in 25-year average recurrence interval, 24-hour rainfall event to prevent overtopping. Ponds shall be lined with an engineered lining system of a similar standard to the landfill cells (Figure 6) to prevent leachate causing contamination.

3.5.5 Stormwater Management

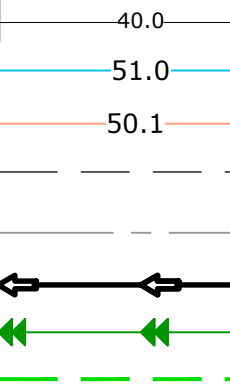
Stormwater runoff from disturbed areas is detained on site to prevent the discharge of any sediment laden water from site. Stormwater shall only be released from site once the water quality is suitable for discharge. Sediment basins and associated grass-lined swales are used to treat sediment-laden water and are required for both Stages of landfill development. It is assumed that diversion swales for clean water will be developed as part of the detailed design for cell construction. The basin sizes required for the development are described in Table 3.6 with detailed calculations based on "The Blue Book" (Landcom, 2004) provided in Appendix C. The location of the basins for Stage 1 are shown in Figure 8 and for Stage 2 in Figure 9. The locations have been selected to allow for gravity flow to the basins whilst minimising the potential impact on vegetation by selecting already cleared areas and/or minimising the footprint as far as practical for the north-eastern basins where higher quality vegetation was found (Section 6.6.2).

Table 3.6 Stormwater Basins for Buronga Landfill

Basin	Area (ha)	Settling Zone Volume (m ³)	Sediment Storage Volume (m ³)	Total Basin Volume (m ³)
Stage 1 North Western	17.1	1493	746	2239
Stage 1 North Eastern	4.3	376	188	564
Stage 1 Southern	20.0	1743	872	2615
Stage 2 North Eastern	11.8	1031	516	1547
Stage 2 Southern	9.7	850	425	1275



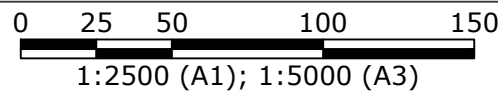
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- EXISTING CONTOUR (0.5m INTERVAL)
- DESIGN CONTOUR MAJ (5.0m INTERVAL)
- DESIGN CONTOUR MIN (1.0m INTERVAL)
- STAGE BOUNDARY
- CAP CROWN
- CAP DRAIN
- STORMWATER DRAIN
- STAGE 1 SERVICE ALIGNMENT

- STORMWATER POND
- LEACHATE POND

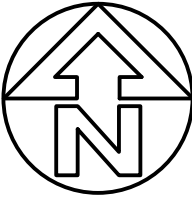
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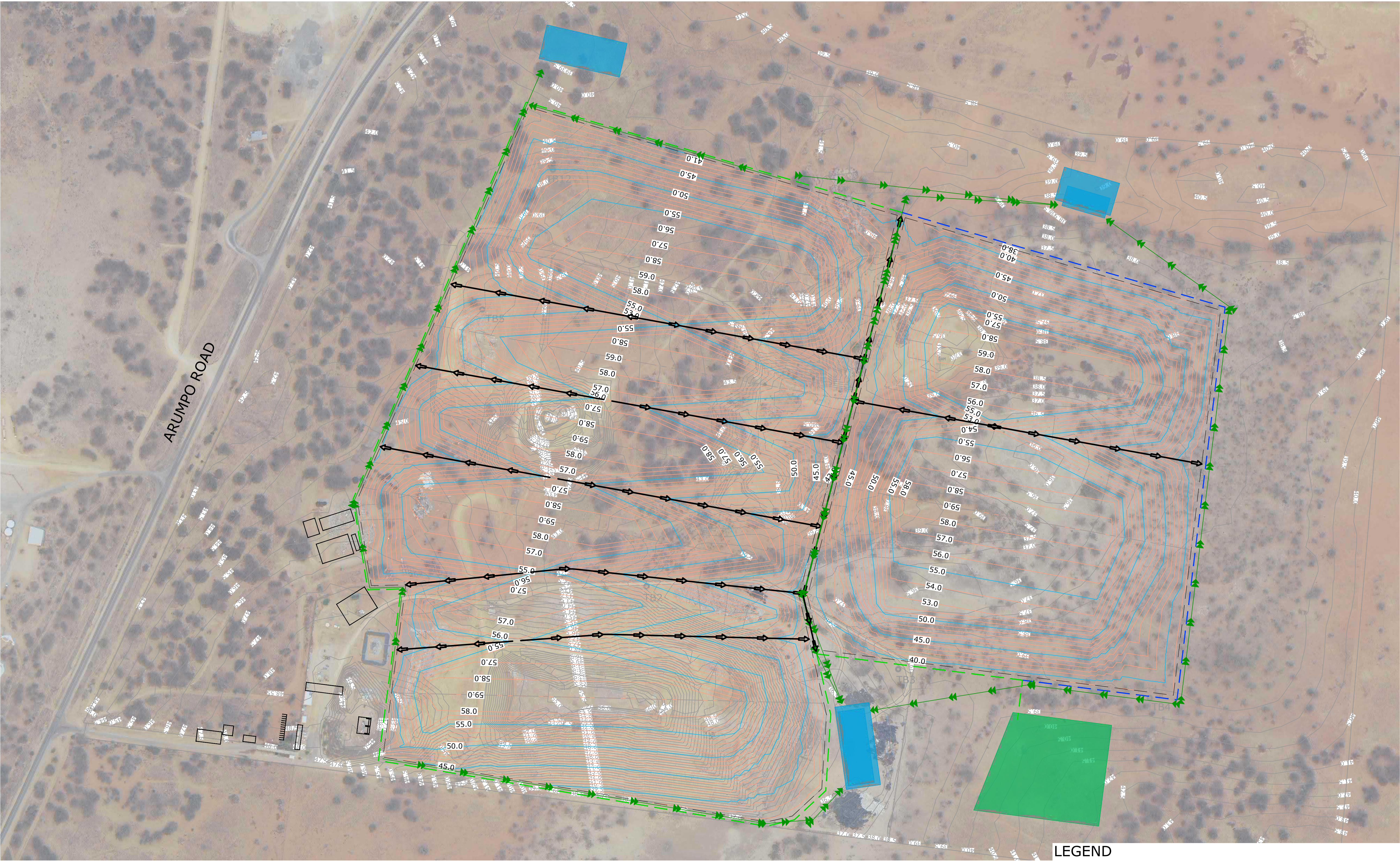


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FIGURE 8
STORMWATER MANAGEMENT STAGE 1

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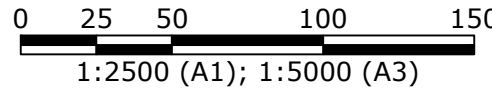


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- 50.1 ——— DESIGN CONTOUR MIN (1.0m INTERVAL)
- STAGE BOUNDARY
- CAP CROWN
- CAP DRAIN
- STORMWATER DRAIN
- STAGE 1 SERVICE ALIGNMENT
- STAGE 2 SERVICE ALIGNMENT

- STORMWATER POND
- LEACHATE POND

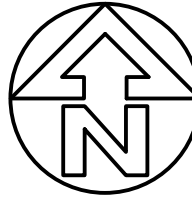
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FIGURE 9
STORMWATER MANAGEMENT STAGE 2

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3.5.6 Landfill Gas Management

Putrescible waste produces landfill gas as it decomposes following filling. Landfill gas consists of a mixture of gases, primarily methane and carbon dioxide with several other trace gases. The design of the facility has been developed to manage landfill gas to prevent environmental harm in accordance with the Landfill Guideline.

As previously identified all cells will be lined with engineered lining systems, these lining systems contain the landfill gas within the cells and prevent gas migration to the surrounding geology and encourages gas to migrate vertically instead of horizontally. To manage atmospheric emissions of landfill gas an active extraction system will be installed to draw landfill gas from the waste mass and burn landfill gas in a flare. The potential location of the flare is shown in Figure 5. The burning of landfill gas destroys the methane in the gas, reducing the potential greenhouse effect of the gas. In addition to the active extraction of landfill gas the waste will be regularly covered with soil, with completed cells capped as discussed in Section 3.8. Covering and capping of the waste encourages landfill gas to leave the landfill via the active extraction system instead of via emissions to the atmosphere.

3.6 Operations

3.6.1 Typical Operations

Buronga Landfill currently accepts building and demolition waste, general exempted waste, waste mineral oils, tyres, asbestos and general solid waste (both putrescible and non-putrescible) as permitted under EPL 20209 (Appendix A). The facility is licenced to receive:

- recovered aggregate (building & demolition waste): up to 10,000 tonnes per annum (tpa) and store a maximum of 20,000 tonnes;
- waste mineral oil: store up to 4,000 litres;
- tyres: store maximum of 50 tonnes at any one time and dispose of 500 tpa;
- asbestos: dispose 500 tpa;
- general solid waste: 30,000 tpa.

Building and demolition waste and waste oils are received for resource recovery. Council personnel take all reasonable steps to ensure that recyclable and reusable items received are diverted from landfill. Where possible building and demolition waste (concrete, bricks and tiles) is mixed with soil to be used as daily cover. Clean fill accepted at the landfill is stockpiled as appropriate on site for use as cover material or for rehabilitation. Garden waste (apart from noxious weeds which are disposed of in the landfill) is stockpiled until the volumes reach a sufficient size for a contractor to shred and remove the mulch created from site.

WSC has constructed a Community Recycling Centre (CRC) on site in accordance with the NSW Environmental Trust Community Recycling Centre Grants Program. The CRC on site accepts recyclables and hazardous waste from the public. Materials accepted at the CRC include paints, motor oils, cooking, hydraulic and transmission oils, household single use batteries, car batteries, fluorescent and compact fluorescent lighting, gas cylinders and smoke detectors. Other recyclable materials accepted at the facility include scrap metal, mineral oils, glass and plastic containers, garden waste and cardboard and paper. The CRC facilitates the diversion of these recyclables away from landfill for reuse and this facility is to continue under the proposed development.

Remaining wastes, i.e. general waste, tyres and asbestos, are disposed of through landfilling. The site currently accepts bonded asbestos materials which are disposed of in accordance with the procedure set out in the LEMP requiring asbestos materials to be appropriately wrapped and sealed and immediately covered when placed. Waste disposed in the landfill is placed and compacted to achieve a maximum practical *in situ* density in accordance with the site licence. The waste is covered daily with a minimum of



150 mm of material in accordance with the LEMP to maintain sanitary conditions on site and minimise environmental impact.

Environmental monitoring is required by the site licence, including monitoring of leachate, stormwater and groundwater. Leachate generated in the lined cell is managed through a formal leachate capture system and pumped to the leachate basin and disposed of via evaporation. The LEMP permits storage of excess leachate in the landfill cell during very wet weather and disposal off site via tanker to a sewage treatment plant or similar, if required. The legacy cell has no formal leachate management system. Surface water from the site is directed to a sedimentation basin in the south eastern corner of the site. As noted in the LEMP, cells are graded to direct clean stormwater away from the waste mass and prevent contamination of stormwater. No landfill gas (LFG) management system exists on site, nor is LFG monitored at the site. The low rainfall is likely to result in limited leachate or gas generation due to relatively dry and aerobic landfill conditions.

The operations of the proposed expansion are to continue to be in accordance with the best management practices of the time, as defined by the EPA Licence and Landfill Guidelines. Facilities for the public to separate recyclables and disposal of waste will continue to be provided.

3.6.2 Power Requirements

Electricity is used for on-site facilities; the expansion of the site is unlikely to change power requirements in comparison to the existing facility. The operating hours are not proposed to be expanded as part of this proposal.

3.6.3 Water Requirements

Water for the offices, toilets, shower and gatehouse are supplied by water from the local Mourquong Irrigation Pipeline on Arumpo Ave. The water is non-potable and stored in a 5000 L Poly tank. Potable water for drinking is supplied by Neverfail in 10 L bottles. Site water is also stored in a 50,000 L poly tank for site use and supplied from the same metered pipeline. The expansion of the site is unlikely to change water requirements in comparison to the existing facility. Water is required for compaction during construction and dust suppression during construction and operations. Alternative sources of water will be used when available, including:

- Roof water from sheds to be collected and used for general wash down and/or firefighting
- leachate for dust suppression at the tipping face;
- stormwater for construction and general dust suppression on-site.

3.6.4 Emergency Response

3.6.4.1 Management of Spills

At the Buronga Landfill, there are two distinct areas in the form of the public drop off area and the landfill. The approach to the management of spills is similar across both areas.

Control measures and procedures will be established to counter spills if and when they occur. Dry sand or other absorbents may be used for such purposes. WSC will have appropriate materials stored on site that are needed to clean up potential spills as identified above. WSC will ensure that staff will be adequately trained in spill management techniques. Areas where items such as oils, batteries, etc., are stored will be bunded and placed undercover to minimise the potential for impacts on the site. Any spillage of waste outside of the landfill cells will be removed as soon as it is practical.



Equipment will be available for removing large spillage of solid waste material at the site including a front-end loader and site truck. To supplement this equipment, hand operated equipment such as brushes and shovels are also provided for small spillages.

Emergency situations involving the spillage of unauthorised waste, including hazardous wastes, or other materials will be avoided by the following provisions:

- control of vehicles entering the facility,
- inspection of waste prior to, and during, discharge and
- training of staff.

WSC will develop a spill control plan as part of the emergency response plans for the facility. The spill control plan will identify the following:

- a list of materials of concern which may be encountered, including materials which can be contained in incoming waste, such as non-permitted waste,
- guidance on toxic spill response actions, including control, clean up, evacuation procedures and lines of reporting,
- guidance on personal protection measures,
- a list of resources provided for the control and clean-up of spillage with details of their location and
- staff training in response procedures.

3.6.4.2 Fire Response

A detailed plan for fire control will be prepared for the site. It will include traffic control, notification requirements, and steps to be taken to extinguish the fire. In the event of a fire, individuals are required to:

- Immediately notify the Site Supervisor;
- State the location, type and size of the fire; and
- Extinguish the fire if possible and safe to do so by the procedures given below.
- Notify the relevant authorities

Landfill Fire

If the fire is a Landfill fire, the following methods are to be used;

- Smother the material with soil;
- Use dry powder or CO2 extinguishers in the first instance; and
- Seek advice from the Site Manager before using water (some materials are not compatible with water).

Only trained operators with appropriate PPE would be utilised. Extreme care must be taken when fighting a landfill fire as smoke and fumes may be toxic.

Equipment Fire

If the fire is an Equipment fire, the following methods are to be used;

- Activate fire suppression system (where fitted); or
- Extinguish with dry powder or CO2 extinguisher; and
- Do not use water. Isolate batteries at earliest convenience.

Another cause of equipment fire is litter, which can build up on exhaust and manifold. To avoid this possibility, staff must ensure that machinery is cleaned and inspected regularly.

Fuel Storage Fire

If the fire is a Fuel Storage fire, the following methods are to be used;



- Always treat fuel storage fires with dry powder or CO2 extinguishers, as water will tend to spread the fire; and
- Endeavour to turn off the valve or stop leak, in order to stop the supply of fuel to the fire.

Bush and Grass Fire

If the fire is a Bush or Grass fire, the following methods are to be used;

- Extinguish using water or fire beaters.

Fire breaks will be established inside the perimeters of the site to assist in controlling bush fires from entering the facility.

Building Fire

If the fire is a Building fire, the following methods are to be used:

- The nominated fire warden will ensure all staff are evacuated;
- The main power isolation switch will be turned off;
- The fire can be extinguished using dry chemical or CO2 extinguishers;
- Once the power is turned off the fire can be extinguished with water;
- If the fire cannot be extinguished readily, call the local fire brigade.

Any significant fire event will require an investigation and written report that will be supplied to the regulator. If required, the local fire brigade or suitably qualified consultant should be consulted to advise on further risk mitigation measures. The report will include information detailing the date, time, location and suspected cause of the fire, and when and how it was extinguished.

3.6.4.3 Breach of Cell Liner

Staff members believing they have detected or inadvertently caused a breach of the cell liner on-site will contact the Site Supervisor immediately. The following procedure should then be followed:

- The Site Supervisor will investigate the report immediately and advise the Site Manager of their findings.
- The relevant consultants will be contacted to inspect and assess the suspected damage.
- The Site Manager upon advice from the site engineering consultants will initiate all required temporary works necessary to minimise the escape of leachate or landfill gas.
- The Site Manager will notify the EPA.
- The Site Manager, in consultation with the site-engineering consultants and the EPA will devise and implement all necessary repairs.
- The Site Manager will submit a report to the B'A outlining the incident, its repair and measures taken to prevent a re-occurrence.

3.6.4.4 Delivery of Illegal Waste

In the event that wastes not permitted for disposal are delivered to the site, the person who detects the prohibited substance will notify the Site Manager immediately. The prohibited substance will be kept separate from the tipping face arrangements will be made for the collection and proper disposal of the waste. The EPA will be notified and procedures checked in relation to the collection system to ensure it does not occur again.

WSC policies and procedures are designed to keep known hazardous wastes from ever being received at a disposal facility; however, hazardous or "questionable" waste may be transported to a site inadvertently at any time. It is the responsibility of every site employee to be aware and to ensure that questionable wastes are recognised, identified and that the proper appropriate action is taken.

WSC will train their staff in the identification and appropriate procedure to follow when a questionable waste is identified.



In the event that illegal waste is detected, the following procedures will be implemented:

- Secure area, notify the dispatcher and Site Supervisor;
- Put on the personal protective equipment if not already being worn;
- Secure and/or seal the leaking container to prevent any further escape of asbestos fibres;
- Spray the spilled asbestos with the wetting agent (i.e. water);
- Using a hand broom and shovel or similar equipment, collect all visible signs of wetted asbestos and place it in the 6mm polyethylene bag provided for spills. For spills on soil, it is advisable to also scoop up a small layer of soil that may have been contaminated;
- Seal the bag and affix an asbestos warning label if it is not already marked;
- Liaise with the EPA on the transport and disposal of the illegal waste.

3.6.4.5 Landfill Gas Leak or Accumulation

All personnel will be made aware of the possible dangers of landfill gas, which are highlighted as follows:

- Ignition/explosion from methane gas when at concentrations of between 5% and 15% (vol/vol);
- Asphyxiation; and
- Poisoning from carbon dioxide, hydrogen sulphide and trace components.

Asphyxiation risk is always present when persons enter a confined space. Certified gas detection equipment will be used at all times. No one will enter a confined space where the oxygen content of air is below 18% by volume unless authorised by the manager in writing and all PPE equipment is supplied. OH&S Regulations on confined space entry will be followed at all times and only personnel trained in confined space entry will be allowed to enter confined spaces.

3.7 Environmental Monitoring

Environmental monitoring occurs at the existing landfill operation in accordance with site licencing conditions. The environmental monitoring regime will be extended as the landfill expansion occurs, with ongoing monitoring of groundwater, surface water, leachate and landfill gas occurring during operation in accordance with the requirements of the Landfill Guideline. Proposed monitoring measures have been discussed below and will be reported on an annual basis with interpretation of potential trends discussed and recommended actions, if required.

All environmental monitoring shall continue into the post-closure phase of site operation until it can be demonstrated that the landfill is stable and non-polluting. The Landfill Guideline sets out the requirements for demonstrating this and requires that a certified statement of completion is submitted to EPA.

3.7.1 Groundwater Monitoring

Monitoring of groundwater shall be undertaken to detect any pollution of groundwater by the landfill operation. Groundwater monitoring shall be undertaken by sampling a network of groundwater monitoring wells on a six-monthly basis. The existing well network consists of four monitoring wells at the site (BH01-BH04). As recommended in the GIA (Appendix I), two of the wells (BH01 and BH04) are located up hydraulic gradient of the landfill and BH02 and BH03 are located down hydraulic gradient. As the landfill moves north and east, the well network will be progressively extended to maintain upgradient, cross-gradient and down-gradient monitoring wells.

Samples from the monitoring wells will be recovered using low-flow or other approved techniques by trained and experienced personnel. Six-monthly samples recovered for *in situ* analysis will be analysed in the field using hand-held equipment. Annual grab samples will be immediately placed in chilled cooler boxes and transferred under Chain of Custody to a NATA-accredited laboratory for the analyses shown in



Table 3.7. Quality assurance and quality control procedures will be undertaken, including the analysis of duplicate and triplicate samples. Results of analyses will be compared with upgradient well concentrations, historical concentrations and the ANZECC guidelines for aquatic ecosystems where relevant trigger levels exist.

Table 3.7 Groundwater, Leachate Quality Monitoring Parameters

Analyte	Sampling method	Groundwater Frequency	Leachate Frequency	Stormwater
pH, EC, Temperature	<i>In situ</i>	6-monthly	3-monthly	3-monthly
Redox potential	<i>In situ</i>			3-monthly
Standing Water Level/Leachate Head	<i>In situ</i>	6-monthly	3-monthly	3-monthly
Alkalinity	Grab sample	Annually	Annually	N/A
Total dissolved solids	Grab sample	Annually	Annually	N/A
Total suspended solids	Grab sample			3-monthly
Cations and Anions (Ca, Cl, F, Mg, K, Na, SO ₄)	Grab sample	Annually	Annually	Annually
Metals and metalloids (Al, As, Ba, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, Zn)	Grab sample	Annually	Annually	Annually
Nitrogen (NO _x , NH ₃ , TOC)	Grab sample	Annually	Annually	3-monthly
Total Organic Carbon	Grab sample	Annually	Annually	N/A
Pesticides (OCP, OPP)	Grab sample	Annually	Annually	Annually
Phenolics – total	Grab sample	Annually	Annually	Annually
Hydrocarbons (BTEX, TRH, PAH)	Grab sample	Annually	Annually	Annually

3.7.2 Leachate Monitoring

Leachate monitoring shall be undertaken to quantify the composition, height levels and volumes of leachate produced in the landfill cells. This information informs the performance of landfill capping and assists in assessing leachate impact to surface water or groundwater.

Leachate pumping volumes will be recorded by recording the daily volume extracted from each leachate sump. Leachate samples will be collected from one leachate sump within each substage. Quarterly samples recovered for *in situ* analysis will be analysed in the field using hand-held equipment. Annual grab samples will be immediately placed in chilled cooler boxes and transferred under Chain of Custody to a NATA-accredited laboratory for the analyses shown in Table 3.7. Quality assurance and quality control procedures will be undertaken, including the analysis of duplicate and triplicate samples. Results of analyses will be compared with historical data.



3.7.3 Stormwater Monitoring

Stormwater monitoring shall be undertaken in the proposed stormwater ponds to detect any pollution of surface water by the landfill operation and prevent any pollution from moving off site. There are no ambient surface water bodies within the immediate vicinity of the site, however monitoring of stormwater should be undertaken at the site.

Stormwater samples will be collected from each stormwater pond. Quarterly samples recovered for *in situ* analysis will be analysed in the field using hand-held equipment. Annual grab samples will be immediately placed in chilled cooler boxes and transferred under Chain of Custody to a NATA-accredited laboratory for the analyses shown in Table 3.7. Quality assurance and quality control procedures will be undertaken, including the analysis of duplicate and triplicate samples. Results of analyses will be compared with historical concentrations and the ANZECC guidelines for aquatic ecosystems where relevant trigger levels exist.

3.7.4 Landfill Gas Monitoring

Landfill gas (LFG) monitoring shall be undertaken to assess if the required outcomes of the Landfill Guideline for LFG management are being achieved. LFG monitoring will be undertaken across areas of intermediate and final cover on a six-monthly basis and inside on-site buildings and structures on a quarterly basis; given the sheds will be well-ventilated and offices are not located over previously placed waste, this will provide adequate screening.

The surface emissions monitoring will be conducted using a flame ionisation detector, or similar. On the capped surface, methane concentrations at 5 cm above the landfill cap will be recorded, preferably during low wind speed conditions. Testing should be conducted in a grid pattern across the landfill surface at 25-metre spacings with additional tests conducted near cap penetrations. Any readings greater than 500 ppm on a volumetric basis will be further investigated and corrective action undertaken. Within buildings or other enclosed structures, methane will be measured within the building with specific attention to areas where gases may accumulate, e.g. cupboards, roof cavities. Any readings greater than 1% by volume will be further investigated, reported to EPA within 24 hours and corrective actions undertaken.

3.7.5 Landfill Cap Condition and Integrity Monitoring

Monitoring of the condition and integrity of the landfill cap shall be undertaken on a six-monthly basis in combination with the surface emissions monitoring. Cap condition monitoring shall include visual assessment of the condition of the landfill cap and vegetation for indications of defects that could cause excessive rainfall infiltration or landfill gas emissions, e.g. scours > 0.2 m deep, depressions > 1 m diameter and > 0.2 m deep. Leachate level and volume monitoring shall also be used to assess cap condition as increased leachate production can indicate a defect in the cap.

3.8 Final Landform and Rehabilitation

3.8.1 Final Landform

The final landform has been designed in accordance with the requirements of The Landfill Guideline to facilitate the rehabilitation of the site following closure. The final landform extends to a height of approximately 59 m AHD, slightly higher than the landform of the existing waste disposal operation in the southern area of the site. The final landform has been designed with grades no steeper than 1V:5H (20%) and no flatter than 5% to facilitate the drainage of stormwater and minimise the risk of erosion and scour of cover materials in accordance with The Landfill Guideline. This will assist in minimising long-term maintenance requirements for the closed landfill. The landform has been designed to be similar to parallel



dunes in an east-west orientation to be sympathetic to other regional landforms. The Top of Cap design is shown in Figure 11.

The landform has been separated into two stages divided by a water management corridor running north-south to allow for final heights to remain below approximately 59 mAHD. This approach also allows for the first stage of the landfill cells and landform to be fully developed with minimal impacts to the remnant vegetation present in the eastern area of the site.

3.8.2 Landfill Rehabilitation

The final landform has been designed to facilitate the progressive capping and rehabilitation of each cell throughout operation. The final capping is proposed to use a phytocap, which is a cap that reduces rainfall infiltration into the waste through natural storage and evapotranspiration processes (Figure 10). Phytocaps also manage emission of fugitive landfill gas through natural microbial activity in the soil. The use of a phytocap allows for revegetation of the capped landfill with trees and shrubs to maximise the visual amenity and environmental values of the landform following rehabilitation. Trees and shrubs can be planted on a phytocap as unlike a conventional or composite landfill cap, no barrier layer is used that can be damaged by deep-rooted vegetation.

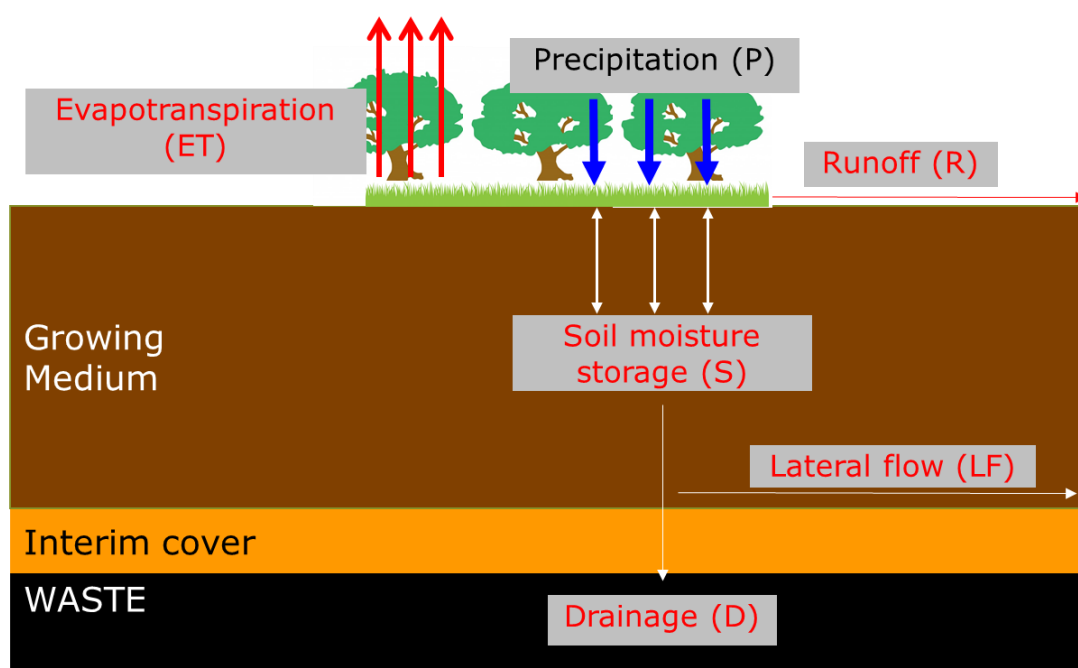
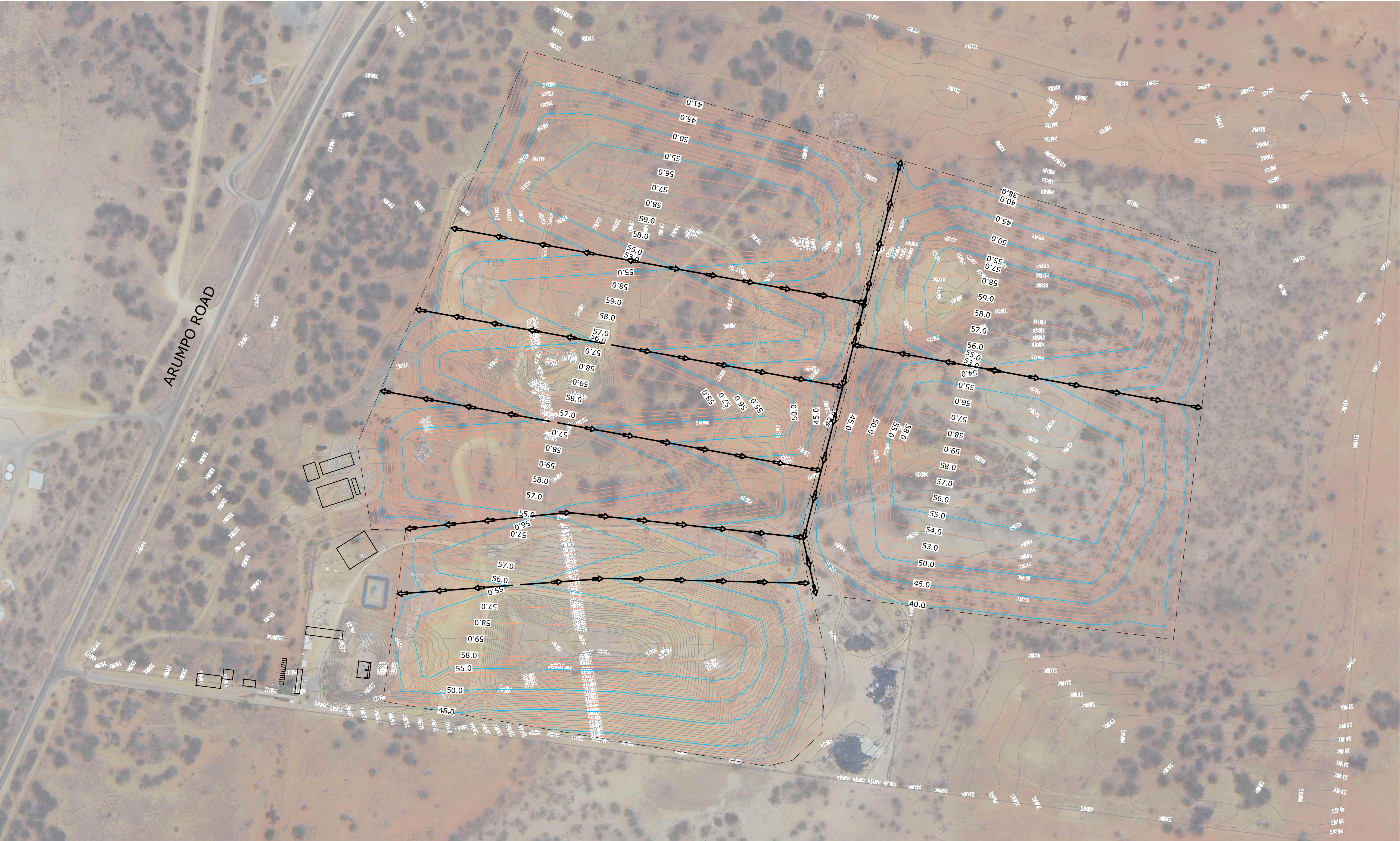


Figure 10 Schematic of water balance in a phytocap showing inputs (blue arrows) and losses (red arrows). Arrow thickness indicates relative percentage.

The Landfill Guideline allows for the use of a phytocap for landfill capping where it can be demonstrated through modelling and a field trial that the cap can meet the required performance objectives. The design of the phytocap is based on the specific soil hydraulic properties, the local climate and suitable vegetation. The climate in Buronga is favourable to the use of a phytocap due to the relatively low rainfall and high evaporation. The design details will be determined prior to capping commencing based on the soil material identified for use. The phytocap design will be prepared in accordance with The Landfill Guideline and the *Guidelines for the Assessment, Design, Construction and Maintenance of Phytocaps as Final Covers for Landfills* (WMAA, 2011).



LEGEND

- 40.0 ——— EXISTING CONTOUR (0.5m INTERVAL)
- 51.0 ——— DESIGN CONTOUR MAJ (5.0m INTERVAL)
- 50.1 ——— DESIGN CONTOUR MIN (1.0m INTERVAL)
- STAGE BOUNDARY
- CAP CROWN
- CAP DRAIN

- STORMWATER POND
- LEACHATE POND

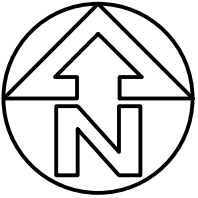
THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.

0 25 50 100 150
1:2500 (A1); 1:5000 (A3)

100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: AS SHOWN
SURVEYED:PRICEMERRET
SURVEY DATE:03.03.21
APPROVED / PROJECT LEADER



PUBLIC UTILITIES:
THE SERVICES SHOWN ARE DERIVED FROM PLANS OBTAINED FROM THE RELEVANT SERVICE AUTHORITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ARRANGE WITH THE RELEVANT SERVICE AUTHORITIES FOR CONFIRMATION OF SERVICES AND THEIR LOCATION BEFORE EXCAVATION WORK COMMENCES.

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NOT FOR CONSTRUCTION

WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 10
PROPOSED TOP OF CAP CONTOURS

REV	FOR INFORMATION	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
A	FOR INFORMATION		14.09.21		

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	012	A



The design of the phytocap will include consideration of profile depth, soil selection and vegetation selection. An estimate of the profile depth can be obtained by determining the moisture surplus, i.e. the amount of moisture that needs to be stored to minimise or prevent drainage into the waste from occurring. Moisture surplus is defined as:

Moisture surplus = Sum (rainfall – 0.8*evaporation) for wet months

Using the historical climate from 1970 until 2020, and calculating the moisture surplus for each year, results in a maximum moisture surplus of 106 mm. Clay soil, as found on site, can typically hold 120-130 mm/m of soil (Hazelton & Murphy, 2007) suggesting a profile of 0.9 m will prevent drainage into the waste mass occurring; however, to provide adequate soil depth for plants the minimum profile would be > 1 m with a recommended profile minimum of 1.2 m thick to provide additional moisture storage for planted vegetation in this semi-arid environment. The actual profile depth will be determined from water balance modelling based on the soil and vegetation characteristics proposed for the cap. The vegetation planted will be representative of the endemic vegetation to provide a rehabilitated surface that is sympathetic to the surrounding environment.

A landfill closure plan will be developed in accordance with the requirements of the Landfill Guideline prior to the closure of the facility. The closure plan will identify controls and steps required to ensure that the landfill remains non-polluting and does not cause environmental harm after the site closure.

3.9 Estimation of Capital Investment Value

The capital investment required for the proposed expansion to the Buronga Landfill is summarised in Table 3.8 with details and assumptions provided in Appendix D. Based upon the concept layout developed by Tonkin (Figure 5 and Figure 7), the capital expenditure cost for the future landfill cells is estimated to range from \$111 million – \$135 million for the Project in present value terms. This capital investment value is based upon the total footprint of the development being constructed as a series of discrete cells over the life of the site. The operating costs were estimated at approximately \$19 million in present value terms (Geolyse, 2015).

Table 3.8 Estimated Capital Costs Excluding Vegetation Offsets

Item	Present Value Cost
FERF and RRA	\$1,486,894
Stage 1	\$46,382,157
Stage 2	\$30,988,203
Final Capping	\$21,292,938
Design, Preliminaries and margins	\$16,876,235
Contingency	\$5,848,871
TOTAL	\$122,826,299

Due to the timeframe proposed for construction, changes in best-practice, technology or material costs could have a substantial impact upon the costs of the proposed development. These costs provided are estimates only and are subject to change during detailed design.



4 Strategic and Statutory Context

This section has been prepared by James Golsworthy Consulting, Mildura.

Table 4.1 Summary of Regulatory Requirements

Regulatory Requirements	Considerations	Location in EIS
State Environmental Planning Policy No. 33 – Hazardous and Offensive Development	Requires a proponent to prepare preliminary hazard analysis	Section 4.1.2.3
State Environmental Planning Policy No. 55 – Remediation of Land	Suitability of site and future remediation of contaminated land	Section 4.1.2.4
State Environmental Planning Policy (Infrastructure) 2007	Waste recovery and minimisation Adoption of landfill best practices Reduction in long term impacts of landfill Land use conflicts Transportation of waste	Section 4.1.2.2, Section 4.1
State Environmental Planning Policy (State and Regional Development) 2011	Identifies the facility as State Significant Development	Section 4.1.2.1
State Environmental Planning Policy (Koala Habitat Protection) 2019	Conservation and management of koala habitat	Section 4.1.2.5
Wentworth Local Environmental Plan 2011	Land use conflicts Impact on terrestrial biodiversity	Section 4.1.2.6

4.1 Strategic Context

4.1.1 Policy Direction

There are several high-level policies which are relevant for this project, including State policy relating to waste and resource recovery through to Council's vision for Buronga and Gol Gol. The key policies are summarised below.

4.1.1.1 State policy

NSW Waste and Sustainable Materials Strategy 2041

The current NSW Waste and Sustainable Materials Strategy 2041 outlines actions required over the next 6 years (phase 1) to transition to a circular economy by 2041.

The principles of a circular economy include:

- Valuing resources by keeping products and materials in use for as long as possible;
- Maximising the use and value of resources brings major economic, social and environmental benefits.

Focus areas in the strategy include:

- Meeting future infrastructure and service needs, including planning for critical waste infrastructure with a focus on co-locating businesses in precincts that support circular economy;



- Reducing carbon emissions through better waste and materials management, including a requirement for gas capture at landfills over a certain site and exploring a waste level rebate for landfills with such an installation;
- Protecting the environment and human health from waste pollution, including management of illegal dumping.

4.1.1.2 Regional policy

Far West Regional Plan 2036

The Far West Regional Plan 2036 is a 20-year blueprint for the future of Western NSW. Direction 29 seeks to manage rural residential development, including an action to locate rural residential areas close to existing settlements to make efficient use of infrastructure and services (including waste services).

Western Murray Regional Economic Development Strategy (2018-2022)

The Western Murray Regional Economic Development Strategy (2018-2022) has been developed to identify economic development opportunities in the Western Murray Region. The plan recognises that the region (in which the project is located) spans the NSW and Victorian border, encompassing several local government areas including WSC and Mildura Rural City Council.

4.1.1.3 Local policy

Wentworth Development Control Plan (2011)

The Wentworth Development Control Plan sets out the expectations for the shire. The DCP must be taken into consideration during the development assessment process, but it is not an environmental planning instrument. The DCP identifies the vision for Buronga and Gol Gol, which is to encourage balanced development for the area, ensuring appropriate infrastructure for a thriving and vibrant community.

Buronga / Gol Gol Structure Plan 2020

The Buronga Gol Gol Structure Plan was originally adopted by Council in 2005 and updated in 2020 to provide a vision for the Buronga – Gol Gol area and the planning guidance necessary to ensure that future development meets the expectations of the local community and the wider regional community.

The structure plan proposed:

- Logical containment of future residential expansion on non-flood prone land to the north east and east of Buronga and to the north and west of Gol Gol;
- Focusing urban development toward the Midway Centre as the main community and commercial centre; and
- Concentration of industrial activities to northwest Buronga.

It contains background information to support future detailed assessment of Local Development Plans and Development Control Plans. Relevantly for this EIS, Figure 6.5 in the report (extracted below as Figure 12) identifies a number of proposed developments, concepts and planning proposals. This allows the consideration of the interaction of this project with future development proposals.

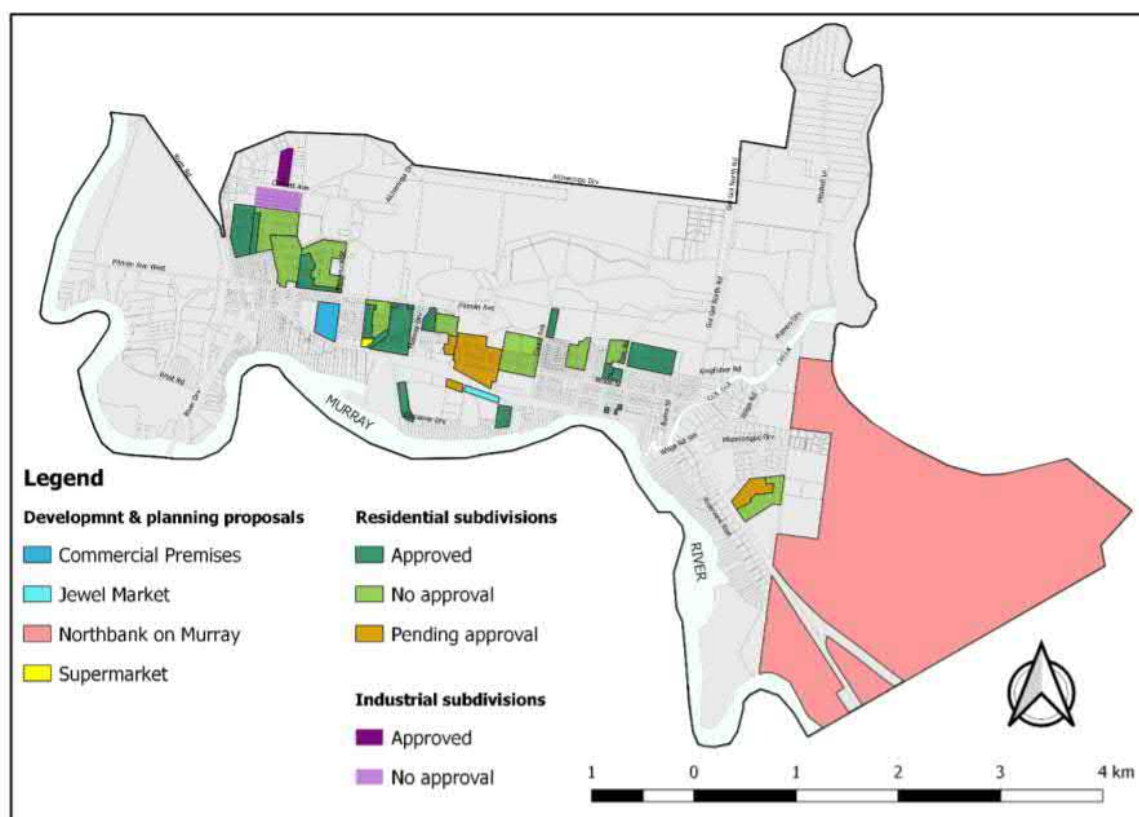


Figure 12 Proposed Developments, Concepts and Planning Proposal (Source: Buronga Gol Gol Structure Plan Report 2020)

4.1.2 Environmental Planning Instruments

Relevant NSW Planning Instruments include:

- State Environmental Planning Policy (State and Regional Development) 2011 No 511;
- State Environmental Planning Policy (Infrastructure) 2007 No 641;
- State Environmental Planning Policy No. 33 – Hazardous and Offensive Development 2011;
- State Environmental Planning Policy No. 55 – Remediation of Land;
- State Environmental Planning Policy (Koala Habitat Protection) 2019;
- Wentworth Local Environment Plan 2011.

These environmental planning instruments are outlined below, including an explanation of how the project responds to each instrument.

4.1.2.1 State Environmental Planning Policy (State and Regional Development) 2011

The *State Environmental Planning Policy (State and Regional Development) 2011* (NSW) identifies what projects are State Significant Development. It contains a definition of waste and resource management facilities that are declared to be State Significant Development at Clause 23(1)(b), Schedule 1.

23 Waste and resource management facilities

(1) Development for the purpose of regional putrescible landfills or an extension to a regional putrescible landfill that:



- (a) has a capacity to receive more than 75,000 tonnes per year of putrescible waste, or*
 - (b) has a capacity to receive more than 650,000 tonnes of putrescible waste over the life of the site, or*
 - (c) is located in an environmentally sensitive area of State significance.*
- (2) Development for the purpose of waste or resource transfer stations in metropolitan areas of the Sydney region that handle more than 100,000 tonnes per year of waste.*
- (3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.*
- (4) Development for the purpose of waste incineration that handles more than 1,000 tonnes per year of waste.*
- (5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.*
- (6) Development for the purpose of any other liquid waste depot that treats, stores or disposes of industrial liquid waste and:*
 - (a) handles more than 10,000 tonnes per year of liquid food or grease trap waste, or*
 - (b) handles more than 1,000 tonnes per year of other aqueous or non-aqueous liquid industrial waste.*

Under clause 23(1)(b), the proposed development is a State Significant Development. Accordingly, Section 4.36, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (NSW) applies. Under Section 4.12, Division 4.3 of the Act, an Environmental Impact Statement, in the form prescribed by the regulations, must accompany the development application.

4.1.2.2 State Environmental Planning Policy (Infrastructure) 2007

Under the infrastructure SEPP, a 'waste disposal facility' is defined as

...a building or place used for the disposal of waste by landfill, incineration or other means, including such works or activities as recycling, resource recovery and other resource management activities, energy generation from gases, leachate management, odour control and the winning of extractive material to generate a void for disposal of waste or to cover waste after its disposal.

Hence, the proposed development is permitted with consent under Section 121 of the *State Environmental Planning Policy (Infrastructure) 2007*.

Note, under section 123 of the Infrastructure SEPP:

(1) In determining a development application for development for the purpose of the construction, operation or maintenance of a landfill for the disposal of waste, including putrescible waste, the consent authority must take the following matters into consideration:

- (a) whether there is a suitable level of recovery of waste, such as by using alternative waste treatment or the composting of food and garden waste, so that the amount of waste is minimised before it is placed in the landfill, and*
- (b) whether the development:*
 - (i) adopts best practice landfill design and operation, and*
 - (ii) reduces the long-term impacts of the disposal of waste, such as greenhouse gas emissions or the offsite impact of odours, by maximising landfill gas capture and energy recovery, and*



(c) if the development relates to a new or expanded landfill:

(i) whether the land on which the development is located is degraded land such as a disused mine site, and

(ii) whether the development is located so as to avoid land use conflicts, including whether it is consistent with any regional planning strategies or locational principles included in the publication *EIS Guideline: Landfilling* (Department of Planning, 1996), as in force from time to time, and

(d) whether transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste to the landfill.

It is proposed to expand an existing facility which is already operating under an EPA licence (Appendix A). The current licence as reflected in the LEMP, requires best management practices at the landfill and its ownership by a local Council authority ensure the interests of the community are well represented. The licence will need to be varied, however there will be an ongoing requirement to adopt best practice landfill design and operation principles.

Land use conflicts are avoided but utilising the existing site which is located 4.5km from the township of Buronga. As discussed in more detail below, there are no strategic plans in place to grow Buronga settlement boundary closer to the north-east (e.g. towards the landfill facility). It is concluded that land use conflicts can continue to be avoided.

4.1.2.3 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

The *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP33) applies to a proposal for potentially hazardous or offensive industries. The Policy requires a proponent to prepare preliminary hazard analysis.

A preliminary hazard analysis has been prepared in consideration of the extended landfill proposal. Based upon the landfill being operational many of the hazards/risks associated with the facility are known and controls are in place and have been tested. Following consideration of the management/design controls to be implemented the preliminary hazard assessment concludes the residual risk of the identified items carry a low rating.

4.1.2.4 State Environmental Planning Policy No. 55 – Remediation of Land

The *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55) aims to provide a State-wide planning approach to the remediation of contaminated land. SEPP 55 require a planning authority to consider the suitability of land for a proposed development. Ultimately, a planning authority needs to be satisfied that a site is suitable for its proposed use or can and will be made suitable, based on what they know of the site.

The landfill is already licensed so SEPP 55 is only relevant in the context of ensuring the site can be feasibly rehabilitated in the future.

The rehabilitation of the site will occur in accordance with the EPA's *Environment Guidelines: Solid Waste Landfill*. Cells will be constructed sequentially as needed (approximately every 2-3 years) and will be rehabilitated within 2 years of closure. Capping will utilise excavated soil materials or locally suitable materials and will be vegetated with endemic grasses, trees and shrubs, as a minimum. It is envisaged that endemic trees will also be included in the planted vegetation, pending selection of final cap type.

4.1.2.5 State Environmental Planning Policy (Koala Habitat Protection) 2019

The *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala Habitat SEPP) provides the framework for conservation and management of natural areas that provide habitat of koalas to ensure permanent free-living populations over the present range. The policy applies to the Wentworth Shire

Council area; however, the site is not located within the mapped Koala Development Application Plan in the Koala Habitat SEPP.

WSC has not published a Koala Management Plan, but the Wentworth Development Control Plan states that the sole vegetation species for koala habitat is the River Red Gum. The ecology assessment (Appendix L) did not identify any River Red Gums on the site.

4.1.2.6 Wentworth Local Environment Plan

The Local Environment Plan relevant to the site is the *Wentworth Local Environmental Plan 2011* (LEP). The Land Zoning Map shown in Figure 13 shows that the Buronga site is zoned SP2 (Infrastructure) for the purpose of “Waste or Resource Management Facilities”. The objectives of the SP2 zone are:

- To provide for infrastructure and related uses;
- To prevent development that is not compatible with or may detract from the provision of infrastructure.

Under Part 2 of the LEP, roads and water reticulation systems are permitted without consent in Zone SP2 Infrastructure. Other uses, as shown on the Land zoning Map, are permitted with consent. The proposed development of a waste disposal facility is permitted with consent on the site. It is understood that Buronga Landfill did not require approval at the time of landfill activity commencing and hence there is no current Development Application or other approval.

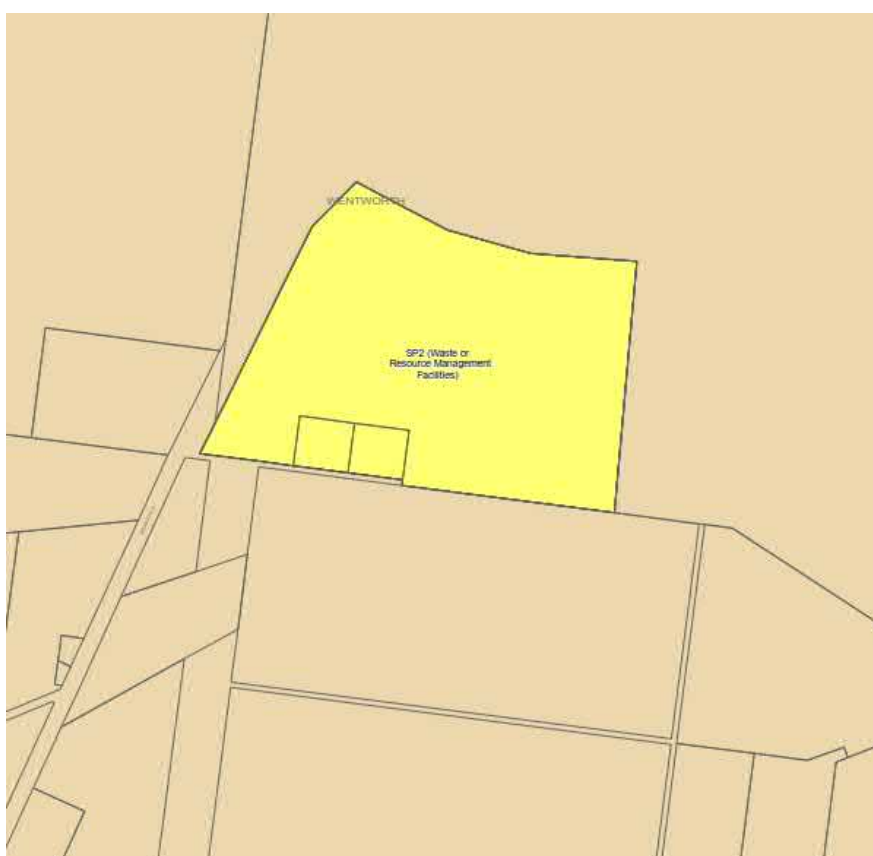


Figure 13 Land Zoning Map (Source: NSW Government)

The Wentworth LEP, defines area where complying development may still require development consent, being areas of special or unique environmental aspects. The Buronga Landfill is not located within 100 m of an environmentally sensitive area, including the wetlands located to the east and west of the site, and is not within the Flood Planning Area or a heritage conservation area (including heritage and archaeological



sites. Buronga Landfill is within the area designated for terrestrial biodiversity and under S7.4 of the LEP, the consent authority must consider whether the development:

- (a) is likely to have any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and*
- (b) is likely to have any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and*
- (c) has any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and*
- (d) is likely to have any adverse impact on the habitat elements providing connectivity on the land.*

The development has been designed, sited and managed to avoid, minimise or mitigate the impact. The concept plan, presented in the Preliminary Scoping Report (Tonkin, 2020), has been refined to minimise impacts on biodiversity. Notably the areas to the north of the current landfill cells have previously been quarried and consent has been given for the use of these areas as a borrow source for landfill cover soil.

The Ecology report has identified that there is approximately 45.75ha of native vegetation occurring within the subject land. Construction and operational works will be managed to minimise the impacts on native flora and fauna. Various controls have been identified in order to manage these impacts which have been adopted and will be implemented through the various stages of the development. Where impacts cannot be avoided mitigation measures will be implemented through securing offsets for losses.

4.2 Statutory Context

4.2.1 Project Approval

Under Section 4.36, Division 4.7 of the Environmental Planning and Assessment Act 1979 (NSW) and Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011 (NSW), the proposed development constitutes a State Significant Development. In accordance with the legislation and pursuant to Part 2, Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW), WSC, has commissioned the preparation of this EIS to support decision-making and enable the community and other stakeholders to understand the project and its impacts.

WSC is seeking to obtain development consent for the site to receipt of up to 100,000 tonnes of mixed waste per annum. The site is currently licenced under the Protection of the Environment Operations Act 1997 (NSW), holding NSW EPA Licence No. 20209. As part of the development process the proponent will apply to the EPA for a variation to the existing licence. Due to the staged nature of the proposed development, the licence will likely require several variations over the lifetime of the landfill site.

4.2.2 NSW Statutory Legislation

The relevant NSW planning legislation includes:

- Environmental Planning and Assessment Act 1979;
- Environmental Planning and Assessment Regulation 2000;
- Protection of the Environment Operations Act 1997.

4.2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the statutory framework for planning and environmental assessment in New South Wales, including allowing for the preparation of environmental planning instruments, being State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs). Part 4 of the EP&A Act



generally provides for the control of local development that requires development consent under an environmental planning instrument.

Under Section 4.36, Division 4.7 of the EP&A Act and Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (NSW), the proposed development constitutes a State Significant Development.

4.2.2.2 Environmental Planning and Assessment Regulation 2000

The proposed development is considered a designated development and requires an Environmental Impact Statement. The facility triggers Clause 32 (1)(a)(iv) of Schedule 3 of this legislation:

- (1) Waste management facilities or works that store, treat, purify or dispose of waste or sort, process, recycle, recover, use or reuse material from waste and:*
 - (a) that dispose (by landfilling, incinerating, storing, placing or other means) of solid or liquid waste:*
 - (iv) that comprises more than 200 tonnes per year of other waste material.*

As described in Section 3, the facility is proposed to accept up to 100,000 tonnes per annum of waste material and therefore comprises a designated development.

The site already comprises a designated development as it is currently a waste facility accepting up to 30,000 tonnes per annum, exceeding the requirement for Clause 32(1)(a)(iv) to be triggered. The Landfill was a pre-existing use prior to the development of the WSC Interim Development Order in 1970 and hence no development application has been submitted (WSC, 2015).

4.2.2.3 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act* (POEO Act) 1997 defines scheduled activities which require an Environment Protection Licence. Waste disposal by application to land is a scheduled activity unless the activity involves the following:

- (f) sites that are outside the regulated area, but only if:*
 - (i) the site is owned by and operated by or on behalf of a local council, and*
 - (ii) the site was in existence immediately before 28 April 2008 and was not required to be licensed before that date, and*
 - (iii) details required under clause 47 of the Protection of the Environment Operations (Waste) Regulation 2005 were provided, in relation to the site, before 28 April 2008, and*
 - (iv) the site receives from off-site less than 5,000 tonnes per year of waste, and*
 - (v) that waste has been generated outside the regulated area and consists only of general solid waste (putrescible), general solid waste (non-putrescible), clinical and related waste, asbestos waste, grease trap waste or waste tyres (or any combination of them). the waste received is <5,000 tonnes/yr.*

As Buronga Landfill receives over 5,000 t/yr of general solid waste it is a scheduled activity and required to hold an Environment Protection Licence. This requirement is current for the existing operation and does not change for the proposed development; however, the licence will require amendment if the proposed development is approved. The current Licence requires adherence to the Landfill Guidelines and development of site-specific plans which will also require updating if approval is granted.

4.2.3 Commonwealth Policy and Legislation

Relevant Commonwealth Policy includes:



- *The National Waste Policy 2009.*

Relevant Commonwealth Legislation includes:

- *National Greenhouse and Energy Reporting Act 2007;*
- *Environmental Protection and Biodiversity Conservation Act 1999.*

4.2.3.1 The National Waste Policy 2009

The response of the project to waste policy is discussed in Section 3.4 of this document.

4.2.3.2 Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires a project to be referred to the Commonwealth if it is likely to have a significance impact on matters of national environmental significance. These matters include certain listed species, heritage places and wetlands of international importance.

The subject site is not listed as a World or National Heritage Place, nor will the development impact upon any World or National Heritage Places. The site is not located near a Commonwealth Heritage Place. The closest protected areas are located approximately 5.5 km away adjacent to the Murray River. There are several Wetlands of International Importance located along the Murray River, with the closest being the Riverland Complex 100km downstream. The targeted survey to be undertaken in October will provide further details on this matter.

4.2.3.3 National Greenhouse and Energy Reporting Act 2007

Reporting requirements under the *National Greenhouse and Energy Reporting Act 2007* are unlikely to apply as annual greenhouse gas rates are intended to be maintained below 25,000 t CO_{2-e} with the construction of the LFG management system once the expansion is progressed and generation rates increase to economic levels.

4.3 Interaction with Existing and Future development

The site is located approximately 4.5 km north north-east of the township of Buronga, is zoned SP2 (Infrastructure) and has been used as a landfill for many years. There are no sensitive receptors within 1 km of the landfill site. The site's neighbours are industrial activities for bentonite and gypsum supply.

The Buronga / Gol Gol Structure Plan (2005) seeks to limit future residential growth to the north-east and east of Buronga. The structure plan directs future urban development towards the Midway Centre. The more recent Buronga Gol Gol Structure Plan Report 2020 identifies recent and proposed developments in Buronga. The closest future development proposals are industrial subdivisions located towards the northern part of the township.

It is not considered that the expanded landfill facility will conflict with existing or planned developments in Buronga. There is clear policy direction to avoid residential development to the north-east, reducing the chance of sensitive receptors being located closer to the site in the future. Furthermore, the site is already in operation and given the zoning of the land there is a reasonable expectation that the use (along with nearby industrial activities for bentonite and gypsum supply) will continue to operate.

There is a potential for additional traffic on the road network according to the Traffic Assessment. However, such impacts can reasonably be managed through Traffic Management Plans. The hours of operation will remain the same and it is therefore concluded that any cumulative impacts on the road network can be managed.



The EPA licence addresses other off-site impacts (e.g. noise, dust and odour). If these potential impacts are managed it is not considered that there will be unreasonable cumulative impacts, taking account of other industrial activities to the north east of Buronga.

4.4 Summary of Project Approval Requirements

4.4.1 State legislation

- Development consent - *Environmental Planning and Assessment Act 1979* (NSW). Under Section 4.12, Division 4.3 of the Act, an Environmental Impact Statement, in the form prescribed by the regulations, must accompany the development application.
- Variation to existing NSW EPA Licence No. 20209 - *Protection of the Environment Operations Act 1997* (NSW). Due to the staged nature of the proposed development, the licence will likely require several variations over the lifetime of the landfill site.
- Consent may be required under Section 138 of the *Roads Act 1993* for any road upgrade works identified through a Traffic Management Plan (e.g. altered access with the landfill facility) - *Roads Act 1993*

4.4.2 Commonwealth legislation

- Referral under the *Environmental Protection and Biodiversity Conservation Act 1999* is only required if the project is likely to have a significant impact on matters of national environmental significance. The ecology assessment (Pinion, July 2021) has identified possible impacts on two matters of national environmental significance, being the Grey Falcon and Corben's Long-eared bat. Targeted species surveys are scheduled to be completed in October 2021. If suitable habitat or species are present, referral triggers under the EPBC Act will be reviewed.
- Reporting requirements under the *National Greenhouse and Energy Reporting Act 2007* are unlikely to apply as annual greenhouse gas rates are expected to be below 25,000 t CO_{2-e} with the inclusion of an LFG management system.



5 Engagement

5.1 Community Engagement

Community and stakeholder engagement was undertaken by PlanCom (Appendix E). A “Community and Stakeholder Participation Strategy” was prepared initially and endorsed by WSC to identify key community members and other stakeholder and the appropriate method of communication. The Strategy drew on WSC’s Community Engagement Strategy 2016-2020 and Community participation Plan which requires Council to Inform, Consult and Consider.

The objective of community and stakeholder engagement during this phase was to

- create broad awareness of the planned expansion and the planning process
- identify particular issues and impacts which can be addressed by changes or provision of additional information within the EIS.

The consultation led by PlanCom focussed on identifying and consulting:

- Surrounding landowners/neighbours. An area of approximately 3 km from the Landfill was selected as an appropriate distance from the boundary, noting that residents in Victoria were not included though marginally inside the 3 km radius;
- Businesses in the vicinity and especially those likely to be impacted along Arumpo Road;
- Community service providers;
- Advocacy groups;
- Previous complainants.

Consultation was initiated by posting or emailing a letter from WSC’s General Manager presenting the proposed development, introducing Plancom and inviting recipients to contact Plancom to discuss the proposal. No responses were received via this method.

Direct contact (phone, on-line interview and/or email) was made with stakeholders in close proximity to the landfill, being residents and businesses along Arumpo Road and to the north of the landfill. Responses were gained from all identified parties with the exception of Morello Gypsum on Arumpo Road who did not respond to phone calls or messages.

5.2 Regulator Engagement

Regulator engagement was undertaken by specialist consultants as required to refine and understand issues raised within the SEARs. This engagement is documented within the individual reports and where additional issues were raised have been included in relevant sections in Section 6.

5.3 Potential Issues Raised

Issues have been grouped to facilitate responses and are summarised in Table 5.1. Detailed responses from each stakeholder are provided in Appendix E.

Table 5.1 Summary of Stakeholder Issues and Proponent Responses

Issues Raised	Response
Need for local waste management services – improved capacity for recycling, increased pick-up	The project proposes to improve community recycling facilities by providing additional drop off facilities aimed at improving diversion of recyclables from the waste stream. We note the request for additional



Issues Raised	Response
services have resulted in less illegal dumping, want to retain local services	<p>drum muster storage and have accommodated this into the concept design</p> <p>The project will also provide surety of local community services into the future. Current projection has the site closing in approximately 5 years' time with no alternative disposal facilities identified. Approval of the project site will provide security for diversionary and disposal options for the community for many years to come</p>
Nature of the material to be accepted by the landfill and need to control what is accepted in the interest of other industry including agriculture	<p>The same waste streams are proposed to be accepted as are part of the current licence. There is no plan to change this as part of this project</p> <p>All quarantine waste, regardless of its origin, is handled and immediately buried in accordance with Commonwealth and State guidelines to minimise any potential to impact the surrounding agricultural industry</p> <p>All waste able to be accepted at Buronga that cannot be reused or recycled, is placed within engineered landfill cells designed in accordance with NSW EPA Solid Waste Landfill Guidelines. The cell is lined with bentonite clay (known as geosynthetic clay liner, GCL) and high-density polyethylene (HDPE) which is under the constant supervision of an independent geotechnical inspection and testing authority to provide quality control. This encapsulates the waste and prevents contaminants entering the surrounding environment</p>
Need for control over the operations	<p>Site operations are strictly controlled through EPA licence conditions and a detailed Landfill Environmental Management Plan (LEMP). WSC carefully manages site operations to achieve compliance with these requirements and will continue to do so moving into the future</p>
Traffic increase and need for improvement to roads as part of the project - Arumpo Road being one in the interest of shared use and safety	<p>A traffic assessment has been undertaken which has recommended improvements to Arumpo Road at the entrance to the Buronga Landfill to maintain a safe environment for local residents and waste transporters. It is noted that widening of shoulders has also been requested to improve residents' safety and it is noted that although the road width meets current standards, the sealed shoulder width can be improved. Further consultation will be held with local residents to discuss timeframes for completion of shoulder sealing</p>
Access to the site and in appropriate use of certain roads	<p>Mourquong Road was noted to be used by large trucks. It is unclear if these trucks are related to the landfill or to other industries. WSC will undertake further consultation on this matter to determine an appropriate response, which may include options such as load limits. Improvement made to Arumpo Road should also assist in encouraging large trucks to use this road rather than smaller roads</p>
Dust from traffic, landfill, and other existing industry	<p>Dust from construction and during operations is minimised as required by the licence. The LEMP identifies the following measures to assist in minimising dust:</p> <ul style="list-style-type: none">• Immediate burial of dusty loads



Issues Raised	Response
	<ul style="list-style-type: none"> • Entrance and site access roads to be maintained and watered if required; • Speed limits enforced on site; • Earthworks avoided on days with moderate winds or stronger where practical; • Soil dampened during excavation; • Water truck used as required for operations likely to cause dust, e.g. crushing concrete, chipping green waste. <p>The project proposes to retain the vegetation along Arumpo Road and set back the landfill operations over 200 m from the boundaries to assist in minimises the impact of dust generated on road users and surrounding residents</p>
Odour	<p>As described in the LEMP, odour from the landfill is controlled by compacting the waste as it is received, minimising the size of the waste placement area, immediately covering malodorous waste and covering the exposed waste surface with daily cover (soil) at the end of each day</p> <p>As stated, the project proposes to keep a minimum 200 m buffer from the boundary to further minimise the potential for odour to be a nuisance to neighbours</p>
Litter	<p>Litter is managed in accordance with the licence with the control measures specified in the LEMP, including:</p> <ul style="list-style-type: none"> • Maintaining a small active waste placement area; • Compacting and covering the waste; • Deploying litter fences around the active tipping area as required; • Fencing the site. <p>The project proposes a 200 m buffer from the landfill, bulking up areas and waste transfer station to the site boundary and will retain and protect existing vegetation along Arumpo Road</p>
Fires in the landfill and resulting impact on air quality and odour	<p>Landfill fires may occur due to the inappropriate disposal of spontaneously combustible waste, such as batteries, in the municipal solid waste. They are controlled as far as practical by limiting the acceptance of flammable wastes</p> <p>The project proposes to improve the handling and sorting of recyclable waste such as green waste. Improved handling and limitations on the volume of potential flammable wastes retained on-site will assist in reducing the frequency of fires</p>
Land use - potential for conflicts with agricultural land use	<p>No rezoning of land is proposed as part of this project. The site is currently appropriately zoned and the surrounding areas are zoned rural. This project does not propose to rezone surrounding land</p>
Visual impact as result of the height of the filled area	<p>The existing height of the landfill is 56 m AHD with the expanded landfill proposed to reach a maximum height of 59 m AHD. The landform has been designed as a series of rolling dunes to replicate</p>



Issues Raised	Response
	similar east-west dunes in this area. In addition, it is proposed to revegetate the final landform with endemic native species which includes a range of grasses, forbs, shrubs and potentially trees to soften the landform outline and match in with the local colour palette
Commercial interest - supply to the landfill, use of the service, expansion of nearby industrial development	WSC will undertake further discussion with the specific parties in relation to their interests that were expressed through the consultation
Future consultation and desire to be informed about the release of the EIS	WSC has undertaken to continue to inform, consult and consider feedback from the community in accordance with the Community Engagement Plan. All parties contacted during this EIS development phase will be provided these responses and will be notified when the EIS has been submitted and the public exhibition commences. They will be provided with information about how to make a submission to Department of Planning, Industry and Environment

5.4 Further Consultation Proposed

Recommendations for future consultation include:

- Ensuring that all those contacted as part of this stage are provided WSC's responses and notified by email when the EIS is submitted and on exhibition.
- Information about the proposal should be provided through WSC newsletters and communication and via the website.
- Further meetings or information session should be offered during the EIS exhibition period. This may be just an advertised time when people can attend at WSC Offices, view maps and have any questions answered with Council staff available. This will be particularly important for resolving the issues raised around Arumpo Road and the use of smaller roads.
- Ensuring that all near neighbours have a contact name and number for a person in WSC who can address any operational concerns on site or incidents such as illegal dumping.
- Information should be provided to the agricultural community but available to all stakeholders about the operations and controls. This is to reassure those with concerns about the impact on local activities including food production.



6 Environment Impact Assessment

6.1 Air Quality and Odour

6.1.1 Methodology

The air quality and odour assessment was undertaken by Vipac Engineers & Scientists (Vipac) and is presented in Appendix F. A summary of this report is presented in this section. Vipac employs suitably qualified staff, including their Principal Air Quality Scientist who has a doctorate related to the characterisation of urban particulate matter, and has relevant experience which includes numerous air quality assessment for landfills, mines in New South Wales.

The air quality impact assessment was conducted according to the *Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales* and the *Optimum CALPUFF modelling guidance for NSW*. Modelling tools, TAPM, CALMET, CALPUFF and CALPOST, were used in series to provide atmospheric dispersion modelling. The models use local meteorological data, air quality records and factors accounting for land use practices and emission mitigation measures to predict ground level concentrations of pollutants over a specific time period. The ground level concentrations can be estimated at different locations – for example, at the locations of different sensitive receptors. In this way, the effect of landfill operations on the quality of air near sensitive receptors can be estimated.

6.1.1.1 Particulate Matter

Air quality assessment and methodology criteria are detailed in the *Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales* which are derived from the *National Environment Protection (Ambient Air Quality) Measure 1998* (referred to as the Air NEPM) which establishes national standards. Due to the type of industry and proximity of sensitive receptors, the NSW requirements for a Level 2 assessment have been adopted, with selected pollutants and criteria defined in Table 6.1.

Table 6.1 Adopted Air Quality Goals for Particulate Matter

Pollutant	Description	Basis	Criteria	Averaging Time
Total Suspended Particles (TSP)	Particulate matter (PM) with diameter ≤ 50 microns (μm);	Human health	$90 \mu\text{g}/\text{m}^3$	Annual
PM10	PM with diameter $\leq 10 \mu\text{m}$);	Human health	$50 \mu\text{g}/\text{m}^3$	24-hour
		Human health	$25 \mu\text{g}/\text{m}^3$	Annual
PM2.5	particulate matter with diameter $\leq 2.5 \mu\text{m}$);	Human health	$25 \mu\text{g}/\text{m}^3$	24-hour
		Human health	$8 \mu\text{g}/\text{m}^3$	Annual
Dust deposition	deposited matter that falls out of the atmosphere	Amenity	Max. incremental increase of $2 \text{ g}/\text{m}^3/\text{month}$	Annual
		Amenity	Max. total of $4 \text{ g}/\text{m}^3/\text{month}$	Annual

6.1.1.2 Odour Emissions

Odour is expressed in Odour Units (OU), which represents the dilution factor required to decrease the concentration of an odorant to a predetermined detection threshold. For example, a 1-second OU value of 1 indicates an odorant is just detectable within 1 second of exposure – meaning the concentration of the



odour is at the detection level. Furthermore, a 1-second OU value of 2 indicates the concentration of the odorant is double the concentration required to detect the odour within 1 second of exposure. Finally, air quality assessment criteria employ a 99th Percentile 1-second OU – meaning 99% of people exposed to 1 OU of an odour will be able to detect that odour within 1 second. *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* include odour assessment criteria as shown in Table 6.2. An odour assessment criterion of 7 OU is appropriate to assess the performance of the project.

Table 6.2 Assessment Criteria for Odour (1 second average, 99th percentile)

Population of Affected Community	Assessment Criteria (OU) for Complex Mixture of Odours
Urban (>2000 people) and/or schools and hospitals	2
500	3
125	4
30	5
10	6
Single rural residence (<2)	7

Odour emissions from the landfill activities were derived from a web-based research of measured data from similar facilities.

6.1.1.3 Greenhouse gas emissions

The assessment of greenhouse gas emissions was conducted according to the national framework set out in the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). The NGER Act requires corporations to submit an annual report in energy consumption, energy production and greenhouse gas emission, if any of the following conditions are met:

- The facility consumes more than 100 terajoules of energy in a financial year or emits more than 25,000 tonnes of CO₂ equivalents (CO_{2-e}).
- All Australian facilities collectively consume more than 200 terajoules of energy in a financial year or emits more than 50,000 tonnes of CO_{2-e}.

A local Council is not a corporation, as it is a body politic of the State and hence annual reporting is not required. A facility is defined as an activity, or series of activities (including ancillary activities), if it involves the production of greenhouse gas emissions.

Greenhouse gas emissions were estimated using the *National Greenhouse Accounts Factors Workbook* (NGA Workbook), which is published and regularly updated by the Department of Industry, Science, Energy and Resources. The scope of the emission assessment is related to source/type of direct and indirect emissions.

6.1.2 Existing Environment

6.1.2.1 Local Setting and Topography

The location of sensitive receptors in relation to the odour source(s) and the local topography are key aspects of assessing air quality impacts. The nearest sensitive receptors are residential dwellings associated with agricultural activities, the nearest of which is located approximately 1 km southwest, and Lake Gol Gol located 1.8 km east of the expansion area. Industrial (mining) operations are located 400 m



west and 50 m north west of the project. The NSW 1:50,000 Topographic Map indicates that the site rises above the surrounding landscape, which is generally flat.

The sensitive receptor locations adopted for modelling were:

- Receptor 1: Residential property near 178 Arumpo Road, approx. 1 km south of project;
- Receptor 2: Residential property at 664 Arumpo Road, 1.9 km north-east of project;
- Receptor 3: Shed/crops at 222 alcheringa Drive Gol Gol, approx. 1 km south-south-east of project;
- Receptor 4: Residential property at 173 Mourquong Road, 1.1 km south-south-west of project.

6.1.2.2 Dispersion Meteorology

The Mildura climate (as recorded at Mildura Airport (BOM Site No. 076031)) is characterised by:

- Mean temperature range 4 °C to 33 °C with the coldest month in July and hottest in December to March
- Mean rainfall of 285.4 mm/yr is consistent across the year and higher in late winter/spring. On average, 43.6 days/year receive rainfall ≥ 1 mm with the highest number of rain days in July. Summer rainfall occurs over a smaller number of high intensity events.
- Winds are primarily from the south and south east at 9 am and from the south, southwest and west at 3 pm. Stronger winds (> 40 km/hr) occur infrequently but most often from the west.

Air dispersion modelling requires detailed information about meteorological factors such as wind speed and direction, atmospheric stability and mixing height. Two modelling suites (TAPM and CALMET) were used to derive a continuous hourly dataset for 12 months. Wind rose diagrams generated using TAPM-CALMET derived datasets were consistent with those obtained from the nearest Bureau of Meteorology (BOM) weather station at Mildura Airport (Station Number 076031).

Atmospheric stability classification schemes provide an indication of the tendency of the atmosphere to resist or enhance vertical motion of pollutants. There are six stability classes (A-F), ranging from very unstable (Class A), to neutral (Class D), to stable (Class F). The TAPM-CALMET-derived datasets indicate the local atmospheric stability is generally neutral to stable.

Mixing height refers to the height above the ground at which particulate matter and other pollutants may be dispersed. During stable conditions, the mixing height is often lower and particulate dispersion is limited to this layer. The mixing height increases following sunrise and continues to increase during the morning reaching maximum mixing heights in the mid to late afternoon due to the dissipation of ground-based temperature inversions and the growth of convective mixing layer.

6.1.2.3 Existing Air Quality

NSW EPA operates a network of air quality monitoring stations with the closest station to the project at Wagga Wagga North, approximately 500 km east of the project. Although the monitoring site is located at distance from the Buronga, it provides a reasonable reference as it is a regional site with rural sources of air emissions (e.g. primarily dust from farming activities and wind erosion). Available and adopted data for the project are shown in Table 6.3. The maximum measured 24-hour average PM_{10} ($114 \mu g/m^3$) was greater than the relevant criteria of $50 \mu g/m^3$.

Table 6.3 Assigned Background Concentrations

Parameter	Unit	Air Quality Criteria	Period	Maximum Measured	Adopted Background	Comments
TSP	$\mu g/m^3$	90	Annual	51.5	51.5	Conservative Assumption
PM10	$\mu g/m^3$	50	24 hour	114	Varies	NSW EPA Measurement
PM10	$\mu g/m^3$	25	Annual	20.6	20.6	



Parameter	Unit	Air Quality Criteria	Period	Maximum Measured	Adopted Background	Comments
PM2.5	µg/m ³	25	24 hour	28.1	Varies	Conservative Assumption
PM2.5	µg/m ³	8	Annual	7.4	7.4	
Dust Deposition	g/m ² /month	4	Month	2	2	

6.1.3 Assessment

6.1.3.1 Emission Inventory, Controls and Source Locations

Dust and particulate matter are most likely to be generated from on-site activities of unloading trucks, equipment operation, wind erosion from disturbed areas, materials handling and vehicle movements. Odour is likely to be generated by putrescible waste within the accepted waste stream at the tip face and under interim cover and generated from leachate stored in ponds with little contribution expected from non-putrescible waste. Emission controls based on typical landfill practices as describe in the Landfill Guideline. The emission data for particulates and odour are shown in Table 6.4 and Table 6.5, respectively.

Table 6.4 Particulate Emission Rates

Activity	Emission Rate			Control applied
	TSP (g/s)	PM10 (g/s)	PM2.5 (g/s)	
Landfill Area				
Machinery on waste	0.486	0.233	0.051	
Trucks dumping waste	0.233	0.084	0.025	
Wind Erosion				
Active landfill	0.311	0.156	0.033	Watering and windbreaks
Inactive landfill	0.036	0.018	0.004	Revegetation
Historical landfill	0.021	0.011	0.002	Revegetation
Haulage				
Wheel-generated dust – heavy vehicles	3.290	0.972	0.056	Watering and limiting vehicle speed to < 50 km/hr
Wheel-generated dust – light vehicles	0.183	0.064	0.007	
TOTAL	4.56	1.54	0.18	



Table 6.5 Odour Emission Rates

Source	Area (m ²)	Specific Odour Emission Rate (OU/m ² /s)	Peak to Mean Ratio	Modelled Odour Emission Rate (OU/m ² /s)
Active tip face	600	3.2	2.5	4,950
Interim cover	400,000	0.16	2.5	55,760
Leachate pond	12,828	0.459	2.5	1,205

Greenhouse gas emissions were estimated for combustion for transport (general) and municipal solid waste disposal (assuming no LFG capture). The emissions which have not been included are: emissions arising by the leachate; emissions arising from waste transport to the site; the use of electricity from the grid. The main greenhouse gas emission is related to waste disposal (Table 6.6).

Table 6.6 Greenhouse Gas Emission Rates with No Mitigation

Source	Scope	Emission Factor	Annual Emission (t CO ₂ -e/yr)
Waste disposal	Direct	1.6 t CO ₂ -e/ t waste	160,000
Equipment – combustion	Direct	2.69 t CO ₂ -e/ t kWh	1664
On-site haulage - combustion	Direct	2.69 t CO ₂ -e/ t kWh	16
TOTAL			161,680

6.1.3.2 Impact Assessment

The predicted concentration of particulate matter and odour were assessed in relation to four sensitive receptors (all greater than 900 m from the proposed expansion footprint). For the majority of parameters, emission concentrations are all predicted to be below relevant air quality criteria (Table 6.7). The exceptions are the predicted 24-hour average PM₁₀ and PM_{2.5} concentrations. For both these parameters, the background concentration exceeds the criteria. Further investigation found that sixteen (16) exceedances for PM₁₀ and two (2) exceedances for PM_{2.5} were above background occur at the receptors over the year. All exceedances correspond to high background concentrations, with the landfill predicted to increase the cumulative concentration by a maximum of 0.81 µg/m³ for PM₁₀ and 0 µg/m³ for PM_{2.5}. These increments provide a negligible contribution to the exceedance and hence the Approved Methods do not require additional assessment. For all particulates and odour, the predicted emissions from the project are not predicted to adversely impact upon the sensitive receptors.

Table 6.7 Predicted Particulate and Odour Concentrations at Receptors

Parameter (units)		Background Concentration	Predicted Concentration at Receptors			
			Receptor 1	Receptor 2	Receptor 3	Receptor 4
TSP – annual average (µg/m ³)	Incremental	51.5	1.68	0.09	0.25	0.55
	Cumulative		53.18	51.59	51.75	52.05
	Criteria		90			
Incremental		114.7	13.12	0.51	1.09	4.08



Parameter (units)		Background Concentration	Predicted Concentration at Receptors			
			Receptor 1	Receptor 2	Receptor 3	Receptor 4
PM10 – 24-hour average (µg/m³)	Cumulative		127.12	114.51	115.09	118.08
	Criteria				50	
	Incremental		0.62	0.04	0.10	0.21
PM10 – annual average (µg/m³)		20.6				
	Cumulative		21.22	20.64	20.70	20.81
	Criteria				25	
PM2.5 – 24-hour average (µg/m³)	Incremental		2.11	0.09	0.30	0.70
	Cumulative	28.1	30.21	28.19	28.40	28.8
	Criteria				25	
PM2.5 – annual average (µg/m³)	Incremental		0.09	0.01	0.02	0.04
	Cumulative	7.4	7.49	7.41	7.42	7.44
	Criteria				8	
Dust deposition (g/m³/month)	Incremental		0.36	0.02	0.04	0.1
	Cumulative	2	2.36	2.02	2.04	2.10
	Criteria		Incremental = 2 Cumulative = 4			
1-second Odour (OU)	Incremental		2.76	0.43	1.11	1.45
	Criteria				7	

Greenhouse gas emissions based on acceptance of 100,000 tonnes/annum of waste is estimated to be around 161,680 tonnes CO₂-e per year. This potential maximum emission represents approximately 0.3% of Australia's 2019 greenhouse inventory estimate. If capping of the active cells and LFG capture in the management system is accounted for a reduction of at least 90% can be expected, most likely more, resulting in greenhouse gas emissions of less than 16,000 tonnes CO₂-e per year.

6.1.4 Mitigation Measures

The Air Quality Assessment concluded that air quality should not be a constraint to the proposal. This was based on the site undertaking typical air pollution mitigation measures, as follows:

- Particulate matter
 - Watering and windbreaks for the active landfill cell;
 - Revegetation of inactive landfill cells;
 - Watering of unsealed roads; and
 - Limiting vehicle speeds on unsealed roads to 50 km/h.
- Odour
 - Restriction of the active tip face to 600 m²;
 - Placement of daily cover on the active tip face at a depth of 150 mm at the close of business each day;



- The use of intermediate cover on areas awaiting final capping.

No mitigation measures related to greenhouse emissions were specified in the assessment; however significant further reductions can be achieved by:

- Interim and final capping of completed cells;
- LFG passive or active extraction.

The reduction in greenhouse gas emissions from these measures could reduce emissions by over 90%.

The potential air quality mitigation measures will be a requirement of the POEO licence and will be embodied in the LEMP. The 200 m buffer around the site boundary has assisted in ensuring that the project will not impact air quality.

6.2 Traffic and Access

The Traffic Impact Assessment (TIA) was prepared by Tonkin and is presented in Appendix G.

6.2.1 Methodology

6.2.1.1 Aim, Scope and Relevant Guidelines

A TIA is a technical appraisal of the traffic and safety implications relating to a specific development. The principal aim of the TIA is to assess the existing road network's suitability to adequately support traffic generated by the landfill expansion and the methods, management and mitigation proposed to avoid or minimise traffic impacts. The assessment is conducted in compliance with the NSW Roads and Maritime Services (RMS) *Guide to Traffic Generating Developments*, which sets out the scope of issues to be addressed in the TIA. Key issues to be addressed by a TIA include:

- the existing locality and surrounding land uses;
- the existing road network and intersections;
- traffic generation characteristics of the project;
- traffic impacts of the project; and
- a summary of the assessed traffic impacts and any traffic management or mitigation measures.

The scope also included issues/requirements raised during consultation with key stakeholders, namely: Wentworth Shire Council (Roads and Engineering Department) and Transport for NSW (TfNSW).

Wentworth Shire Council indicated that the access with the landfill should be upgraded to suit the largest vehicle required to access the landfill. TfNSW indicated that the TIA should address where the additional waste is expected to come from and any potential impact on George Chaffey Bridge; how the waste is expected to be processed on site; and the regional impacts on the state road network.

The design, construction, maintenance and operation of road networks in Australia and New Zealand are described in standardised guides published by Austroads. The following Austroads Guides, including the RMS Supplements, were used in assessing the adequacy and potential upgrades of the existing roads:

- Austroads Guide to Road Design Part 3 – Geometric Design
- Austroads Guide to Road Design Part 4 – Intersections and Crossings - General
- Austroads Guide to Road Design Part 4A – Unsignalised intersections and signalised intersections
- Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings
- Austroads Guide to Pavement Technology Part 5 – Evaluation Treatment Design

The National Heavy Vehicle Regulator (NHVR) Performance Based Scheme (PBS) - Network Classification Guidelines have also been referred to in the preparation of the assessment.



6.2.1.2 Methodology

On 24 March 2021, Tonkin conducted a site inspection of the current landfill entrance and the junction of Arumpo Road and Silver City Highway. The aim of the inspection was to assess the existing road arrangements, geometry, sight distances and pavement conditions in order to identify any constraints these factors may place on the proposed development.

The existing roads and the future requirements were compared with the Austroads Guidelines to determine potential upgrades or management and mitigation to avoid or minimise impacts. A broad range of methods, primarily derived from the Austroads Guides, were employed for the assessment of the following:

- **Function and Geometry**
 - The layout or geometry of a road network, the technical specifications of a road (e.g. width, seal type, load capacity, speed limits), and the types of vehicles permitted to use a road can be determined using maps and state and government records/databases.
- **Road Condition**
 - The physical condition of key stretches of the roads were assessed via visual inspection.
- **Traffic and Safety**
 - Daily traffic volumes were obtained from Austraffic traffic surveys undertaken in March 2021. Crash data (e.g. crash frequency, type, and resulting injuries or fatalities) was obtained from the Centre for Road Safety.
- **Intersection Sight Distance**
 - The Safe Intersection Sight Distance (SISD) of an intersection was assessed using Austroads Guide to Road Design Part 4A.
- **Intersection Upgrade Warrants**
 - Conditions warranting/prompting the upgrade of intersections are outlined in Austroads Guide to Traffic Management Part 6; and are primarily based on speed limits, peak hourly traffic rates and turning traffic movements.
- **Landfill Traffic Volumes**
 - Traffic to and from the landfill was primarily assessed using landfill weighbridge records.
- **Traffic Projections**
 - Future traffic projections for multiple traffic generation scenarios were based on assumptions of the usage of surrounding areas and traffic engineering experience. See Section 6.3 of the TIA for the specific assumptions used in the traffic projection calculations.

6.2.2 Existing Environment

6.2.2.1 Silver City Highway

Function and Geometry

The Silver City Highway (maintained by TfNSW) is the primary route for transport between Buronga/Mildura and Broken Hill. It is a designated heavy vehicle route and has approval for travel by B-double, Type (1) A-double, Modular B-triple, B-triple and AB-triple vehicles. Between Buronga and Arumpo Road, it is two-lane and two-way, sealed (with sealed shoulders) and edge lined, with marked lane widths of 3.5 m and sealed shoulder widths of 1.0 m and a speed limit of 100k/h from 1.5 km north of Buronga.

Road Condition

The condition of the Silver City Highway appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.



Traffic and Safety

The volume of two-way traffic to the north and south of the Arumpo Road -Silver City Highway intersection is 2,501 and 2,999 vehicles/day, respectively, with peak traffic occurring at 6 am northbound and 2 pm southbound. Heavy vehicles comprise 19-24% of the traffic volume, making this a designated heavy vehicle route, and resulting in recommended minimum 7 m seal (Austroads Part 3 Table 4.5).

Crash records indicate that there were 5 crashes within 2.5 km of the Arumpo Rd-Silver City Highway intersection between 2015 and 2019. There do not appear to be trends in the nature/cause of the crashes. All crashes resulted in minor injuries.

6.2.2.2 Arumpo Road

Function and Geometry

Arumpo Road (maintained by Wentworth Shire Council) is the primary route for transport between Buronga and Mungo National Park (World Heritage listed) and Mungo State Recreation Area, approximately 120 km north-east of the Project. The road has approval for travel by B-double, Type (1) A-double and Modular B-triple vehicles. The speed limit is 80 km/h for 2 km from the Silver City Highway and then increases to a 100 km/h posted speed zone.

Arumpo Road has lane widths of 3.6 m each way with an unsealed shoulder width of 1.0 m on approach to Silver City Highway. On the approach to the Buronga Landfill, the lane widths are approximately 3.25 m, with an unsealed shoulder width of 1.5 m.

Road Condition

The condition of Arumpo Road appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.

Traffic and Safety

The volume of two-way traffic for Arumpo Road is 478 vehicles per day with peak traffic at 6 am eastbound (i.e. toward Buronga Landfill and Mungo) and at 2 pm westbound (toward Buronga). Heavy vehicles comprise 23-26% of the two-way traffic volume is attributable to heavy traffic, making this a designated heavy vehicle route, and resulting in recommended minimum 7 m seal (Austroads Part 3 Table 4.5).

Crash records indicate there were no crashes within 15 km of the intersection between Arumpo Road and Buronga Landfill access road.

6.2.2.3 Silver City Highway/Arumpo Road Junction

A deceleration and acceleration exist on Silver City Highway for vehicles turning left onto and from Arumpo Road and an auxiliary right-turn treatment on Silver City Highway allows vehicles to pass right-turning vehicles via a short, left lane. This results in a seal width of up to 14 m in the vicinity of the intersection, which meets the Austroads Guide Part 4A minimum width of 6 m to allow passing. A truck rest area is located directly opposite the intersection, on the western side of Silver City Highway. The entrance and exit to the rest area are located approximately 100 m south and 150 m north of the intersection, respectively.

The minimum required SISD was determined to be 262 m (Austroads Guide Part 4A). Based on a site visit, sight distances were deemed to be acceptable, with sight distance deemed to be ≥ 300 m, despite horizontal curves existing on either side of the intersection.

The number and types of turning lane warranted at a major intersection are based on the sum of traffic volume for the major roads at an intersection and the number of vehicles turning at the intersection per hour. The traffic assessment indicates that a basic left turn is adequate whilst a channelised right turn lane is required. Changing the existing auxiliary right turn to a channelised right turn may limit the ability of heavy vehicles to turn into and out of a truck parking area west of the intersection. As a result, the existing design is the most appropriate design and should not be changed.



6.2.2.4 Arumpo Road/Buronga Landfill Junction

At the intersection to Buronga Landfill, a widened sealed shoulder is present, likely designed to allow vehicles travelling straight to pass vehicles turning into the landfill. Austroads Guideline Part 4A recommends a minimum 6 m width between the edge of the widened shoulder to the centreline be implemented to allow vehicles to pass, which does not currently exist. Road conditions upon entrance to Buronga Landfill are poor with deformed areas and small potholes. There is widespread evidence of stripping, with some areas of the base exposed.

The SISD at the intersection was determined to be 262 m (Austroads Guide Part 4A). Sight distances at the intersection appear to be > 700 m with negligible changes to the horizontal alignment.

The assessment indicates basic left and right turns are adequate for the intersection between Arumpo Road and Buronga Landfill.

6.2.2.5 Landfill Traffic Volumes

On average, 50 vehicles pass over the weighbridge each day: 24 light vehicles (e.g. cars and utes with or without trailers), 21 heavy rigid trucks and 1 articulated truck. An additional 6 vehicles, belonging to employees, are expected to visit the site each day. An average of 56 vehicles per day turn into the Buronga Landfill.

6.2.3 Assessment

6.2.3.1 Traffic Generation and Distribution

Traffic generation was considered for four scenarios: (1) current operation; (2) current operation and initial construction; (3) future operation; and (4) future operation and top-up construction. Light vehicles are anticipated to be the dominant vehicle type, followed by heavy rigid trucks, light rigid trucks and articulated trucks with the largest vehicle expected to be a B-Double.

Site traffic is anticipated to increase over time as the landfill capacity increases and as waste is taken in from surrounding areas, including Mildura once the Mildura landfill is closed (Table 6.8). Peak site traffic is expected to reach 261 vehicles per day during future operations and cell construction.

Table 6.8 Daily Traffic Types Generated by the Project

Vehicle Type	Daily Traffic (vehicles/day) for Each Scenario							
	Current Operation		Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Light Vehicles	30	48	45	72	46	74	61	98
Light Rigid Trucks	4	6	5	8	15	24	16	26
Heavy Rigid Trucks	21	34	22	35	81	130	82	131
Articulated Trucks	1	2	3	5	2	3	4	6
TOTAL	56	90	75	120	144	230	163	261



Under current operations, vehicles are likely to be predominantly from the WSC area as the Mildura Landfill is close to the township and can receive a variety of wastes (Table 6.9). In the future, the distribution of vehicles is expected to be predominantly from Victoria/Mildura, given Mildura is the major service centre and combined with the likely closure of the Mildura Landfill, it has the largest nearby population generating waste. The number of light vehicles is not expected to increase in the future as the Mildura Waste Transfer Centre will continue to operate and residual waste for landfilling will be transported by rigid trucks.

Table 6.9 Daily Traffic from Regions Generated by the Project

Region	Daily Traffic (vehicles/day) for Each Scenario					
	Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak
Mildura	17	27	66	106	83	133
Buronga/ Gol Gol	1	2	13	21	14	23
Wentworth	1	2	9	14	10	16
TOTAL	19	30	88	141	107	171

6.2.3.2 Traffic Impacts on the Road Network

The roadway Design Annual Average Daily Traffic (AADT) represents a measure of the acceptable traffic capacity of a road. The Design AADT for Silver City Highway and Arumpo Road were determined using existing road cross sections:

- Silver City Highway North: >3000 vehicles per day
- Silver City Highway South: >3000 vehicles per day
- Arumpo Road: 500-1000 vehicles per day

Vehicles from Mildura must cross the George Chaffey Bridge and then combine with traffic from Buronga and Gol Gol to use the Silver City Highway south of Arumpo Road to travel to the Buronga Landfill.

The projected AADT for George Chaffey Bridge and the Silver City Highway shows a minor increase in the expected traffic (Table 6.10). The largest relative increase is predicted on Arumpo Road but this remains within the design AADT for this road. Overall, the results indicate that additional traffic generated by the Project is within the design capacity of the roads so no road upgrades or modifications are required.

Table 6.10 Current and projected construction and operational traffic (vehicles/day).

Road Name	Current AADT	Additional Vehicles	Traffic Increase	New AADT
George Chaffey Bridge	18,000	83	0.46%	18,083
Silver City Highway (South of Arumpo Road)	2,999	97	3.24%	3,096
Silver City Highway (North of Arumpo Road)	2,501	10	0.39%	2,511
Arumpo Road	478	107	22.38%	585



6.2.3.3 Traffic Impacts on Road Geometry

Silver City Highway meets the recommended requirements and does not require any geometry or condition improvements as it meets the Austroads recommendations based on traffic volumes and the NHVR PBS for heavy vehicles routes.

Arumpo Road is in good condition and has sufficient lane and shoulder widths for a single lane rural road. For single carriageway rural roads with 500-1,000 average annual daily traffic, recommended total lanes widths (edge-line to edge-line) are 6.2-7 m with 1.5 m total shoulder including 0.5 m sealed shoulder and, where >15% are heavy vehicles a minimum 7.0 m seal should be provided (Austroads Guide Part 3 Table 4.5). Arumpo Road has sufficient lane and shoulder width but, on approach to the landfill, the shoulder is unsealed and does not meet the recommended width for heavy vehicles routes. An additional 0.35 m seal on each shoulder to meet this recommendation.

It is noted that the seal widths are guidelines and not mandatory. The overall road width is compliant and the road is not dangerous, as further evidenced by the lack of crashes. From the community consultation it is evident that there is community concern over the lack of sealed shoulder and hence WSC will consult with the community and TfNSW to develop a plan to improve the road as construction works will impact transport to and from surrounding industrial and agricultural enterprises as well as tourist traffic to Mungo National Park.

6.2.3.4 Traffic Impacts at Intersections

The current and projected major road traffic volumes and intersection turn volumes are shown in Table 6.11. As for the current traffic volumes, future traffic volumes suggest a channel right turn should be provided at the intersection of Silver City Highway and Arumpo Road; however, as noted in Section 6.2.2.3, this change may limit the ability of heavy vehicles to turn into and out of a truck parking area and hence is not recommended. The existing intersection layout, which includes a 500 m auxiliary lane, does not limit access to the truck parking bay and hence it is recommended that the current intersection layout is retained.

Table 6.11 Future Daily Intersection Volumes

Road	Current Major Road Volume	Current Turn Volume	Peak Additional AADT	New Major Road Volume	New Turn Volume
Silver City Highway (North of Arumpo Road)	130	24	16	132	26
Silver City Highway (South of Arumpo Road)	252	24	156	268	40
Arumpo Road	47	6	171	64	22

At the intersection with Arumpo Road and the Buronga Landfill entrance, the current width is < 6 m from shoulder to centreline and hence requires upgrading. It is recommended that the pavement is widened and basic left and right turns are constructed to allow B-doubles and A-triple vehicles safe entry and exit and for vehicles to safely pass.

6.2.3.5 Site Access and Parking Demands

Local users (civilian vehicles and commercial waste trucks) are expected to drop off their waste at designated points around the site and leave. As such, parking demand is principally associated with landfill staff. There are currently 6 staff members that require on-site parking. The proposed landfill expansion is anticipated to require an additional 4 staff members. Current parking facilities (located in front of the site offices) should provide an adequate amount of permanent parking space for 10 employees, with the



proposed parking facilities being the same size as existing. An upgrade of the current parking facilities is not necessitated by projected increases in the number of employees or site traffic.

6.2.3.6 Traffic and Transport Management

Implementing the proposed treatments would require preparation of a Construction Traffic Management Plan which utilises the Austroads and TfNSW guidelines for major intersection operations and worksite traffic control. Additional traffic management will not be required during operational and cell construction phases, except if oversize and/or over mass vehicles are required whereby a Transport Management Plan will need to be prepared and submitted to TfNSW to obtain appropriate permits.

6.2.4 Mitigation Measures

To appropriately manage traffic, both currently and in the future, some improvements to the existing roads and intersection are recommended. These improvements are:

- Basic right turn from Arumpo Road into the Buronga Landfill and Basic left turn into Arumpo Road from the Buronga Landfill. Concept designs are provided in the TIA (Appendix G);
- Additional shoulder sealing along Arumpo Road where the recommended seal width is not met.

6.3 Soil and Water

A geotechnical assessment report and groundwater impact assessment are presented as Appendix H and Appendix I, respectively. Additional interpretation of soil test results has been provided by Dr Melissa Salt who is a Certified Professional Soil Scientist.

6.3.1 Methodology

The soil and water at the site were assessed by interrogation of publicly available desktop sources and an intrusive investigation.

6.3.1.1 Site Investigations

Tonkin conducted a field investigation from 16-18 February 2021 to describe the geological features, identify impediments to excavation, estimate the likelihood of encountering contamination and record the depth to groundwater. Twelve boreholes were drilled in an approximate grid pattern (Figure 14) within the proposed expansion area to a maximum of 10 m below ground level (m bgl). Groundwater elevation in the boreholes was measured where possible on the first and second day of the investigation.

Bulk samples taken at random locations and depths from the borehole cores and sent to CivilTest for geotechnical laboratory analysis. The results of the tests were primarily used to suitability of the subsurface material for reuse on site (e.g. as cell capping or base liner material). The following parameters were tested:

- Particle Size Distribution (PSD)
 - Describes the composition of soil in terms of the relative proportion of sand (2.00-0.02mm diameter particles), silt (0.02-0.002mm) and clay (< 0.002mm).
- Atterberg Limits
 - Provides a measure of the moisture content at which the physical consistency or behaviour of the soil changes from solid (brittle/non-malleable), to plastic (malleable), to liquid (flows under its own weight).
 - A high 'plasticity index' suggests a soil will display plastic properties under a broad range of moisture contents. The plasticity index typically increases with increasing clay content. Soils with a low plasticity index are not typically suitable for use in the construction of cell base liners.



Legend
Borehole Locations

**Buronga Landfill Expansion
Hydrogeological Investigations
Borehole Location Plan**

Wentworth Shire Council



Job Number: 202597
Filename: 202597GQ00
Revision: Rev 0
Date: 2021-03-31
Drawn: WG



Data Acknowledgement:
Primary Imagery from ESRI, 2021



Figure 14



- Emerson Class

- Provides a measure of the soil's tendency to disperse (i.e. break apart without physical agitation) upon wetting.
- Dispersive soils (e.g. Emerson Class 1, 3 and 5) are undesirable for use in both construction and agriculture.

Environmental Testing

Representative soil samples, primarily surface samples, were taken from the borehole cores and sent to Australian Laboratory Services (ALS) for environmental laboratory testing. The scope of testing was intended to provide a broad classification of the potential contamination status of the soils on site and included a broad range of metals (e.g. arsenic, cadmium, chromium, and lead) and Organochlorine Pesticides (OCPs) and Organophosphorus Pesticides (OPPs).

NSW EPA Excavated Natural Material (ENM) assessment criteria were used to determine if the soil met the definition of Virgin Excavated Natural Material (VENM) (i.e. uncontaminated natural material that has been excavated), which is classified as general solid waste (non-putrescible). The ENM assessment criteria used were:

- NSW 2014 ENM (Absolute Max)
- NSW 2014 ENM (Max Average)

The laboratory results were also assessed against the following *National Environment Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM) commercial/industrial investigation levels to account for the soils remaining or being reused on site:

- ASC NEPM Health Investigation Level (HIL) Level D – Commercial/ Industrial;
- ASC NEPM Ecological Screening Level (ESL) – Commercial/ Industrial;
- ASC NEPM Ecological Investigation Level (EIL) – Commercial/ Industrial;
- ASC NEPM Management Levels for TPH Fractions – Commercial/ Industrial.

6.3.2 Existing Environment

6.3.2.1 Geology and Soil

The surface layers are

- aeolian Woorinen Formation which include windblown sands, silts and calcareous clays from Quaternary deposits;
- alluvial Coonambidgal Formation which includes alluvial deposits and channel sands from the Holocene Era.

The soil types were reported to comprise Vertosols of the Huntingfield Land System to the west and Rudosols of the Canally Landscape to the east associated with the change in vegetation. Vertosols are cracking clay soil that display significant shrink and swell during wetting and drying cycles and associated with lake deposits in the Mallee region. Rudosols have little pedological organisation and are likely to be comprised of shallow red texture contrast soil or sandy solonized brown soil.

The site investigation identified two main soil types, being a sand over clay to the west (H1 – H6, H10-H12) and a clay profile to the east (H7-H9) with a sand unit below 6 m across the site. The soil description conforms with expectations; however the clayey vertosols were expected in the west and not the east and the sandy soil was expected in the east and not the west. The clayey soil in the east does coincide with the Black Box Open woodland wetlands on outer floodplains and to the west the sandy soil coincides with the Black-oak rosewood open woodland on deep sandy loams (see Section 6.6.2).

The following soil units were identified:



- Unit 1: Surface to red-brown to pale brown, fine to coarse grained sand. The upper unit at the sand over clay profile with the exception of H5, where it was absent. Lower depth 0.4-1.7 m
- Unit 2A: pale orange/brown to pale brown and white clayey gravelly sand/ clayey sand. Present for sand over clay profiles. Lower depth 2.0-6.4 m depth.
- Unit 2B: pale brown, orange/brown and orange sand/ clayey sand. Present for sand over clay profiles but was absent in H4. Lower depth 4-10 m depth.
- Unit 3A: grey-brown, clayey sand. Present in H4 and H5 overlying clay (3.5 – 4.6 m depth) and as a thin surface layer in H9.
- Unit 3B: grey, grey/brown, yellow/brown or red sandy clay/clay of medium plasticity. Present in all profiles ranging from 1 m to 9m thick. The exception is H1 where it was not encountered in the upper 10 m; however it is considered likely to be present at lower depths
- Unit 4A: yellow-brown to grey clayey sand to silty sand underlying clay and encountered in most profiles
- Unit 4B: grey sand only encountered in H8 and H9.

The soil was moderately to strongly alkaline throughout (Table 6.12). The surface soil was non-saline to slightly saline. The profile to at least 1 m depth is non-saline to slightly saline in the clay and sand units. Below 2 m depth, the sand unit was highly saline. A similar change was noted for sodicity with the upper soil being non or slightly sodic but the deeper soil being highly sodic; however Emerson Aggregate tests indicate the soil is typically well-aggregated and unlikely to be dispersive. Organic matter is very low and corresponds to the observed lack of topsoil. Contaminant testing noted that there were no reported exceedances of the relevant ENM or ASC NEMP assessment criteria.

6.3.2.2 Surface Water

The closest surface water bodies are Gol Gol Lake, approximately 1.5 km east, and the Murray River, over 5 km south. There is no direct waterway or pathway from the Project area to either water body. The Project Area is outside the flood planning area defined in the Wentworth LEP 2011. The lack of surface water bodies and defined drainage is not unexpected given the gently undulating to flat topography and low rainfall (274 mm average annual rainfall).

6.3.2.3 Regional Hydrogeological and Geological Setting

The site is situated within the southern part of the Western Porous Rock resource unit. Significant aquifers in this resource unit include:

- the Renmark Group Aquifer (deep, confined). The Renmark Group Aquifer is a major confined aquifer that begins 100-200 m below ground level and is up to 400 m thick. The aquifer underlies most of the Murray Basin and is primarily composed of riverine sediments deposited 30-50 million years ago. Salinity ranges from 2,000 mg/L (moderately saline) to 36,000 mg/L (brine).
- Pliocene Sands Aquifer (shallow, unconfined). The Pliocene Sands Aquifer is a major unconfined/semiconfined aquifer that begins close to the surface (typically < 50 m bgl) and is around 100-150 m thick. The Pliocene Sands Aquifer is often conceptualised in two parts: the Loxton Sands to the west (including Buronga) – characterised by marine sands – and the Cavil Formation to the east – characterised by riverine sands and gravels. Groundwater salinity ranges from 1,000 mg/L (slightly saline) to 82,000 mg/L (brine) and near salt lakes can locally increase to 160,000 mg/L.

The Western Porous Rock SDL is governed by the *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources* (NSW Office of Water 2011). The on-line database indicates that there are 20 groundwater bores within a 2 km radius of the project area of which 5 are within 1 km of the site. The boreholes vary from 10.5 – 61 m below ground level (bgl) with water levels reported as 1.5 – 7.54 m bgl. During site investigations groundwater was intercepted in most boreholes, at ranging from 9.5 m below ground level in the south west to 7-8 m in the east. In boreholes H7 and H9 the groundwater level rose by approximately 1 m when left overnight suggesting the clay may be partially confining the aquifer.



Table 6.12 Select Soil Properties

Parameter (unit)	Soil Concentration for Boreholes at Differing Depth Intervals (m)											
	H3 0-0.15	H1 0-0.15	H4 0-0.15	H6 0-0.15	H11 0-0.15	H12 0-0.15	H7 0-0.15	H8 0-0.15	H10 0.4-0.55	H9 0.7-0.85	H2 0.8-0.95	H5 2-2.15
Unit Number	Fill	1	1	1	1	1	3B	3B	2A	3B	2A	2B
pH (CaCl ₂ , units)	7.8	7.7	7.5	8.1	8	7.7	7.5	6.7	7.6	7.7	8	8.1
pH (units)	8.9	9	8.6	9.2	8.8	8.5	8.5	8	8.6	8.6	8.9	9
Electrical Conductivity (dS/m)	0.096	0.085	0.074	0.17	0.218	0.085	0.231	0.059	0.17	0.247	0.173	1.01
ECe (estimated)	1.2	1.1	1.0	2.2	2.8	1.1	2.1	0.4	1.9	1.5	1.9	13
Exch. Calcium (meq/100 g)	5.1	4.3	6.5	5.2	5.4	6.3	10.2	9.2	9.2	11.3	4.8	2.1
Exch. Magnesium (meq/100 g)	1.1	0.8	1.4	2.2	1.1	0.7	3.7	3.2	3.1	4	2.9	3
Exch. Potassium (meq/100 g)	1	1.1	1.7	1.3	0.7	0.6	1.6	1	1.2	1.1	0.4	0.6
Exch. Sodium (meq/100 g)	<0.2	<0.2	0.2	0.6	0.7	<0.2	0.9	0.4	0.4	0.5	0.2	1
Cation Exchange Capacity (meq/100 g)	7.2	6.1	9.8	9.4	8	7.6	16.4	13.8	13.9	16.8	8.3	6.8
Exch. Sodium %	<0.2	<0.2	2.6	6.9	9	<0.2	5.6	3	2.8	2.8	3.1	15.6
Calcium/ Magnesium Ratio	4.4	5.6	4.7	2.3	4.7	8.7	2.8	2.9	2.9	2.8	1.7	0.7
Organic Matter (%)	<0.5	<0.5	<0.5	<0.5	0.5	0.6	0.5	0.7	<0.5	<0.5	<0.5	<0.5



6.3.2.4 Groundwater Use

A search of the Water NSDW Real Time Data website² identified several groundwater bores within 3 km of the centre of the Project. Two bores are located within the site boundaries with many to the east and south east located around Laker Gol Gol. It is expected that the wells to the north may be used for stock watering and the ones to the south may be used for irrigation, though it is noted that the salinity is unlikely to be suited to these uses given the proximity to Lake Gol Gol to the east and Mourquong Disposal Basin to the west. A previous investigation noted that the water level in the on-site wells was 9.29 m and 7.37 m bgl for on-site wells GW087083 and GW088479, respectively and that all wells within 1-2 km of the site were registered for monitoring purposes (GHD, 2012).

Bore ID	Status	Distance (km)	Date completed	Total depth (m)	Ground level (mAHD)
GW087083	Manual Observations	0.4 (on site)	1/03/1972	20	40.54
GW088479	Unknown	0.6 (on site)	21/03/2007	61	37.89
GW087644	Unknown	1.3 west	5/03/1991	17.2	36.12
GW088478	Unknown	1.7 north	16/05/2007	52	36.74
GW088168	Unknown	1.8 south	2/02/2000	10.5	-0.5
GW088169	Unknown	2.0 south	3/02/2000	10.5	-0.05
GW088170	Unknown	2.0 south	7/02/2000	13.5	-0.5
GW087038	Unknown	2.0 south	12/10/1977	10.97	-0.11
GW087073	Unknown	2.1 east	12/10/1972	12.19	-0.12
GW087812	Unknown	2.3 south east	10/12/1996	5.5	-0.5
GW273072	Equipped	2.4 east	12/03/2009	24	-0.6
GW273069	Supply Obtained	2.4 east	11/02/2009	20	-1
GW087081	Unknown	2.4 north	12/10/1972	12.5	-0.2
GW600409	Equipped	2.6 south	6/09/2012	15	39
GW087039	Unknown	2.6 south	12/03/1972	10.97	-0.1
GW273071	Equipped	2.6 east	6/03/2009	25.5	-0.6
GW087811	Unknown	2.7 south east	5/12/1996	11.5	-0.5
GW087074	Unknown	2.7 south	12/10/1972	14.02	-0.13
GW087328	Filled	2.7 south east	21/10/1977	16	-0.14
GW087813	Unknown	2.7 south east	11/12/1996	6.5	-0.5

² <https://realtimedata.watarnsw.com.au/>



Bore ID	Status	Distance (km)	Date completed	Total depth (m)	Ground level (mAHD)
GW088473	Unknown	2.8	26/02/2007	47	35.08
GW088305	Unknown	2.8	14/09/2005	20.56	32.39
GW087529	Unknown	2.8	4/04/1987	15	-0.48
GW273068	Supply Obtained	2.8	9/02/2009		-1
GW273074	Equipped	2.8	30/03/2009	25	-0.4
GW088167	Unknown	2.9	28/01/2000	3.08	-0.5
GW087814	Unknown	3.0	12/12/1996	8	-0.5
GW087331	Unknown	3.1 west	19/10/1977	12	-0.11

6.3.2.5 Salt Interception Scheme

The Buronga Salt Interception Scheme collects highly saline water from eight locations in the deeper Parilla Sands aquifer to reduce the pressure from extensive irrigation which is forcing the saline water into the Murray River. The saline water is pumped to the Mourquong Disposal complex which is over 1 km west of the Project area. Salt crystallisation ponds are used to evapo-concentrate the salt for commercial harvesting.

6.3.3 Impact Summary

6.3.3.1 Soil Impacts

Soil across the site is expected to be readily excavated with machinery typically used during similar construction projects, such as an excavator of notional 20 tonne capacity. Additionally, the soil is expected to be self-supporting for short periods (e.g. 2-3 days) after excavation (in dry weather). Although the existing borrow pit contains benched walls (of approximately 2 m height and 2 m width) that appear stable, slopes should be maintained at a gradient no steeper than 1 vertical to 2.5 horizontal (1V:2.5H).

It is expected that the majority of excavated material are suitable for use as general engineered fill for bulk earthworks (subject to appropriate moisture conditioning). The upper 1.5 m of the soil profile should be reserved for final capping with the remaining depth used for daily and interim cover. Stockpile the sand and clay separately. The deep sandy 4A and 4B units are not suitable for engineered fill or bulk earthworks; however, given they are > 6 m below ground level, it is not expected that construction works would intercept these layers. Based on the geotechnical laboratory results, soils from Unit 3B are considered suitable for use in water retaining structures if placed and compacted at a suitable standard. Conversely, none of the soil materials are suitable for use as pipe embedment material or pavement materials for sheeting internal roads.

The soil does not contain any contaminants in concentrations which are likely to result in any potential impact to the surrounding environment. The exception is the salinity of the soil >2 m below ground level, which may impact the surrounding environment if it not appropriately stored prior to use as daily or interim cover in the landfill cell.



6.3.3.2 Groundwater Impacts

During the field investigations, the groundwater was predominantly intercepted in the clay layer and was intersected at around 7 to 9 m below ground level; however the potential confinement of the aquifer by the clay layer may result in higher groundwater levels. Based on the conceptual site model, the groundwater appears to flow toward the east; towards Lake Gol Gol. Given the relatively flat topography the hydraulic gradient is likely to be slow with velocities of 1.8×10^{-5} m/day to 3.3×10^{-10} m/day, i.e. the groundwater would take 153 years to travel 1 m.

The groundwater appears to be use locally with groundwater wells within 2 km, suggesting shallow groundwater of variable salinity and quality. There are no soaks or other water features onsite that suggest importance as an Aboriginal area, which is further discussed in Section 6.7. There are likely to be groundwater dependent ecosystems within proximity of the site given the wetlands and terrestrial vegetation.

Groundwater is relatively shallow and essentially unconfined so are, theoretically able to rise with recharge; however the low rainfall and clay units would limit this and it is unlikely that groundwater levels would significantly rise. As a result, the overall risk to groundwater from the Project is low; however, given the limited information and potentially shallow groundwater, monitoring f upgradient and downgradient wells should be undertaken to provide early detection of any potential groundwater impacts from the Project.

6.3.4 Mitigation Measures

The assessment of the soil and groundwater results in the following recommendations:

- The upper 1.5 m of the soil will be prioritised for final capping. It is expected that three stockpiles will be required being: topsoil (nominally 0-10 cm); sandy overburden; clay overburden. As far as practical, the stockpiles will be located on or near the next area to be rehabilitated.
- Overburden excavated from below 1.5 m will be stockpiled away from the final capping soil in an area which has been cleared and topsoil removed to prevent any salts from leaching into the topsoil.
- Slopes should be maintained at a ratio of 1V to 2.5H to ensure suitable slope stability.
- Excavations should be limited to 2 m above the groundwater level (\sim 5-9 m bgl) to avoid the softening of subgrade material.
- It is recommended that groundwater monitoring wells are installed up and down hydraulic gradient of the site to enable temporal groundwater data and water quality data to be monitored prior to construction and during operation of the site.

6.4 Hazard Analysis

6.4.1 Method

The objective of this preliminary hazard analysis (PHA) is to identify the off-site risks posed by the Project to people, their property and the environment and assess the identified risks using applicable qualitative criteria. In accordance with Multi-level Risk Assessment (DPIE, 2011), this assessment specifically covers risks from fixed installations and does not encompass transportation by pipeline, road, rail or sea. This PHA therefore considers off-site risks to people, property and the environment (in the presence of controls) arising from atypical and abnormal hazardous events and conditions (i.e. equipment failure, operator error and external events), with a specific focus on fixed installations on-site. The on-site environmental risks are assessed in the Environmental Risk Assessment (ERA).

The methodology employed during the preparation of this PHA was as follows:

1. Identify the hazards associated with the Project.



2. Analyse the consequence of identified hazardous events.
3. Qualitatively estimate the likelihood of hazardous events.
4. Propose risk treatment measures.
5. Qualitatively assess risks to the environment, members of the public and their property arising from atypical and abnormal events and compare these to the risk criteria outlined in HIPAP No. 4: Risk Criteria for Land Use Safety Planning (DoP, 2011).
6. Recommend further risk treatment measures, if necessary.
7. Qualitatively determine the residual risk assuming the implementation of the risk treatment measures.

This PHA has been undertaken using the risk management process described in AS/NZS ISO 31000:2018 Risk Management – Guidelines. The risk management process is shown schematically on Figure 15 below and includes the following components:

- Establish the context
- Identify risks
- Analyse risks
- Evaluate risks
- Treat risks

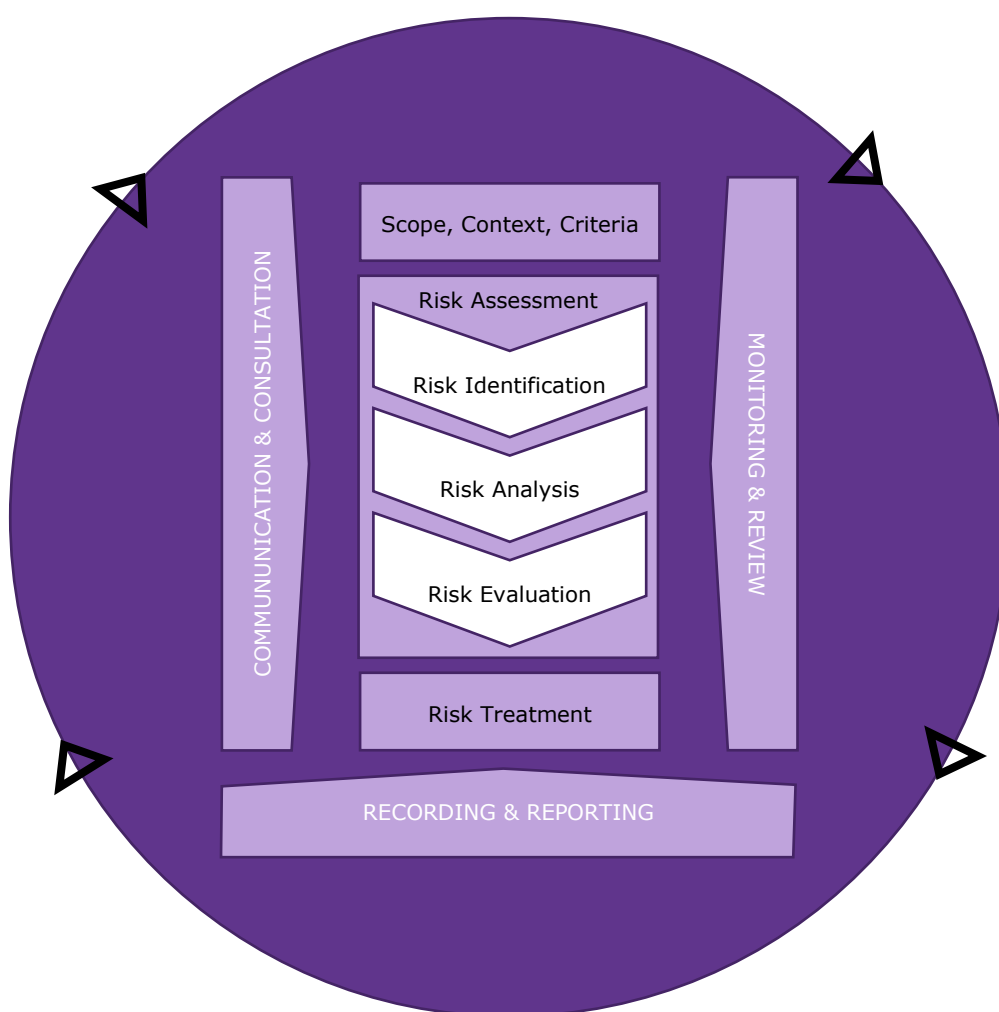


Figure 15 Preliminary Hazard Analysis Process from AS/NZS ISO 31000:2018 Risk Management – Guidelines.



This PHA considered the following qualitative criteria:

1. All 'avoidable' risks should be avoided. This necessitates investigation of alternative locations and technologies, wherever applicable, to ensure that risks are not introduced in an area where feasible alternatives are possible and justified.
2. The risks from a major hazard should be reduced wherever practicable, irrespective of the value of the cumulative risk level from the whole installation. In all cases, if the consequences (effects) of an identified hazardous incident are significant to people and the environment, then all feasible measures (including alternative locations) should be adopted so that the likelihood of such an incident occurring is made very low. This necessitates the identification of all contributors to the resultant risk and the consequences of each potentially hazardous incident. The assessment process should address the adequacy and relevance of safeguards (both technical and locational) as they relate to each risk contributor.
3. The consequences (effects) of the more likely hazardous events (i.e. those of high probability of occurrence) should, wherever possible, be contained within the boundaries of the installation.
4. Where there is an existing high risk from a hazardous installation, additional hazardous developments should not be allowed if they add significantly to that existing risk.

To undertake a qualitative risk assessment it is useful to define (in a descriptive sense) the various levels of consequence of a particular event, and the likelihood (or probability) of such an event occurring. Risk assessment criteria were developed during the 'Establish the Context' phase of the Risk Management Process. In accordance with AS/NZS ISO 31000:2018, the tables below were reviewed and considered to be consistent with the specific objectives and context of this PHA.

Table 6.13 Qualitative Measures of Probability of the Event Occurring

Likelihood	Description
Almost Certain	Is expected to occur with a probability of multiple occurrences within a year. Is expected to occur almost all the time
Likely	Will probably occur within a 1 - 5-year period. Is expected to occur most of the time. Known to occur, or "it has happened"
Possible	Might or should be expected to occur within a 5 - 10-year period. Could occur or "I've heard of it happening"
Unlikely	Could occur within 10-20 years or in unusual circumstances. Not likely to occur. Not expected
Rare	May occur only in exceptional circumstances. May occur once in 100 years. Practically impossible. 1 in 100 years

Table 6.14 Qualitative Measures of Credible Consequence of Unwanted Event

Consequence	People	Environment	Production delay, loss or damage
Catastrophic	Death. Permanent disabling injury Major impact for large population. Death	Potentially lethal to regional ecosystem or threatened species; widespread on-site and off-site impacts; Extensive clean-up required; complete failure of environmental controls	Huge financial loss, more than \$5m delay/loss



Consequence People		Environment	Production delay, loss or damage
Major	Extensive permanent injury Major impact for small population Hospitalisation required. Extensive injuries or illness	Potentially lethal to ecosystem; predominant local but potential off-site impacts. Medium to long term impact, potentially reversible over several years. Possible cessation of use; off-site clean-up required; breach of environmental legislation	Major financial loss \$1m to \$5m delay/loss
Moderate	Minor impact for large population Medical Treatment Required	Potentially harmful to regional ecosystem with local impacts primarily contained on-site. Moderate on-site impacts, temporary impacts, some off-site impacts	High financial loss \$0.5m to \$1m delay/loss
Minor	Minor impact for small population First Aid Treatment	Potentially harmful to local ecosystem with local impacts confined to site. Minimal onsite impacts no discernible offsite impacts, immediately contained, no external complaints received	Medium financial loss \$50k to \$500k delay/loss
Insignificant	Insignificant impact or not detectable No injuries or illness	Insignificant impact or not detectable. Negligible on-site impacts and no off-site impact	Low financial loss. Less than \$50,000 delay/loss

Combining the probability (Table 6.13) and consequence (Table 6.14), Table 6.15 provides a qualitative risk analysis to assess risk levels.

Table 6.15 Risk Ranking Table

Consequence	Probability				
	Almost Certain	Likely	Possible	Unlikely	Rare
Insignificant	M - 18	M - 19	L - 22	L - 24	L - 25
Minor	M - 14	M - 15	M - 17	L - 21	L - 23
Moderate	H - 8	H - 9	H - 12	M - 16	L - 20
Major	E - 3	E - 5	E - 7	H - 11	H - 13
Catastrophic	E - 1	E - 2	E - 4	E - 6	H - 10

NOTES:

L: Low risk, manage by routine procedures

M: Moderate risk, management responsibility required

H: High risk, senior management attention required

E: Extreme risk, immediate action required

The lower the risk rating number, the higher the risk. For example E-3 would have priority over E-7 or M-17



6.4.2 Existing Environment

The major potential hazards are associated with:

- Dust from various sources, as discussed in Section 6.1 Air Quality and Odour
- waste, including unknown material receipt (discussed in Section 3.4.2 Waste Control Program) and fire, (discussed in 3.6.4.2 Fire Response and 6.5 Bushfire);
- landfill gas, discussed in 3.5.6 Landfill Gas Management, 3.6.4.5 Landfill Gas Leak or Accumulation and 3.7.4 Landfill Gas Monitoring;
- leachate, discussed in 3.5.4 Leachate Management and 3.7.2 Leachate Monitoring;
- storage of fuel, discussed below.

6.4.2.1 Dust

Dust can be typically generated from dry, fine particles subject to wind or other movement resulting in their dispersion in air. Dust can irritate the respiratory tract causing coughing, wheezing, etc. but increased response is associated with finer particles. Dust particles less than 2.5 µm diameter (PM2.5) pose the greatest risk of causing human health problems such as respiratory and cardiovascular health problems, whilst particles less than 10 µm diameter (PM10) pose a serious risk to susceptible individuals.

Dust may be generated from on-site activities and includes particulate matter raised from bare areas by wind or traffic as well as from the unloading, sorting or processing of waste. The site experiences stronger westerly winds which may raise dust from unvegetated, dry areas across the landfill area. Dust may also be generated within the FERF and RRA whilst handling, sorting or processing wastes.

6.4.2.2 Unknown Wastes

Unknown wastes are those that are not declared and may have an impact to human health or the environment. The majority of waste received on-site is declared and, although has the potential to impact human health, can be appropriately handled based on its known properties, e.g. asbestos can be handled safely with specified, controlled practices but if now known to be present, these management practices may not be utilised resulting in an increased risk to staff health.

In addition to impacts on human health, the inclusion of unknown wastes can also lead to landfill fires. Inappropriate disposal of batteries in kerbside collection can result in fires when large earthmoving machinery compacts the waste into the cell and a spark results.

Unknown wastes may be received comingled with other wastes accepted at the Buronga landfill. Currently most waste received at the site is destined for the landfill; however the proposed upgrades to materials recycling areas may increase the risk of staff encountering unknown wastes.

6.4.2.3 Landfill Gas

Landfill gas (LFG) is a mixture of methane and carbon dioxide with minor concentrations of other gases, such as sulfur dioxide and carbon monoxide. It is produced by the anaerobic decomposition of waste in the landfill. The landfill cell liners to be deployed at Buronga Landfill prevent the movement of gas horizontally through the soil and hence most LFG is released through the surface. The final cap proposed for Buronga Landfill is a phytocap, which is known to promote the natural destruction of methane by microorganisms which live naturally in the soil.

Poorly managed LFG systems can result in fire when oxygen is drawn into the collection system, which at worst can lead to explosions. LFG may also accumulate in buildings or enclosed spaces which can cause personal injury or asphyxiation.



6.4.2.4 Leachate

Water is generated during the decomposition of waste. This water also contains soluble contaminants and hence is referred to as leachate. Leachate may contain a variety of contaminants and the volume and concentrations may vary over time depending on the composition of waste deposited in the cell, the prevailing weather conditions, waste compaction, cell capping status and recirculation of leachate in the cells. The leachate is likely to contain high concentrations of salt which, at best, may result in minor skin irritation and also may release gases which can lead to asphyxiation.

Contact with leachate is most likely to occur at the leachate ponds where staff, public or fauna may fall into the ponds or may be from a failure of the leachate collection system resulting in the release of leachate into the environment.

6.4.2.5 Storage of Fuel

Hydrocarbons used at the Buronga Landfill include fuels (diesel), petrol, oils (including waste oil), greases and degreaser.

Diesel

Diesel is classified as a combustible liquid by Australian Standard (AS) 1940:2004 The Storage and Handling of Flammable and Combustible Liquids (AS 1940:2004) (Class C1) for the purpose of storage and handling but is not classified as a dangerous good by the criteria of the Australian Dangerous Goods (ADG) Code (National Transport Commission, 2007). In the event of a spill, diesel is damaging to soils and aquatic ecosystems and fires can occur if ignited (flash point 61 to 150 degrees Celsius).

The risks associated with the Project include diesel storage and usage. The use of diesel at the Project and the construction and operation of all fuel storages would be undertaken in accordance with the appropriate Australian Standard. This would include the use of self-bunded diesel fuel storage systems.

Petrol

Petrol is classified as a flammable liquid (Class 3) by AS 1940:2004 and as such is classified as a dangerous good by the criteria of the ADG Code. On-site petrol usage would be minor and held in approved jerry cans. Petrol engine vehicles would be fuelled off-site at local service stations.

Oils, Greases and Degreaser

Oil is classified as a combustible liquid and as such needs to be managed accordingly. Procedures have been developed at the Buronga Landfill for the handling, storage, containment and disposal of workshop hydrocarbons (i.e. oils, greases and degreaser). Waste oil is stored within a bunded area and collected by a licensed contractor.

The Project hazard identification table (Attachment A) provides a summary of the potential on-site hazards identified for the Project and a qualitative assessment of the risks posed.

6.4.3 Impact Assessment

Preliminary screening to determine the requirement for a PHA was undertaken for the Project, taking into account broad estimates of the possible off-site effects or consequences from hazardous materials present on-site and their locations. Potentially hazardous industry is defined as having “potential for significant injury, fatality, property damage or harm to the environment in the absence of controls” (DPIE, 2011). The Project was determined to be potentially hazardous as the possibility of harm to the off-site environment in the absence of controls could not be discounted. A Level 1 assessment can be justified if the analysis of the facility demonstrates that there are no major off-site risks, if the technical and management controls are well understood and where there are no sensitive surrounding land uses. The PHA review team reviewed this screening process and concluded that there is limited potential for



scenarios with significant off-site consequences, existing controls are in place at the existing Buronga landfill and that there are no sensitive surrounding land uses. Accordingly, the team implemented a Level 1 assessment (Qualitative analysis) for this PHA.

The hazard identification was undertaken as a desktop assessment with the hazards shown in Appendix J. Bushfire has been assessed separately and hence was not included as a hazard, though waste fire was included.

The hazard assessment has not identified any hazards which cannot be controlled by best management practices as contained within the current site Landfill Environmental Management Plan, prepared in accordance with the licence and the Landfill Guideline.

6.4.4 Mitigation Measures

Several hazard control and mitigation measures are described in the existing site Landfill Environmental Management Plan however additional hazard control and mitigation measures would be incorporated into this document as required to suit the needs of the Project. In particular, the following hazard treatment measures would be adopted:

- Engineering Structures – civil engineering structures would be constructed in accordance with applicable codes, guidelines and Australian Standards. Where applicable, Council would obtain the necessary licences and permits for engineering structures.
- Contractor Management – All contractors employed by Council would be required to operate in accordance with the relevant Australian Standards and NSW legislation.
- Storage Facilities – Storage and usage procedures for potentially hazardous materials (i.e. fuels and lubricants) would be developed in accordance with Australian Standards and relevant legislation.
- Emergency Response – Emergency response procedures manuals and systems would continue to be implemented.
- PPE: In addition to standard PPE, (long shirts, pants, steel-capped boots) other PPE such as hard hats should be mandatory when working around equipment and gloves mandatory for any manual work, particularly in the FERF. Appropriate respiratory equipment should be available to all staff for specific tasks and should be easily available in the FERF and RRA

Various mitigation measures can be employed to reduce the potential impact of these hazards. These measures are typically management techniques employed at landfill sites and are able to reduce the potential risk to low. These measures will be included in the LEMP to maintain a low risk of the site becoming a hazardous or offensive facility.

6.5 Bushfire Assessment

The Bushfire Assessment has been completed by Building Code & Bushfire Hazard Solutions Pty Ltd and is presented as Appendix K.

6.5.1 Methodology

A site inspection was undertaken on 5 April 2021 by an accredited bushfire assessor.

The Project area and surrounds have been assessed against the relevant specifications and requirements of *Planning for Bush Fire Protection - 2019* (PBP) in relation to the proposed relocation or construction of office and amenity buildings.

The *Bushfire Prone Land* (BFPL) map (available through NSW ePlanning Spatial Viewer) was used to assess the potential for bushfires to occur in the development area. BFPL maps are prepared by local councils and certified by the Commissioner of the Rural Fire Service (RFS).



6.5.2 Existing Environment

The site is susceptible to bushfire from vegetation contained within the site or surrounds. The vegetation within the site is classified as “semi-arid woodland” with central and easterly areas more open and supporting less vegetation than to the west. The central and eastern portion of the Project area are not recognised as being bushfire prone whilst the western area contains Category 2 Vegetation, which is described by the NSW RFS *Guide for Bush Fire Prone Land Mapping* as having a lower combustibility and/or limited potential fire size when compared to Vegetation Categories 1 and 3.

There have been no wildfires recorded within 5 km of the Buronga Landfill. The closest fires were over 7 km from the Site and were recorded in 1975 and 1977 to the east of the site. As a result the site is not within a known fire path and the likelihood of a bushfire occurring in the immediate area is considered unlikely. Anecdotally, fires have occurred within the landfill due to the inappropriate disposal of batteries in municipal solid waste but were quickly extinguished by smothering with soil.

The existing site assets comprise non-habitable on-site buildings (office, amenities) and fuel store with one access road servicing the site. The National Construction Code (NCC) Class of the office and amenity buildings are Class 5 and 10, respectively. To provide adequate asset protection, a 16 m zone around buildings has been adopted. The existing buildings all comply with this buffer. The bushfire attack level (BAL) was determined to be BAL29 and, although the National Construction Code has no specific requirements for the office buildings, requirements for access, water supply and services and emergency and evacuation planning are still required.

6.5.3 Assessment

6.5.3.1 Bushfire Assessment

Due to the occurrence of Category 2 Vegetation, the whole site (including Lot 212 DP756946) is considered to be bushfire prone. Consequently, proposed developments must comply with AS 3959-2018 (*Construction of Buildings in Bushfire Prone Areas*).

6.5.3.2 Asset Protection Zone Compliance and Construction Level Compliance

An Asset Protection Zone (APZ) is a buffer zone between bushfire hazards and buildings. The minimum APZ distance is based on the vegetation formation type, slope (0-5°, 5-10°, 10-15°, or 15-20°) and nature of the development (e.g. residential development or special fire protection purpose developments).

In light of the NCC Classes, a ‘residential’ development type was used to determine APZ distance. Table A1.12.2 in the PBP indicates that a APZ distance of 16 m is appropriate for the proposed relocation of the office and amenity buildings. The area nominated for the relocations is ~ 40 m x 20 m and is considered to suitably accommodate the APZ when combined with the access road and managed surrounding vegetation.

6.5.3.3 Construction Level Compliance

A Bushfire Attack Level (BAL) is a measure of level of exposure of a building to bushfire hazards; and the basis for establishing requirements for construction under AS 3959-2018.

The Bushfire Attack Level was determined using Table A1.12.5 in the PBP, which requires the vegetation formation type and the distance from the proposed building locations to the nearest vegetation. The proposed developments have a BAL of 29 (increasing levels of ember attack and ignition of debris with a heat flux of up to 29 W/m²). The PBP indicates that NCC Class 5 to 8 buildings, such as the office buildings, do not require any bushfire specific performance requirements. The specific objectives for residential developments have been adopted to assess compliance of the Project with *Planning for Bushfire Protection* and is summarised in Table 6.16.



Table 6.16 Compliance with Aims and Objectives of Planning for Bushfire Protection

Aim/Objective	Project Area Assessment
Asset protection zones are provided commensurate with the construction of the building and a defensible space is provided	Limited low risk vegetation found on site. The proposed buildings to be > 16 m from Category 2 vegetation. Buildings to afford BAL29 rating and comply with AS3959-2018 Multiple internal access roads will reduce or prevent fire spread Sufficient defensible space will be provided and the protection zone will be maintained
Fire-fighting vehicles are provided with safe all-weather access roads to structures and hazard vegetation	All-weather access road is existing from Arumpo Road to the site and its width exceeds requirements. An additional emergency access gate from Arumpo Road will be required. Internal access roads capable of supporting fire fighting vehicles have been provided around the site to facilitate operations if required. Future construction of access roads will require access by B-doubles and will easily accommodate firefighting vehicles which are equivalent to heavy rigid trucks. Access for fire-fighting vehicles is considered satisfactory
There is appropriate access to water supply	Suitable access and hardstand areas have been provided to existing firefighting water draw off points Hard stand areas for new static water draw off points recommended
Adequate water supplies are provided for firefighting purposes	Reticulated water is not available at the site. No reticulated gas services are available on-site. An existing 45,000 L static water supply is available complete with hardstand and several water draw off points. NSW Rural Fire Service couplings have been provided at all water draw off points. An additional static water supply has been recommended The proposed firefighting water supply will be satisfactory
On-going management and maintenance of bush fire protection measures	All APZs to be maintained in accordance with the NSW Rural Fire Service "Standard for Asset Protection Zones" and Appendix 4 of "Planning for Bush Fire Protection 2019" Any new landscaping around buildings to comply with the provisions of Appendix 4 of "Planning for Bush Fire Protection 2019"

6.5.4 Mitigation Measures

Several recommendations were listed as being necessary for compliance with Planning for Bushfire Protection – 2019. These include:

- A 16 m Asset Protection Zone (APZ) be provided around the Office and Amenities buildings.



- Office buildings are constructed of non-combustible cladding with metal mesh screening on openable windows and doors and door weather strips. Where compressed timber is used for flooring, the underside of the building will require protection such as metal mesh screening
- That any new landscaping around buildings is to comply with Appendix 4 of Planning for Bush Fire Protection 2019.
- That a Bushfire Emergency Management and Evacuation Plan be prepared (if already not done so) consistent with the NSW Rural Fire Service Guidelines.
- That an additional 45,000 L static water supply (minimum) is provided to supplement the existing water tank or is to be positioned further north with respect to the proposed new landfill expansion area.
 - That a suitable number of new pillar type fire hydrants or fixed water draw off points including suitable RFS 'storz' couplings be provided for fire service use.
 - The new static water supply location and water draw off points are to be provided with hard stand areas in compliance with Table 7.4a of PBP "Water Supplies".
 - Static water tanks are provided with mechanical water level devices to indicate available water.
- Any new internal service roads comply with the requirements for Access Roads as detailed in Table 7.4a of PBP, specifically:
 - property access roads are two-wheel drive, all-weather roads;
 - the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
 - there is suitable access for Category 1 fire appliances to within 4.0m of a static water draw off point hard stand area.
 - access is provided to all structures;
 - access roads must provide suitable turning areas in accordance with Appendix 3; and
 - a minimum 4.0m carriageway width kerb to kerb;
 - Passing bays are provided at 200m intervals that are 20m long by 2m wide making a minimum trafficable width of 6.0m at the passing bay.
 - a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;
 - turning areas are to accord with Appendix 3 of PBP;
 - curves of roads have a minimum inner radius of 6m;
 - the crossfall is not more than 10 degrees;
 - maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.
- Provide an addition emergency vehicle access gate off Arumpo Road near the north-western corner of the site. A key for the gate lock should be provided to the Rural Fire Service. A dedicated access road from this new gate to the new water supply should be provided

In accordance with the bushfire safety measures listed above, and consideration of the site-specific bushfire risk assessment it is BCBHS's opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development. Finally, as the proposal satisfies all relevant specifications and requirements of Planning for Bush Fire Protection 2019, the development should be supported.

6.6 Biodiversity

The Biodiversity Development Assessment Report (BDAR) was completed by Pinion Advisory and is presented as Appendix L. The assessment was led by Troy Muster who is accredited under Section 6.10 of the *Biodiversity Conservation Act 2016* (NSW).

6.6.1 Methodology

The BDAR to assess the impacts of the Project has been carried out according to the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020) as required by the SEARs. The BAM is used to characterise ecological communities and assess the impact on biodiversity values from proposed developments. The BAM employs biodiversity credits to measure: the residual impacts of a proposal on biodiversity values; and gains in biodiversity values at biodiversity stewardship sites. There are two broad credit classes: ecosystem credits and species credits. Credits are principally a function of the size, density and diversity of

the ecological community (e.g. the vegetation area and the number and species richness of fauna/flora potentially impacted by the proposed development), the integrity or condition of the habitat (e.g. undisturbed vs heavily cleared) and the vulnerability or sensitivity of the ecological community to risk (e.g. abundance of threatened species). These factors were determined by Pinion using a desktop study and field survey.

Fieldwork to survey vegetation and observe any evidence of fauna was initially conducted on 29 March 2021. Following these findings, the concept design was modified and further assessments were completed on 31 March, 6-8 April, 4 May and 6 May to better inform the Project design.

An existing development consent for the establishment of borrow pits (DA15/154) exists over the western part of the Project area. During consultation, DPIE requested the impacts and offset requirements within this area and the remaining Project area be accounted for separately.

6.6.2 Existing Environment

Pinion Advisory completed a biodiversity assessment of the site using the NSW Biodiversity Assessment Method (BAM). Of the 68 ha within Lot 1, approximately 46 ha is native vegetation with the remaining 22 comprised of no vegetation or vegetation which is not native (Figure 16). Clearing of native vegetation was noted due to the development of borrow pits (in accordance with DA15/154) and historical sand mining which now has some regrowth that is Category 1 exempt land.

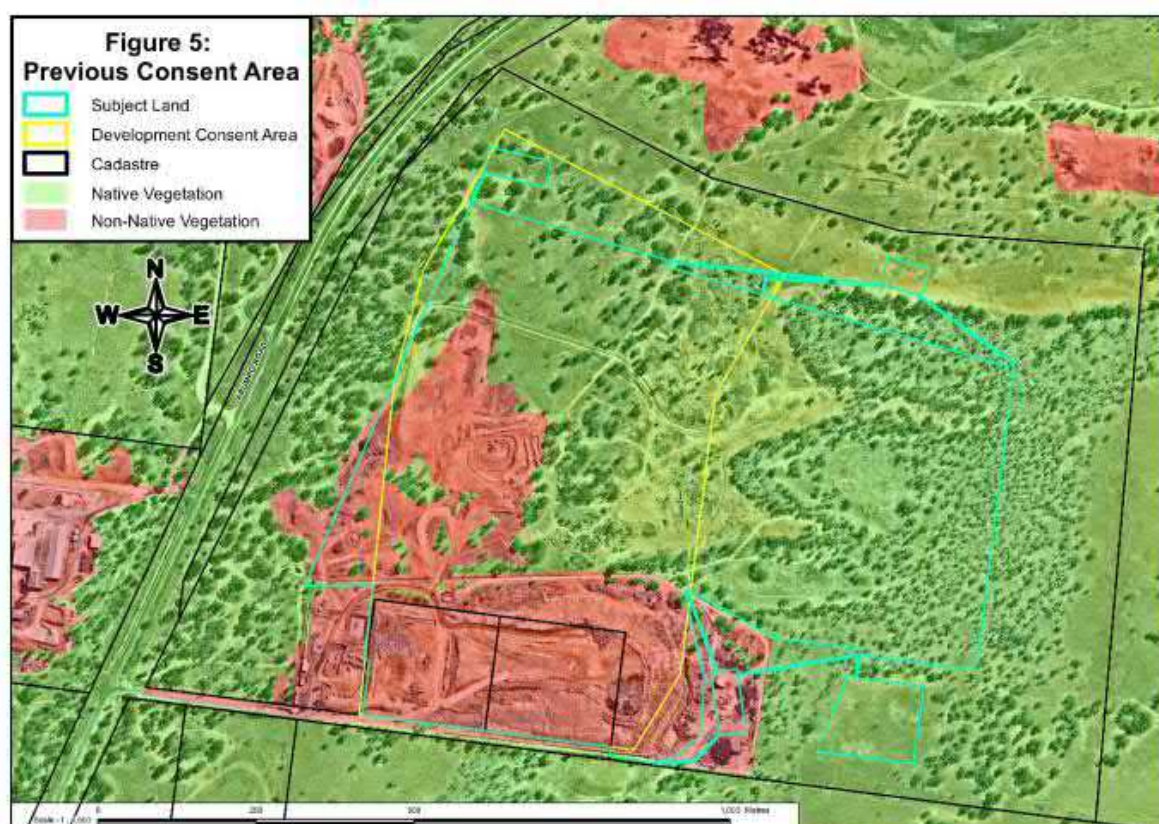


Figure 16 Development Consent and Subject Areas Native and Non-Native Vegetation (extracted from Pinion, 2021)

The Project is within the Robinvale Plains IBRA Sub-region of the Riverina IBRA bioregion. To the north and within the buffer zone it is classified as the South Olary Plain IBRA subregion of the Murray Darling Depression IBRA bioregion. The Mitchell Landscapes present include Murray lakes, swamps and lunettes



(approx. 60% of area), Murray channels and floodplains (approx. 35%) and Mallee cliffs sandplains (approx. 5%). The plant community types (PCTs) and other areas described within the Project area is summarised in Table 6.17.

Table 6.17 Plant Communities Types (PCT) Described in Project Area

PCT	Description	Area (ha)	Main species	Notes	Threatened Ecological Community
15	Black Box open woodland wetland with chenopod understory mainly on the outer floodplains in south-western NSW	19.76	<i>Eucalyptus largiflorens</i> , <i>Rhagodia spinescens</i> , <i>Marieana pyramidata</i> , <i>Atriplex vesicaria</i>	Most <i>E. largiflorens</i> (black box) appears to have grown in a single episodic event Evidence of past logging	No
58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Region	10.5	<i>Sclerolaena patentiscus</i> , <i>Dissocarpus paradoxus</i> , <i>Casuarina pauper</i> , <i>Alectryon oleifolius</i> subsp. <i>canescens</i>	<i>C. pauper</i> (Black oak) is dominant and varies in height and form <i>A. oleifolius</i> (rosewood) is scattered in stands across the area	No
170	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	4.54	<i>D. biflorus</i> , <i>E. dumosa</i> , <i>E. oleosa</i> , <i>Pittosporum angustifolium</i>	Eucalypts are dominant overstory with diverse shrubby sub-formation. A range of tree forms present Overall vegetation density higher than other PCTs surveyed	No
252	Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion	1.7	<i>Myporum platycarpum</i> , <i>S. pentatropis</i> , <i>D. biflorus</i> , <i>Enchylaena tomentosa</i>	<i>M platycarpum</i> (Sugarwood) is dominant overstory species, sparse and age varies. Understory is almost totally comprised of <i>S. pentatropis</i> and <i>D. biflorus</i>	No
N/A	Regrowth	8.93	Young regrowth of early colonising species	Evidence of excavation, lack of topsoil, large bare areas and exotic plant cover	N/A
	Bare ground or exotic	22.05		Includes current operational areas	N/A
TOTAL		67.48			

6.6.3 Assessment

6.6.3.1 Vegetation Integrity

The vegetation has been divided into vegetation zones to allow assessment of its condition. The location of the zones is shown in Figure 17 and described in Table 6.18.

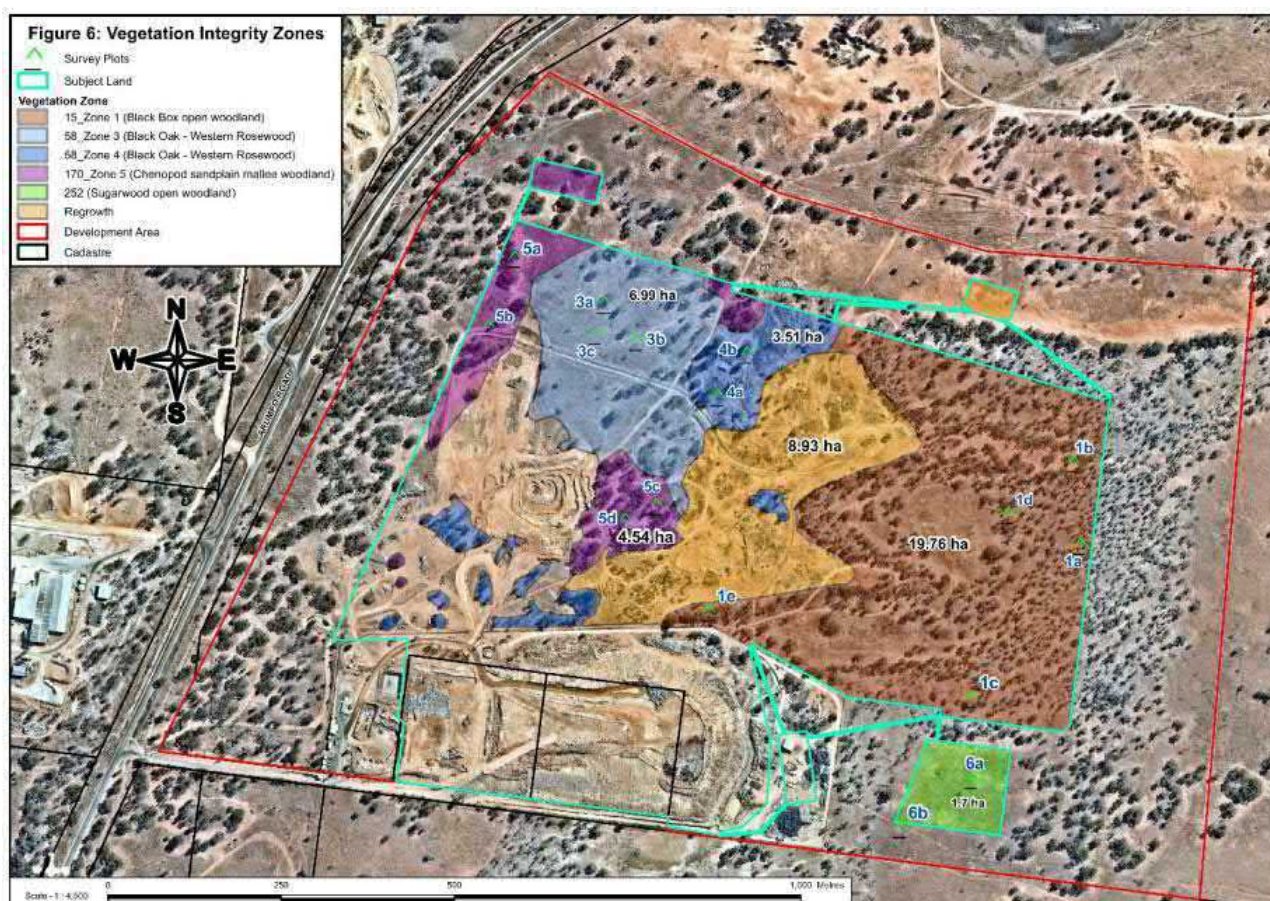


Figure 17 Vegetation Integrity Zones (extracted from Pinion, 2021)



Table 6.18 Vegetation Zones and Integrity Within and Outside existing Consent Area

PCT	Zone ID	Location	Condition	Impacted Area (ha)	Zone area (ha)	Integrity score*
15 Black box	15_Zone 1	Consent area	Good quality vegetation aligns closely to the representative PCT benchmark. There is little bare ground or litter within this zone	0.57	0.57	57.1
		Remainder		19.19	19.2	
58 Black oak-Rosewood	58_Zone 3	Consent area	Poor quality vegetation aligns closely to the representative PCT benchmark. This zone shows very little disturbance from earthworks and vehicles//machinery	6.99	6.99	24.2
	58_Zone 4	Consent area	Moderate-quality vegetation aligns closely to the representative PCT benchmark; however, there is significant disturbance from earthworks and vehicles/machinery. This zone has a wider range of understory plants which increased the subsequent diversity of flora	3.38	3.51	40.8
		Remainder	Poor quality vegetation aligns closely to the representative PCT benchmark. This zone shows very little disturbance from earthworks and vehicles/machinery	0.12	0.12	
170 Chenopod	170_Zone 5	Consent area	Moderate-quality vegetation aligns mostly with the representative PCT benchmark; there is significant degradation in areas from litter and roadways; however, the majority of old growth is healthy.	4.49	4.54	49.5
		Remainder	Moderate-quality vegetation aligns with the representative PCT benchmark; however, there is significant disturbance from earthworks and vehicles/machinery. This zone has a wider range of understory plants which increased the subsequent diversity of flora	0.05	0.05	
252 Sugarwood	252_Zone 6	Remainder	Poor quality vegetation. Very sparse overstory of Sugarwood with a low diversity of understory dominated by shrubs	1.70	1.70	14.2

* Integrity Score is for total area. The score for outside the consent area is the same as the total area, though individual scores vary



6.6.3.2 Threatened Species

No threatened species were observed during the survey. The Biodiversity Assessment Method Calculator (BAM-C) was used to determine:

- ecosystem credit species. Based on the PCTs present, the BAM-C identified twenty-two fauna species classified as Vulnerable under the *Biodiversity Conservation Act 2016 (NSW)* may be present within the Project area, of which four were bats and the remainder birds. None of these species are listed under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*.
- species credit species. Three flora species and nine fauna species are predicted to occur with the Project area; however one flora species and three fauna species have been identified as unlikely to occur due to habitat constraints and so are excluded. The remaining species which will require targeted assessment are listed in Table 6.19.

Table 6.19 Species Credit Species Requiring Further Assessment

Scientific Name	Common Name	NSW Status	Survey Months
<i>Austrostipa metatoris</i>	Spear-grass	Vulnerable	October to November
<i>Burhinus grallarius</i>	Bush stone-curlew	Endangered	February to December
<i>Eucalyptus leucoxylon subsp. pruinosa</i>	Yellow gum	Vulnerable	All year
<i>Hieraaetus morphnoides</i>	Little eagle	Vulnerable	August to October
<i>Lophochroa leadbeateri</i>	Major Mitchell's cockatoo	Vulnerable	September to December
<i>Lophoictinia isura</i>	Square-tailed kite	Vulnerable	September to January
<i>Ninox connivens</i>	Barking owl	Vulnerable	May to December
<i>Pimelea serpyllifolia subsp. serpyllifolia</i>	Thyme rice-flower	Endangered	July-November

Based on the suitable survey months for the species requiring further assessment (Table 6.19), all species are likely to be able to be observed during October, if present. It is proposed to undertake a targeted survey for all species during October 2021. The BDAR as current presented has assumed that all these species are present.

6.6.3.3 Matters of National Environmental Significance

A Protected Matters search tool (PMST) report including a 10 km buffer was used to identify matters of National Environmental Significance (MNES). Protected matters relating to biodiversity include:

- Wetlands of International Importance (RAMSAR). The closest wetland is over 170 km from the Project and unlikely to be impacted by the Project
- Listed Threatened Ecological Communities. No threatened ecological communities occur within 10 km of the Project;
- Listed Threatened species. Two species have potential habitat within the Project area, being:
 - *Falco hypoleucos* Grey Falcon
 - *Nyctophilus corbeni* Corben's Long-eared Bat
- Listed migratory species. None were identified with potential habitat within the Project area;
- State and Territory reserves. The closest reserve is Kings Billabong Park which is upstream and there is no connection from the Project Area to the Murray River, hence it was determined there will be no impact from the Project on these reserves.



- Nationally important wetlands. Kings Billabong Wetlands is within the Kings Billabong Park and located on the Victorian side of the Murray River and upstream of the Project so there will be no impact from the Project.

6.6.4 Mitigation Measures

The direct impacts are limited to the clearing of native vegetation and habitat, with indirect impacts including habitat fragmentation and loss, competition from the introduction and/or encouragement of weeds and/or pests, contamination and collisions/accidents. A summary of the mitigation measures for design and construction and for operational phases of the facility is provided in Table 6.20.

Table 6.20 Mitigation Measures Summary for Construction and Operational Phases

Impact	Design and Construction Measures	Operational Measures
Contamination - soil, groundwater, waste, leachate, sediment-laden water	Design and construct landfill cells in line with best management practices Prepare a Construction Environmental Management Plan including erosion and sediment control plan Topsoil removed during cell construction should be transported to area/s awaiting rehabilitation. Stockpile height to be limited to 1.5 m. Maintain separation between topsoil and overburden during removal, transport and storage.	Implement measures from Landfill Environmental Management Plan to contain all waste to landfill cells and collect leachate. Use appropriately sized and bunded areas for containment of liquid wastes within the Recycling Facility Maintain separation between topsoil and overburden during storage
Pest plants and animals	Priority noxious weeds are management under the <i>Biosecurity Act 2015</i> , including developing a Weed Control Plan which includes monitoring of weed infestations in winter. Implement a pest animal control plan, including maintenance of fences to exclude domestic stock and feral goats, as described in the LEMP	
Native fauna injury, fatality and displacement	Engage a suitably qualified ecologist prior to clearing a new cell to provide detailed advice Establish controls to prevent work occurring outside the construction area Engage a suitably qualified ecologist to identify habitat trees with logs/hollows for relocation and to relocate native fauna which may be displaced Inspect trenches left open overnight for entrapped wildlife and contact suitably qualified fauna relocation services, if trapped animals are found Inspect pipes and conduit for fauna prior to placement. Seal pipe ends overnight to prevent fauna entrapment	Establish controls to prevent works from occurring outside the subject land Identify suitably qualified fauna re-location services Prevent illegal collection of firewood through fencing and signage
Odour, gas, noise, vibration and dust. Landscape	Include endemic vegetation in rehabilitation Construct compacted rubble haul roads	Restrict tip face and daily covering of waste



Impact	Design and Construction Measures	Operational Measures
and visual amenity	Maintain 200 m buffer to provide wildlife corridors and refuges and reduce visual amenity impact	Implement adequate dust control measures
Traffic collisions	Limit site speeds for construction and operation traffic. Restrict traffic to operational areas by providing established haul roads and clear signage	
Native flora destruction, habitat loss	Plan construction activities for January to April to facilitate revegetation in May (optimal time). Avoid clearing in Spring when breeding most likely to occur. Clearly identify extent of disturbance using on-ground markers Locate waste management infrastructure in already disturbed areas to the extent practical Relocate cleared logs and hollows in buffer zone or rehabilitated areas Construct a temporary fence between construction area and buffer zone for cell adjacent to buffer. New tracks to be established outside the drip line of trees Progressive develop and rehabilitate substages and cells	Undertake rehabilitation as soon as practical. Maintain temporary fence between cell and buffer zone for cells adjacent to the buffer zone Prepare a Rehabilitation Management Plan which includes site preparation measures (light contour ripping, surface stabilisation, mulching), weed control, suitable species selected from PCT15 and PCT58 and of local provenance, placement of logs/hollow trees, monitoring and on-going weed and pest control. Maintain perimeter fencing to prevent illegal dumping of rubbish outside of operational hours. Maintain fire breaks to limit spread of wildfire

6.6.4.1 Ecosystem Credits and Offsets

The impacts of the Project require offset due to the area and vegetation integrity scores. The ecosystem credit requirements based on the floristic survey data are presented in Table 6.21. Species credit requirements will be calculated once targeted surveys are completed in October 2021.

Table 6.21 Ecosystem Credits for Plant Community Types

PCT	Zone ID	Credits Required	
		Consent Area	Remainder
15 Black box	15_Zone 1	14	479
58 Black oak-Rosewood	58_Zone 3	74	
	58_Zone 4	60	2
170 Chenopod	170_Zone 5	83	1
252 Sugarwood	252_Zone 6		0



6.7 Aboriginal Cultural Heritage

An Aboriginal Cultural Heritage Assessment was completed by Landscape and is presented in Appendix M.

6.7.1 Methodology

An Aboriginal Cultural Heritage Assessment was undertaken to support the application for development approval of the Buronga Landfill Expansion (the Project) with consideration of the requirements in the following guidance:

- *Aboriginal cultural heritage consultation requirements for proponents 2010 (Part 6 National Parks and Wildlife Act 1974)*, NSW Department of Environment, Climate Change and Water (DECCW, 2010a).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* NSW Department of Environment, Climate Change and Water (DECCW, 2010b).
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, NSW Office of Environment and Heritage (OEH, 2011).
- *Burra Charter*, The Australia International Council on Monuments and Sites (ICOMOS) (Australia ICOMOS, 2013).
- *NSW National Parks and Wildlife Service Aboriginal Cultural Heritage: Standards and Guidelines Kit*, NSW National Parks and Wildlife Service (NPWS, 1997).
- *Ask First; A Guide to Respecting Indigenous Heritage Places and Values*, Australian Heritage Commission (AHC, 2002).

The principal objectives of the ACHA were to:

- Consult the local Aboriginal community (consultation with the Aboriginal community followed Aboriginal cultural heritage community consultation requirements for proponents [DECCW, 2010a]), including in relation to cultural values of the Buronga Landfill Expansion area.
- Conduct a desktop assessment to delineate areas of known and predicted cultural heritage potential within the Buronga Landfill Expansion area.
- Undertake an archaeological survey of known and predicted Aboriginal cultural heritage potential areas identified in the desktop assessment, with representatives of the local Aboriginal community. The field survey was undertaken on 23 June 2021 with representatives from the Registered Aboriginal Parties (RAPs). The survey was undertaken by examining the ground surface and all mature trees along transects every 10 metres across the Project site. This achieved a high level of coverage given the open and relatively bare ground conditions
- Record any Aboriginal cultural heritage sites within the Buronga Landfill Expansion area and assess their significance.
- Identify the nature and extent of any potential impacts of the Buronga Landfill on Aboriginal cultural heritage.
- Devise options in consultation with the community to avoid or mitigate potential impacts of the development on Aboriginal cultural heritage sites and items.

Landscape employed both desktop and field studies in order: to establish the environmental context of the site (i.e. to identify key landforms and vegetation), to establish the Aboriginal cultural heritage context of the site (i.e. to determine which heritage items are likely to occur within Buronga landfill based on archaeological investigations onsite and in the broader region), to search for heritage items onsite, and to assess the archaeological significance of discovered heritage items.

Consultation with RAPs and other stakeholders (e.g. Heritage NSW, WSC, Dareton Local Aboriginal Land Council, Western Local Land Service) was undertaken and included:

- registering interest in the Project;
- reviewing and commenting on the Proposed Methodology;
- participating in field survey;
- reviewing the draft ACHA.



RAPs were encouraged to provide feedback and input throughout the assessment process. No comments were received on the proposed methodology from the RAPs.

6.7.2 Existing Environment

6.7.2.1 Site Setting

Over the past 60 million years, the area was shallow seas and lakes which were then overlaid by wind-blown sediments comprising low, undulating sand hummocks vegetated by low-open shrublands and woodlands with tall shrublands on sandier hummocks and black box woodland toward Lake Gol Gol. From the second half of the 19th century, the site has been used for sheep and cattle grazing as well as soil stripping and sand quarrying.

The earliest evidence of human occupation of Australia is from the south-western area of NSW with artefacts dating to 46,000 to 50,000 years ago at Lake Mungo, 75 km north east of the Project. Aboriginal people of the Barkindji, Kureinji, Latje, Maraura and Yerre Yerre language groups appear to have occupied the Murray River near the junction with the lower Darling River at the time of first contact with Europeans. They were noted to be hunter-fisher-gatherers suggested to live in large groups along the river in the warmest months and dispersing as smaller groups to the dune fields to collect food after winter rains. Based on previous archaeological surveys, the main artefacts likely to occur at the Project site are shown in Table 6.22.

Table 6.22 Site Predictive Model Summary

Type	Description	Likelihood within Project
Stone artefact scatters	Flakes of sandstone debris from the making and resharpening of stone tools. Typically located near permanent or semi-permanent water sources on level, well-drained ground elevated above the water source. In the Lower Darling commonly located on river terraces, creek-lines and around the margins of lakes, swamps and clay pans	Possible but low density
Evidence of cooking and food preparation	Includes campfire hearths which consist of lumps of burnt clay or stone cobble hearthstones. May also contain remnants of burnt animal bones, eggshells and stone artefacts. They are often located in dune swales, particularly on claypans, near soaks and on floodplain terraces	Possible but low density
Shell middens	Deposits of shell and other food remains typically as thin layers or small patches. Commonly occur along the Darling River and its tributaries. There is no permanent water source within the Project Area	Unlikely
Earth mounds	Used as cooking ovens or campsites and range from 3-35 wide and 0.5-2 m tall and may contain oven material, stone artefacts, food refuse or foundation. Many are difficult to detect or have disappeared due to ploughing	Possible but low density
Quarry sites	Sites for obtaining stone or ochre for tools, art or decoration. Chert, silcrete, quartz and quartzite were commonly used but are scarce in the lower Darling region and stone would have been sourced from	Unlikely



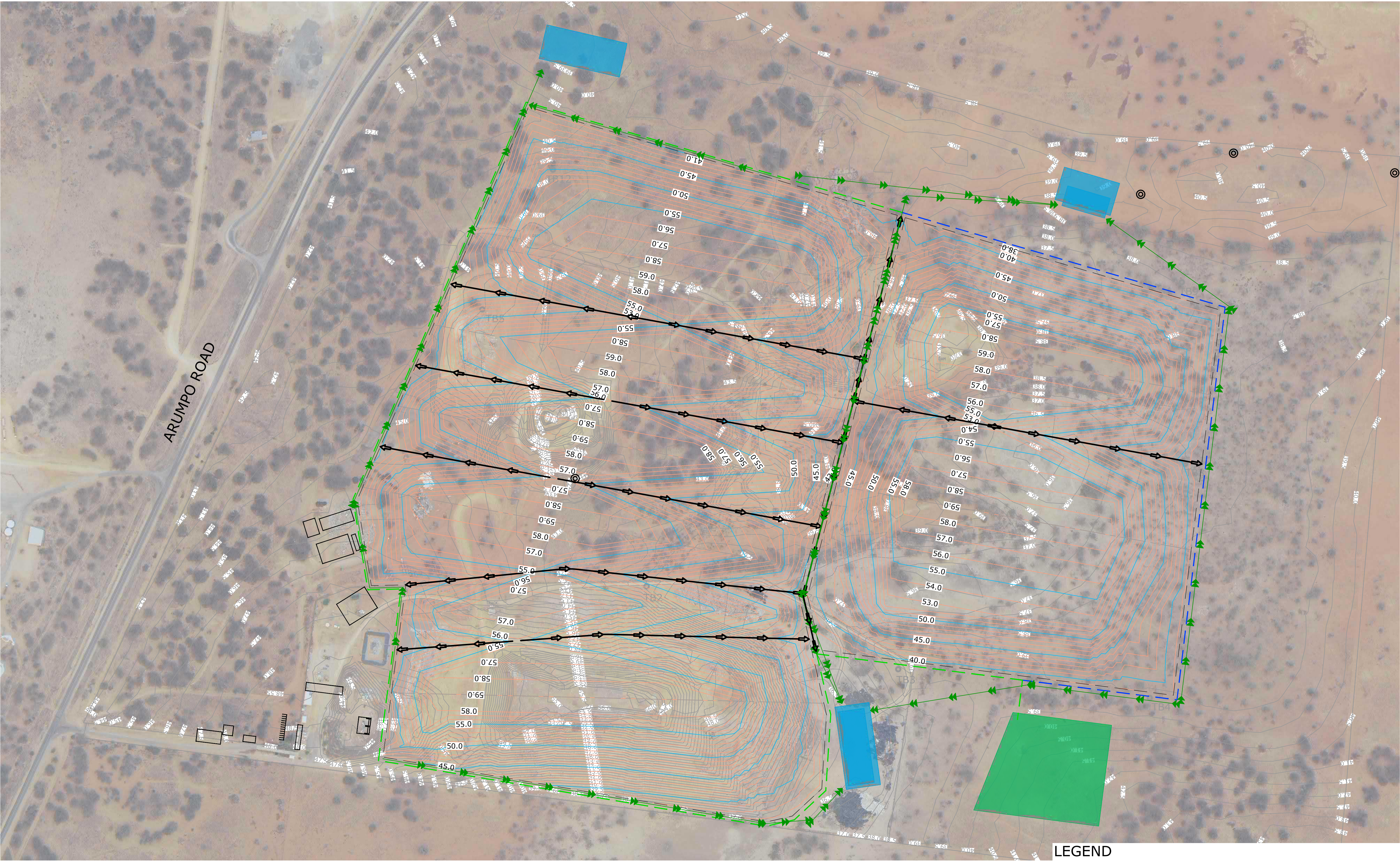
Type	Description	Likelihood within Project
	Murray River or long-distance trade links. There are no suitable rock outcrops on the Project site	
Modified trees	slabs of bark were removed from trees for uses such as shelter roofs, canoes, shield and containers and scars were incised to facilitate tree climbing to collect honey to capture tree-dwelling animals. River Red Gum or Black Box are the most commonly scar species in the lower Darling and the scar must be more than 150 years old to be considered related to Aboriginal activities. Black box occurs within the Project site and are likely to be old	Likely
Stone arrangements, ceremonial rings, dreaming sites	Stone arrangements in many configurations or specific natural features used for or associated with ceremonies or associated with ancestral creators. Stone arrangements are uncommon in the Lower Darling Region; however consultation with local Aboriginal communities is required to assess	Unlikely
Burials	Maybe singular or multiple interments. Typically located in sandy areas above the floodplain and frequently in sand dunes and ridges, lunettes and levees along watercourses	

6.7.2.2 Site Survey

Surveys undertaken of the project site have identified four artefacts within the Project site (Table 6.23). One was identified from a 2016 and, although not relocated in a subsequent survey, a permit to disturb was obtained and this artefact no longer exists. Three new objects, all stone artefacts, were located in the north-eastern corner of the Project area within the sandplains (Figure 18); there were no modified trees identified. The low number of finds was attributed to the landscape setting of the Project away from permanent water, and historical disturbance for sand quarrying.

Table 6.23 Artefacts Identified at the Project Site

AHIMS Site Number	Site Name	Location	Landform	Contents	Status
46-3-0192	Buronga Landfill Artefact Scatter 1	610565 m E; 6223164 m N	Sandplain	Broken sandstone core	Destroyed under permit
NEW	Buronga Landfill Artefact 1	611253 m E; 6223510 m N	Sandplain	Silcrete flake	In place
NEW	Buronga Landfill Artefact 3	611366 m E; 6223560 m N	Sandplain	Broken sandstone muller	In place
NEW	Buronga Landfill Artefact 3	611562 m E; 6223536 m N	Sandplain	Silcrete angular fragment	In place



LEGEND

- 40.0 ——— EXISTING CONTOUR (0.5m INTERVAL)
- 51.0 ——— DESIGN CONTOUR MAJ (5.0m INTERVAL)
- 50.1 ——— DESIGN CONTOUR MIN (1.0m INTERVAL)
- STAGE BOUNDARY
- CAP CROWN
- CAP DRAIN
- STORMWATER DRAIN
- STAGE 1 SERVICE ALIGNMENT
- STAGE 2 SERVICE ALIGNMENT
- STORMWATER POND
- LEACHATE POND
- ⊙ ABORIGINAL ARTEFACT SITE

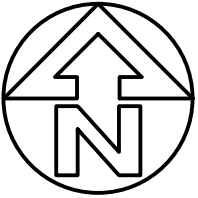
THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.

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100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: AS SHOWN
SURVEYED:PRICEMERRET
SURVEY DATE:03.03.21
APPROVED / PROJECT LEADER



PUBLIC UTILITIES:
THE SERVICES SHOWN ARE DERIVED FROM PLANS OBTAINED FROM THE RELEVANT SERVICE AUTHORITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ARRANGE WITH THE RELEVANT SERVICE AUTHORITIES FOR CONFIRMATION OF SERVICES AND THEIR LOCATION BEFORE EXCAVATION WORK COMMENCES.

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NOT FOR CONSTRUCTION

WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 18
LOCATION OF ABORIGINAL ARTEFACTS

REV	FOR INFORMATION	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
A	FOR INFORMATION		14.09.21		

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	014	A



6.7.3 Assessment

The Project may be assessed in terms of significance to Aboriginal people, science (archaeology), aesthetics or history. Consultation with the RAPs, particularly during the field survey, did not uncover any specific information pertaining to the Project area and suggested that the Project area was unlikely to contain abundant physical remains of past Aboriginal occupation due to the past disturbance by sand quarrying. The value of the objects to science was rated as low overall as the artefacts were small, few and not unique and affected by to the disturbance and erosion. Their aesthetic and historical values were also considered to be low.

Landscape assessed the direct and indirect potential impacts of the proposed expansion on Aboriginal cultural heritage. Direct and indirect impacts were considered as described below and are summarised in Table 6.24.

- Potential Direct Impacts:
 - the loss of information which could otherwise be gained by conducting research today;
 - the loss of the archaeological resource for future research using methods and addressing questions not available today; and
 - the permanent loss of the physical record.
- Potential Indirect Impacts:
 - deposition of dust generated by earthworks and vehicular traffic;
 - accidental disturbance by peripheral activities;
 - and inappropriate visitation including the unauthorized removal of Aboriginal objects.

Landscape concluded that the direct and indirect impacts of the proposed works pose no loss of value to the discovered artefacts. However, there is a moderate likelihood of encountering previously undiscovered Aboriginal objects (likely stone flakes and grindstones) during the proposed works.

Table 6.24 Impact summary for Aboriginal object discovered at Buronga Landfill.

AHIMS Site No.	Site Name	Type of Harm	Degree and Consequence of Harm
46-3-0192	Buronga Landfill Artefact Scatter 1	Direct (already harmed under AHIP)	Total loss of value (already harmed under AHIP)
N/A	Buronga Landfill Artefact 1	None	No loss of value
N/A	Buronga Landfill Artefact 2	None	No loss of value
N/A	Buronga Landfill Artefact 3	None	No loss of value

6.7.4 Mitigation Measures

The ACHA recommends the following mitigation measures:

- Wentworth Shire Council avoid harm to the three isolated finds of stone artefacts (Buronga Landfill Artefact 1-3) near the proposed disturbance areas. A permanent protective barrier fence should be erected around the sites. Fences should be maintained and personnel directed not to enter fenced areas except to complete appropriate land management maintenance and weed control.
- If any previously unidentified Aboriginal objects are encountered during construction of the proposal all works likely to affect the material must cease immediately and Heritage NSW and the RAPs consulted about an appropriate course of action prior to recommencement of work.
- In the unlikely event that human skeletal remains are encountered during construction the proposal, all work with the potential to impact the remains must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old



the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, Wentworth Shire Council should contact the Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the local Aboriginal community.

- Wentworth Shire Council should provide training to all on-site personnel regarding the Aboriginal cultural heritage management activities strategies relevant to their employment tasks.
- Wentworth Shire Council should continue to involve the registered Aboriginal parties and any other relevant Aboriginal community groups or members in matters pertaining to the proposal.
- Prepare a Heritage Management Plan to co-ordinate and implement management and mitigation strategies.

6.8 Noise and Vibration

A Noise and Vibration Assessment was conducted by Sonus and is presented as Appendix N.

6.8.1 Methodology

Potential noise impacts associated with the proposed landfill expansion were assessed in accordance with the EPA's 2017 *Noise Policy for Industry* and the Department of Environment, Climate Change and Water's 2011 *NSW Road Noise Policy*. Potential vibration impacts were assessed in accordance with the Department of Environment and Conservation's (DEC) 2006 *Assessing Vibration: a technical guideline* (Vibration Guideline).

6.8.1.1 Background Noise Assessment

On May 6, a noise logger was placed by Sonus in the northwest corner of the proposed expansion area to record background noise between May 6 and 14. The noise logger location was chosen to capture background noise sources while avoiding the noise associated with landfill operations. Noise levels over a given period of time are described in terms of Sound Pressure/Power Levels and are expressed in a mathematically weighted form of decibels (dB) known as A-weighted decibels (dB(A)). The background noise recordings were used to calculate Rating Background Level (RBL) values over day (7 am-6 pm), evening (6 pm to 10 pm) and night (10 pm-7 am) time periods. The RBL values provide a single figure that represents the background noise level for assessment purposes.

6.8.1.2 Operational Noise Assessment

Potential noise impacts of a proposal are assessed against Project Noise Trigger Levels (PNTLs). If proposed activities are expected to exceed PNTLs, then noise impact avoidance and/or mitigation measures should be implemented to minimise the adverse effects of operational noise on sensitive receptors. PNTLs are the lower of either the Project Intrusiveness Noise Levels (PINL) or the Project Amenity Noise Levels (PANLs). The PINL aims to protect against acute or short-term noise generation, while the PANL aims to protect against cumulative noise impacts from industry and to maintain amenity for particular land uses.

The PINL of an industrial noise source is considered acceptable if the level of noise from the source measured over a 15-minute period ($L_{Aeq,15min}$) does not exceed the RBL by more than 5 dB(A). The outcome of this approach aims to ensure that the intrusiveness noise level is being met for at least 90% of the time periods over which annoyance reactions can occur (taken to be periods of 15 minutes).

The PANL is aligned with the planning zone in which nearby noise sensitive premises with the potential to be impacted by the proposed development are located. The PANL for a new industrial development is set at 5 dB(A) below the Recommended Amenity Noise Level (RANL) defined by the *Noise Policy for Industry* for the nearby planning zone.

Projected noise levels were estimated using the SoundPLAN noise modelling suite. Noise measurements taken during the site visit were supplemented with a range of previously acquired noise measurements and



observations at other similar facilities, including noise from operation of civil earthmoving equipment (front end loader and an excavator), road truck movements, articulated dump truck movements, a road truck depositing waste material, a dump truck depositing fill and an air compressor. Based on observations on-site of existing operations, the following assumptions about onsite activities were made for modelling purposes: a single road truck accessing the site and depositing waste material; continuous operation of a front end loader processing waste throughout the assessment period; a single return haul truck movement between the excavator site, and the waste processing area; continuous operation of an excavator throughout the assessment period; and continuous operation of the air compressor throughout the assessment period. It was also assumed that all operational activities would be located in the southwestern corner of the proposed expansion area (i.e. as close as possible to the sensitive noise receptors); and that there was a direct line of sight between the noise source and receptor. These assumptions were made to provide a conservative estimate of noise impact on nearby noise sensitive receivers.

6.8.1.3 Traffic Noise Assessment

Road traffic noise assessment criteria are described from the NSW Road Noise Policy and are dependent on the road type (freeway/arterial/sub-arterial road or local road), the type of noise sensitive receptor, (residential or non-residential), and whether the assessment applies to a new or existing road. Category/type 6 assessment criteria which apply to “existing residences affected by additional traffic on existing local roads generated by the land use developments” were deemed to be the most suitable for this assessment. Category 6-day (7 am-10 pm) and night (10 pm-7 am) road noise thresholds ($L_{Aeq,1hour}$) are 55 and 50 dB(A), respectively.

The effect of additional traffic on road traffic noise levels at residences in the vicinity of Arumpo Road to the south of the site were estimated using the SoundPLAN noise modelling suite.

6.8.1.4 Vibration Impact Assessment

Potential vibration impacts are typically divided into two categories: amenity (i.e. human annoyance) and structural damage. Human annoyance occurs at lower vibration levels than structural damage, so adherence to human annoyance criteria ensures structural damage does not occur. The criteria are derived from the DEC’s Vibration Guideline, which is based on BS 6472:1992 *Guide to Evaluation of Human Exposure to Vibrations in Buildings (1 Hz to 80 Hz)*. The daytime assessment criteria for continuous operation were considered as landfill operations take place within normal operating hours and, at worst, could be continuous.

The vibration levels associated with the following activities were measured during the site visit: a loader operating at high and low power settings and a dump truck moving and dumping fill. Vibration was measured 100 m from the loader and 50 m from the dump truck. These activities are expected to generate the highest levels of vibration (currently and during the proposed landfill expansion). Measurements are weighted for assessment purposes using a conservative screening method described in Appendix A of DEC’s Vibration Guideline.

6.8.2 Existing Environment

The planning zone for the nearest noise sensitive premises is “Rural 1” with the nearest residences over 900 m from the current and proposed landfill activities. The primary noise sources in the area are: Buronga Landfill; a bentonite mining operation immediately west of the landfill (Arumpo Bentonite, 291 Arumpo Road), a gypsum mining operation northwest of the landfill (Morello Gypsum), farming activity to the southwest of the landfill, and road traffic on Arumpo Road serving these facilities and as general transit.

The background noise levels ranged from approximately 20-80 dB(A), with three maximum noise levels ranging from 80-100 dB(A) which occurred outside the landfill operating hours (Appendix N). The RBL values calculated from these measurements (Table 6.25) were less than the minimum RBL values set out



in the EPA's *Noise Policy for Industry* so the minimum RBLs were used to calculate the PINLs. The PANLs were greater than the PINLs and hence were used as the PNTLs. The modelling predicted that the noise level at the closest practicable distance to the residences and with direct line of site (e.g. at the top of the landfill with no shielding) is 38 dB(A).

Table 6.25 Noise Assessment Criteria and Prediction

Parameter	Unit	Daytime	Evening	Night-time
Measured Rating Background Level (RBL)	dB(A)	26	17	16
Minimum RBL	dB(A)	35	30	30
Project Intrusiveness Noise Level (PINL)	L _{Aeq,15min} dB(A)	40	35	35
Recommended Amenity Noise Level (RANL)	L _{Aeq,15min} dB(A)	53	48	43
Project Amenity Noise Level (PANL)	L _{Aeq,15min} dB(A)	48	43	38
Project Noise Trigger Level (PNTL)	L_{Aeq,15min} dB(A)	40	35	35
Predicted Noise Level with direct line of site	dB(A)	35	n/a	n/a

NOTES:

Daytime – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sunday and Public Holidays

Evening – the period from 6 pm to 10 pm

Night-time – the remaining periods

n/a – not applicable as landfill operations only occur during daytime

6.8.3 Assessment

6.8.3.1 Operational Noise Assessment

The predicted noise level for the Project is 38 dB(A) at the closest practicable distance to the residences and with direct line of site (e.g. from the higher levels of the landfill with no shielding). The predicted noise level is within the rise and fall of the ambient environment during the daytime period and so a penalty for annoying characteristics was not applied. The predicted noise level is below the day PNTL and is therefore compliant with the EPA's *Noise Policy for Industry*.

6.8.3.2 Traffic Noise Assessment

The proposed development is not likely to result in a significant increase in traffic on the local road network in short to medium term but rather a gradual increase. The road traffic noise assessment was based on the peak site traffic generation predicted in the Traffic Impact Assessment (Table 6.10) being 261 vehicles per day associated with future operation and construction traffic thus representing a worst-case scenario. Based on these predictions, a 1-hour average noise level of 51 dB(A) is predicted at the most affected house which is below the day assessment criteria threshold of 55 dB(A). The noise levels predicted from the proposed development achieve the assessment criteria and therefore satisfy the *Road Noise Policy*.



6.8.3.3 Vibration Impact Assessment

Observations on-site suggested that vibration from even the most intensive operations could not be perceived at distances in the order of 100 m from activity. As residences are over 900 m from the site, vibration would not typically require further consideration; however, the SEARs required an assessment be undertaken.

The results of the vibration measurements in relation to the relevant assessment criteria are shown in Table 6.26. All measured vibration levels were below assessment criteria. Additionally, vibration was measured at 50-100 m from the source, while the nearest sensitive receptor is over 900 m away from the landfill. As such, potential vibration impacts are expected to be negligible and meet the requirements of the applicable guidelines.

Table 6.26 Summary of Vibration Assessment

	X Axis (rms, m/s ²)		Y Axis (rms, m/s ²)		Z Axis (rms, m/s ²)	
	Measured	Criteria	Measured	Criteria	Measured	Criteria
Loader – low power	0.001	0.0071	0.003	0.0071	0.001	0.01
Loader – high power	0.001	0.0071	0.002	0.0071	0.001	0.01
Dump truck	0.002	0.0071	0.002	0.0071	0.001	0.01

6.8.4 Mitigation Measures

The noise and vibration levels associated with the proposed activities are well below action trigger thresholds. Consequently, no impact avoidance/mitigation measures have been recommended.

6.9 Social and Economic

6.9.1 Current Environment

The Buronga Waste Facility provides waste management services to the majority of WSC's population. The closest population is located in Buronga and is over 4 km from the Project area. The surrounding uses are for industrial facilities, being bentonite and gypsum suppliers, and agricultural properties with extensive grazing to the north and irrigated horticulture to the south toward the Murray River.

Census data from 2016 shows that Buronga, Gol Gol and Wentworth account for 60% of the WSC local government area (LGA) (Table 6.27). Mildura has a significantly larger population than the entire Wentworth LGA. Mildura, Buronga and Gol Gol have a similar median age and are similar to the entire NSW and Victorian populations which are 38 years and 37 years, respectively; Wentworth has an older population. Gol Gol is the most affluent suburb with higher median household income and property mortgages and very low unemployment percentage. Compared with Mildura, Buronga has higher household income and lower rent and unemployment. Wentworth has the lowest household income, mortgage and rent, which would be affected by its older population and higher unemployment compared with the other nearby suburbs.

Wentworth Shire Council owns and operates the Buronga Landfill. The Buronga Landfill currently employs six people directly with contractors engaged for construction activities every 5 to 10 years. Additional Council staff are engaged in the management and administration of the landfill and collection of domestic waste. Additional employment is generated from transporting recyclables, such as recycling chemical drums, and chipping of green waste and crushing of masonry from construction and demolition activities.



The Project existing area is zoned SP2 Infrastructure and the surrounding land is zoned rural. The existing use of the Project area is for soil borrow pits and has previously been used for sand mining. Morello Earthmoving holds a Mining Lease over the project area (Figure 19) and currently has operations east of the landfill consisting of gypsum mining and production and composting of manure and other organic wastes.

6.9.2 Assessment

The demographics of Buronga are similar to the closest towns of Gol Gol and Mildura. There are no specific data for the areas directly around Buronga landfill. The data for Buronga suggest that the demographics and socio-economic status is comparable with Mildura, though Gol Gol, with its more extensive river frontage, has attracted a population with higher household incomes. The existing Buronga Landfill does not appear to have detrimentally affected the demographics of Buronga compared with Mildura suggesting that the proposed expansion is also unlikely to affect the house prices or incomes of the surrounding area.

The estimated direct full-time equivalent employment per 10,000 tonnes of waste is 9.2 for recycling and 2.8 for landfill disposal and indirect employment is expected to result in a multiplier of 1.84³. Six staff are currently directly employed at Buronga Landfill which is less than estimated for 24,000 tonnes of waste but this does not include rubbish collection staff. The increase in waste volumes, particularly after the closure of Mildura Landfill, is likely to double the number of full-time employees, with the increase in recycling effort expected to result in more employment opportunities. Assuming waste acceptance of 60,000 tonnes/annum and 50% recycling (which is likely to be conservative based on national recycling of over 60%), direct employment could increase to 36 full-time equivalent and 66 full-time equivalents as an indirect labour force. Although this is not a large number of people, in the context of the smaller populations of Buronga, Gol Gol and Wentworth, this could have a significant impact on unemployment.

The Buronga Landfill is estimated to cost approximately \$90M over the next 120 years generating employment through increased staff and purchase of goods and services to assist its development, based on the Concept Design Cost Estimate (Appendix D). With the exception of specialised services for supply and installation of geosynthetic materials (approximately \$17M) the remainder of goods (quarry rubble, etc.) and services (e.g. earthworks contractors, surveyors) can be supplied from the WSC LGA or Mildura area.

Overall, the Project is expected to have no impact on the demographics of Buronga and a beneficial impact through the generation of additional local employment, particularly for increased recycling.

6.9.3 Mitigation Measures

There are no detrimental impacts estimated to occur so no mitigation measures are proposed.

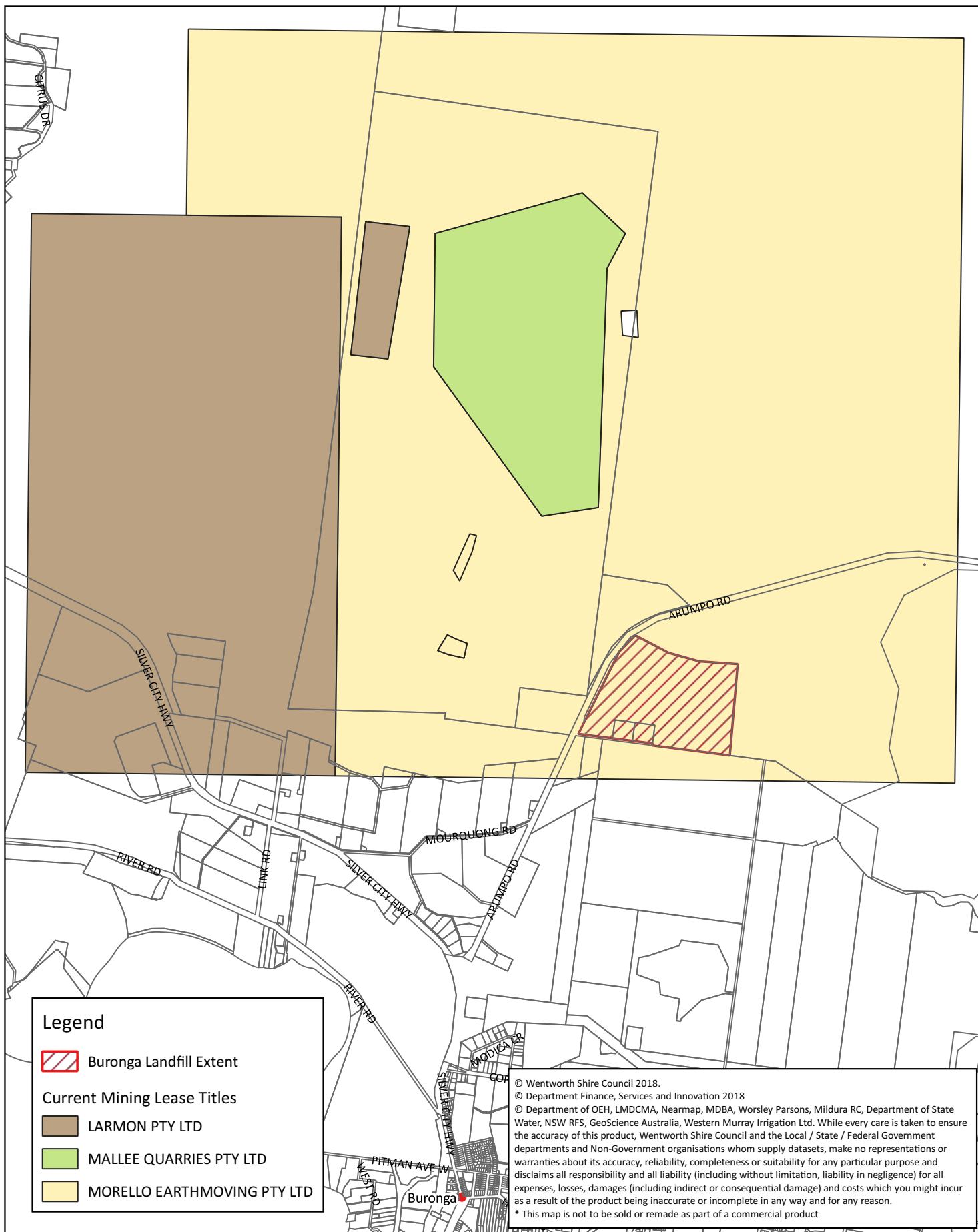
³ Access Economics. 2009. *Employment in Waste Management and Recycling*. Department of Environment Waste, Heritage and the Arts



Table 6.27 2016 Census Data for Local Government Areas (LGA) and State Suburbs near the Project

LGA or Suburb	Total	Median Age	0-19 Year	20-64 Years	65+ Years	Median Weekly household income	Median Monthly Mortgage	Median Weekly Rent	Unemployed
Wentworth Shire LGA	6,794	44	1,675	3,739	1,381	\$1052	\$1200	\$160	106 (6.1%)
Buronga	1,212	38	332	704	188	\$1,149	\$1,235	\$190	39 (6.8%)
Gol Gol	1,523	38	481	816	225	\$1,527	\$1,517	\$205	24 (3.1%)
Wentworth	1,437	56	255	699	495	\$792	\$888	\$170	47 (9.2%)
Mildura Rural City LGA	53,878	40	13,749	30,047	10,077	\$1,064	\$1,200	\$210	1,784 (7.3%)
Mildura	32,738	39	8,203	18,278	6,254	\$1,023	\$1,231	\$225	1,218 (8.5%)

Unemployed % - People who reported being in the labour force, aged 15 years and over



**WENTWORTH
SHIRE COUNCIL**

WORTH THE DRIVE

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Scale: 1:50,000

Datum/Projection: GDA94 / MGA 54



0 1,000 2,000 3,000 m



Original sheet size: A4

Buronga Landfill Mining Leases



6.10 Visual and Design

6.10.1 Exiting Environment

The Project area is located in an industrial and agricultural use area with Morello Gypsum and Arumpo Bentonite as its nearest neighbours on the western side of Arumpo Road. To the south is irrigation agriculture/horticulture and to the north and east is broadscale agriculture. The Silver City Highway, a major thoroughfare between Mildura and Broken Hill is over 2.5 km south and the Buronga residential area commences over 4 km south. Irrigated orchards and scattered remnant vegetation are present between Buronga and the Project and provides a staggered screen to the landfill area.

The district elevations range from topographical lows of 30-40 m AHD and highs of 60 m AHD. Arumpo Road is at approximately 44 m AHD at the south western corner of the site and decreases to around 40 m AHD toward the north-western corner. From the roadway the elevation increases by up to 4 m over a 50-100 m length to form a long low ridge between the landfill and the roadway (Figure 20). This effectively screens the existing operations, which rise to 56 m AHD, from the roadway.



Figure 20 View from Landfill Entrance looking north (top) and North-West Boundary Looking South (bottom).



The new sheds and other structures (fire water tank) will be constructed from materials with non-reflective subdued or dull colours, such as pale eucalypt, to limit reflection and blend into the natural vegetation. The new office area will be non-reflective white, as is typical for ATCO huts, to assist with cooling. These structures are not visible from the road. All structures are less than 4 m above ground level and will not be visible from the road.

6.10.2 Mitigation Measures

The mitigation measures proposed are:

- Structures to be non-reflective and subdued colours, e.g. pale eucalypt colorbond steel;
- Maximum height of structures is 5 m;
- After construction, a drive-by along Arumpo Road and from Buronga will be undertaken to assess visual impact. Where structures or the landfill are easily visible, additional planting within the buffer areas will be undertaken to assist with screening and soften the visual impact;
- Rehabilitation using endemic plant community types.



7 Mitigation Measures

Three main ways exist for an impact to be conditioned (Department of Planning and Environment, 2017):

- performance-based conditions identify performance criteria that must be complied with to achieve an appropriate environmental outcome but do not specify how the outcome is to be achieved;
- prescriptive conditions require action to be taken or specify something that must not be done;
- management-based conditions identify one or more management objectives that must be achieved through the implementation of a management plan.

For a landfill, the POEO Licence and approved LEMP will provide the prescribed criteria for the operation of the landfill. It is expected that the existing licence conditions will be strengthened to reflect the proposed scale of the Project. Table 7.1 below details a summary of the risks identified in this EIS and the proposed conditions and mitigation measures to be implemented in the design, construction and operation of the Project.



Table 7.1 Summary of Environmental Risk and Mitigation Measures

Impact	Potential Impact	Criteria, Measurements and Plans	Mitigation Measure	Residual Impact
Community concern	Community concern is not addressed and the community's sentiment becomes negative	<p><u>Criteria:</u> Community is supportive of Buronga Landfill and not impacted by operations</p> <p><u>Measure:</u> A community complaints register will be maintained to measure the level of community concern</p> <p><u>Plan:</u> Prepare a Community Consultation Plan for the on-going operation of the Landfill in line with Council's existing community engagement policies and procedures.</p>	<p>Ensuring that all those contacted as part of this stage are notified by email when the EIS is submitted and on exhibition. Information about the proposal should be provided through WSC newsletters and communication and via the website.</p> <p>Further meetings or information session should be offered during the EIS exhibition period. This may be just an advertised time when people can attend at WSC Offices, view maps and have any questions answered with Council staff available. This will be particularly important for resolving the issues raised around Arumpo Road and the use of smaller roads.</p> <p>Ensuring that all near neighbours have a contact name and number for a person in WSC who can address any operational concerns on site or incidents such as illegal dumping.</p> <p>Information should be provided to the agricultural community but available to all stakeholders about the operations and controls. This is to reassure those with concerns about the impact on local activities including food production.</p>	By consulting with the community, any issues should be addressed quickly and are unlikely to escalate. Overall, the residual impact to the local and broader WSC communities should be positive.
Air – dust	Air pollution. Particulate matter (dust) and other air impurities generated during construction and operation exceeding prescribed air quality limits and/ or adversely affecting the health or quality of life of nearby sensitive receptors (e.g. neighbouring residents and native and domesticated animals).	<p><u>Criteria:</u> No complaints on dust received</p> <p><u>Measure:</u> A community complaints register must be maintained as a metric of dust impacts.</p> <p>Multiple complaints over a 6-month period will trigger air quality monitoring to assess compliance with air quality assessment criteria described in the <i>National Environment Protection (Ambient Air Quality) Measure 1998</i>.</p> <p><u>Plan:</u> Include requirements in updated LEMP</p>	<p>Watering and windbreaks for the active landfill cell</p> <p>Revegetation of inactive cells</p> <p>Watering of sealed roads</p> <p>Limiting on-site vehicle speeds on unsealed roads to 50 km/hr</p>	Minor increases in dust may be observed; however these are within acceptable criteria or are a rare occurrence
Air - odour	Air pollution. Odour generated during operation exceeding prescribed air quality limits and/ or adversely affecting the health or quality of life of nearby sensitive receptors (e.g. neighbouring residents and native and domesticated animals).	<p><u>Criteria:</u> Boundary concentrations and surface concentrations on capped areas: $\leq 1.0\%$ vol/vol methane and $< 1.5\%$ vol/vol carbon dioxide</p> <p><u>Measure:</u> Report NPI and NGERs</p> <p><u>Plan:</u> Prepare a LFG Management Plan, including a risk assessment and monitoring requirements.</p>	<p>Limit active tip face to $< 600 \text{ m}^2$;</p> <p>Place 150 mm daily cover over the tip face by the close of business</p> <p>Place interim cap on finished areas</p> <p>Construct final cap and revegetate within 2 years of completion, where feasible</p>	No residual impact is expected from the Project as predicted odour is below criteria
Air - greenhouse	Greenhouse gas emissions generated during construction and operation exceeding quantities deemed to be unreasonably excessive in relation to the size of the facility and its operations.	<p><u>Criteria:</u> Boundary concentrations and surface concentrations on capped areas: $\leq 1.0\%$ vol/vol methane and $< 1.5\%$ vol/vol carbon dioxide</p> <p><u>Measure:</u> Report NPI and NGERs</p> <p><u>Plan:</u> Prepare a LFG Management Plan, including a risk assessment and monitoring requirements.</p>	<p>Construct a LFG passive or active management system</p> <p>Repair and/or construct interim or final capping</p> <p>Rehabilitate thin or cracked areas</p> <p>Apply surface mulch or compost where additional capping is not feasible</p>	The expected contribution to greenhouse gas is estimated to be $< 0.32\%$ of Australia's inventory and likely to be less given the semi-arid environment likely to lead to low LFG generation



Impact	Potential Impact	Criteria, Measurements and Plans	Mitigation Measure	Residual Impact
Traffic	Increased traffic loading adversely impacts the efficacy of the local and/or broader road network, and increases the likelihood of traffic related incidents.	<u>Criteria:</u> No crashes or incidents related to waste management transport Roads meet Austroads requirements No use of Mourquong Road by waste transporters <u>Measure:</u> Reported incidents	Construct basic right turn from Arumpo Road into the Buronga Landfill and Basic left turn into Arumpo Road from the Buronga Landfill. Concept designs are provided in the TIA (Appendix F); Consult with TfNSW and residents to determine appropriate treatment for Arumpo Road. Advise transporters, including staff of requirement to use Arumpo Road to access site and not Mourquong Road Ensure sign-posting on Mourquong Road advises of weight limit	Minor increases in traffic are predicted but will not detrimentally impact George Chaffey Bridge or Silver City Highway.
Soil - quality	Contamination of topsoil (undisturbed or stockpiled) due to spills or contact with contaminated fill.	<u>Criteria:</u> No visual contamination of stockpiled capping soil <u>Measure:</u> If contaminated is suspected, undertake chemical testing and assessment criteria to ensure ENM	Ensure vehicles/ machinery are used and maintained according to the manufacturer's instructions for use. Conduct any inspections, maintenance or refuelling on hardstand areas and ensure a spill kit is available on hand. Stockpile capping materials in dedicated areas away from main haul routes	Unlikely to be any residual impact
Soil - erosion	Erosion of topsoil (undisturbed or stockpiled) resulting in net export of soil/ sediment offsite.	<u>Criteria:</u> No movement of sediment into undisturbed buffers Stockpiles with rills < 0.3 m deep and/or wide <u>Measure:</u> Routine visual observation of stockpile areas	Sandy topsoils, which are prone to erosion, are dominant onsite. However, the low annual rainfall (250-300 mm/yr) and flat topography greatly lower the risk of net erosion. Implementation of adequate stormwater and erosion control infrastructure (e.g. drains, stormwater detention basins, sediment fences) – as described in <i>Managing Urban Stormwater: Soils and construction - Volume 2B: Waste Landfills</i>	No residual impact likely
Groundwater	Contamination of groundwater (e.g. due to leaching of the fill).	<u>Criteria:</u> Groundwater remains within 10% of background concentration or below NEPM <u>Measure:</u> Groundwater depth and chemistry <u>Plan:</u> Prepare and Groundwater Monitoring Plan	Site investigation indicates groundwater is located 7-9 mbgl and may be partially confined by a clay layer. The vertical and lateral movement of groundwater is anticipated to be low due to low rainfall, flat topography and low subsoil permeability. Cells constructed in accordance with best management practices as per the Landfill Guideline and maintain a minimum 2 m separation to groundwater	There is no residual impact to groundwater expected from the Project
Hazards	Potential impact to the environment or people from the uncontrolled release of hazardous or offensive material	<u>Criteria:</u> No penalty or warning notices issued by EPA <u>Plan:</u> Incorporate appropriate management into LEMP	Site operated in accordance with POEO Licence and Landfill Guideline	Minor potential exists for impacts to staff from the receipt of unknown hazardous waste or from accidents; however the proposed management and mitigation has reduced the risks to low
Fire	Fire arising on- or off-site causing harm to people, fauna and flora, and/or infrastructure and equipment.	<u>Criteria:</u> No fires to leave the premises <u>Measure:</u>	Maintain 16 m asset protection zone; Construct office buildings with non-combustible cladding Provide an additional 45,000 L static water supply to the north of the site Construct roads able to be traversed by fire-fighting appliances	Fire remains a risk on from on-site and off-site but the risk has been reduced to low



Impact	Potential Impact	Criteria, Measurements and Plans	Mitigation Measure	Residual Impact
		All fires known to or thought to have originated on the premises will be recorded as an incident and investigated in line with the <i>Work Health and Safety Act 2011</i> . <u>Plan:</u> Prepare a Bushfire Emergency Management and Evacuation Plan	Provide an additional emergency exit in the north-west corner	
Flora and Fauna	Unauthorised damage or removal of State or Nationally protected flora or fauna (including habitat) during landfill construction and operation activities (e.g. clearing, excavation). Proliferation of listed weeds or pest animals resulting in environmental harm.	<u>Criteria:</u> No removal of unauthorised vegetation No listed weeds growing in buffer areas <u>Plan:</u> Prepare a Weed Control Plan Prepare Pest Animal Control Plan Prepare a Rehabilitation Management Plan which includes site preparation measures (light contour ripping, surface stabilisation, mulching), weed control, suitable species selected from PCT15 and PCT58 and of local provenance, placement of logs/hollow trees, monitoring and on-going weed and pest control	Engage a suitably qualified ecologist prior to clearing to identify habitat trees with logs/hollows for relocation and to relocate native fauna which may be displaced Inspect trenches left open overnight for entrapped wildlife and contact suitably qualified fauna relocation services, if trapped animals are found Inspect pipes and conduit for fauna prior to placement. Seal pipe ends overnight to prevent fauna entrapment Establish controls to prevent works from occurring outside the subject land Identify suitably qualified fauna re-location services Prevent illegal collection of firewood through fencing and signage Include endemic vegetation in landfill rehabilitation. Maintain 200 m buffer to provide wildlife corridors and refuges and reduce visual amenity impact Plan construction activities for January to April to facilitate revegetation in May (optimal time). Avoid clearing in Spring when breeding most likely to occur. Clearly identify extent of disturbance using on-ground markers Locate waste management infrastructure in already disturbed areas to the extent practical Relocate cleared logs and hollows in buffer zone or rehabilitated areas Construct a temporary fence between construction area and buffer zone for cell adjacent to buffer. New tracks to be established outside the drip line of trees Progressive develop and rehabilitate substages and cells Undertake rehabilitation as soon as practical. Maintain temporary fence between cell and buffer zone for cells adjacent to the buffer zone Maintain perimeter fencing to prevent illegal dumping of rubbish outside of operational hours. Maintain fire breaks to limit spread of wildfire	Impact to ecosystems is expected and will require payment of offset
Aboriginal Heritage	Damage/ disturbance of Aboriginal heritage items during construction and operation activities (e.g. clearing and excavation).	<u>Criteria:</u> No disturbance to known artefacts Minimise potential for disturbance or harm of unknown items	Construct a permanent protective barrier fence around the known artefacts	There is a low risk of impact to aboriginal heritage from the Project given the low



Impact	Potential Impact	Criteria, Measurements and Plans	Mitigation Measure	Residual Impact
		<u>Measure:</u> Staff trained in appropriate cultural heritage management procedures <u>Plan:</u> Prepare a Heritage Management Plan, including aa procedure for accidental finds.	Train staff in all requirements, including no access to fenced area except for land management practices (e.g. weed control) Continue to liaise with RAPs as needed	potential of finds and the low quality of the finds to date
Noise	Noise generated by landfill activities exceeding prescribed limits or adversely affecting the health or quality of life of nearby sensitive receptors.	<u>Criteria:</u> No complaints received. <u>Measure:</u> A community complaints register must be maintained as a metric of impacts. Multiple complaints over a 6-month period will trigger noise or vibration monitoring to assess compliance with <i>Noise Policy for Industry</i> <u>Plan:</u> Include requirements in updated LEMP	Limit construction and operation activities to normal operating hours.	Noise levels are well-below action trigger thresholds so no impact is predicted
Visual Amenity	Reduction of visual amenity due to a line of site between sensitive receptors (e.g. neighbouring residents and tourists) and the landfill.	<u>Criteria:</u> No complaints received. <u>Measure:</u> A community complaints register must be maintained as a metric of impacts. After construction, a drive-by along Arumpo Road and from Buronga will be undertaken to assess visual impact. <u>Plan:</u> Include requirements in updated LEMP	Maintain vegetated 200 m buffer along Arumpo Road Structures to be non-reflective and subdued colours, e.g. pale eucalypt colorbond steel; Maximum height of structures is 5 m; Where structures or the landfill are easily visible, additional planting within the buffer areas will be undertaken to assist with screening and soften the visual impact; Staged construction to commence in the south-west to provide screening to future landfill operations. Rehabilitate existing and future operations by planting endemic vegetation as soon as practicable.	The landfill is at distance from residents and screened by vegetation along Arumpo Road. Short term reduction in visual amenity will occur whilst a cell is being filled and prior to final capping and rehabilitation occurring.



8 Evaluation and Conclusion

The Buronga Landfill is located in a semi-arid environment with no sensitive receptors within 1 km of the site; its neighbours are industrial activities for bentonite and gypsum supply. The site is a former quarry and has been used as a soil borrow pit and hence is a degraded site. The geology of the site is stable and the environment naturally leads to lower leachate and LFG generation than more temperate environments. The current licence as reflected in the LEMP, requires best management practices at the landfill and its ownership by a local Council authority ensure the interests of the community are well represented. Alternative sites have not been investigated given the suitability of the existing site.

If the expansion is not approved, then the Buronga Landfill will be nearing closure. An alternative site in Wentworth Shire is unlikely to be found, given that this site is an existing use as a landfill. The nearest landfill in Mildura (Vic) is nearing closure and other nearby landfills are unlicensed or closed. The closest licenced landfills in NSW are at Broken Hill and Deniliquin, both over 300 km away, showing significant distances would need to be travelled to dispose of non-recyclable waste.

The Project has been modified during its development to:

- Reflect concerns from residents on the traffic along Arumpo Road have commenced investigations into improvements for Arumpo Road and limitations for Mourquong Road;
- Reduce potential impact to native flora and fauna, particularly to the vegetation to the east by:
 - The FERF, and RRA have been redesigned and moved to existing disturbed areas.
 - The landfill footprint is focussed on the already disturbed areas from quarrying and commences construction in these areas. This increases the potential that future waste management improvements may negate the need for Stage 2 to be developed;
 - stormwater ponds and leachate ponds have been moved and designed as smaller ponds to concentrate construction on areas which have been disturbed or have lower quality vegetation;
- Include the use of phytocapping techniques to allow for revegetation of the finished cap using endemic vegetation. This has the benefit of providing offset to vegetation clearing by restoring ecology and habitat and reducing the visual amenity impact;
- Avoid impact to aboriginal heritage items by locating stormwater ponds away from artefacts;

The remaining potential impacts to air quality, soil and groundwater, fire, noise and vibration were all found to have a low potential for detrimental impact to occur. Beneficial impact was most likely to employment as the upgrade and expansion of the FERF and RRA is likely to generate additional jobs as well as the on-going construction which will utilise locally produced materials, such as bentonite, and employ local consultancy and earthmoving/construction contractors.

The expansion of Buronga Landfill is the optimal solution and on the balance of impacts and benefits favour the public interest as:

- Aggregation of waste improves recycling opportunities;
- Consolidation of landfill facilities improves management and utilisation of best management practices;
- The site is an existing landfill meets the siting requirements for a landfill in this region;
- No other facilities are available within economic distances from Wentworth and Buronga;
- Improved economies of scale should reduce cost to current rate payers.

For these reasons, we endorse the expansion of Buronga Landfill as proposed herein.



9 References

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Appendix A. EPA Licence 20209



Environment Protection Licence

Licence - 20209

Licence Details	
Number:	20209
Anniversary Date:	05-April

Licensee
WENTWORTH SHIRE COUNCIL
PO BOX 81
WENTWORTH NSW 2648

Premises
BURONGA LANDFILL
ARUMPO ROAD
BURONGA NSW 2739

Scheduled Activity
Waste disposal (application to land)

Fee Based Activity	Scale
Waste disposal by application to land	Any capacity

Region
South West
Suites 7-8, Level 1 Griffith City Plaza, 130-140 Banna Avenue
GRIFFITH NSW 2680
Phone: (02) 6969 0700
Fax: (02) 6969 0710
PO Box 397
GRIFFITH NSW 2680

Environment Protection Licence

Licence - 20209

INFORMATION ABOUT THIS LICENCE	4
Dictionary	4
Responsibilities of licensee	4
Variation of licence conditions	4
Duration of licence	4
Licence review	4
Fees and annual return to be sent to the EPA	4
Transfer of licence	5
Public register and access to monitoring data	5
1 ADMINISTRATIVE CONDITIONS	6
A1 What the licence authorises and regulates	6
A2 Premises or plant to which this licence applies	6
A3 Other activities	6
A4 Information supplied to the EPA	7
2 DISCHARGES TO AIR AND WATER AND APPLICATIONS TO LAND	7
P1 Location of monitoring/discharge points and areas	7
3 LIMIT CONDITIONS	8
L1 Pollution of waters	8
L2 Waste	9
L3 Noise limits	10
L4 Hours of operation	10
L5 Potentially offensive odour	10
4 OPERATING CONDITIONS	10
O1 Activities must be carried out in a competent manner	10
O2 Maintenance of plant and equipment	11
O3 Dust	11
O4 Emergency response	11
O5 Processes and management	11
O6 Waste management	12
O7 Other operating conditions	13
5 MONITORING AND RECORDING CONDITIONS	13
M1 Monitoring records	13
M2 Requirement to monitor concentration of pollutants discharged	14
M3 Testing methods - concentration limits	15

Environment Protection Licence

Licence - 20209



M4	Recording of pollution complaints	15
M5	Telephone complaints line	15
M6	Other monitoring and recording conditions	16
6	REPORTING CONDITIONS	16
R1	Annual return documents	16
R2	Notification of environmental harm	17
R3	Written report	17
R4	Other reporting conditions	18
7	GENERAL CONDITIONS	18
G1	Copy of licence kept at the premises or plant	18
DICTIONARY		20
	General Dictionary	20

Environment Protection Licence

Licence - 20209



Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 20209



The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

WENTWORTH SHIRE COUNCIL
PO BOX 81
WENTWORTH NSW 2648

subject to the conditions which follow.

Environment Protection Licence

Licence - 20209

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled development work listed below at the premises listed in A2:

Construction of landfill cells and leachate and stormwater collection systems.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Waste disposal (application to land)	Waste disposal by application to land	Any capacity

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
BURONGA LANDFILL
ARUMPO ROAD
BURONGA
NSW 2739
LOT 197 DP 756946, LOT 212 DP 756946 & LOT 1 DP 1037845

A3 Other activities

A3.1 This licence applies to all other activities carried on at the premises, including:

Ancillary Activity
Resource recovery - recovered aggregate processing and storage
Waste storage

A3.2 Recovered aggregate processing and storage as per Development Application and attachments

Environment Protection Licence

Licence - 20209



DA13/120 approved by Wentworth Shire Council dated 20 February 2014.

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

A4.2 For the purposes of condition A4.1 the licence application includes:

- 1) Wentworth Shire Council - Buronga Landfill - Landfill Environmental Management Plan (LEMP) - dated November 2012 and prepared by GHD;
- 2) Wentworth Shire Council - Buronga Landfill - Engineering Design Report - dated November 2012 and prepared by GHD;
- 3) Wentworth Shire Council - Buronga Landfill - Geotechnical Investigation Report - dated November 2012 and prepared by GHD;
- 4) Transpacific Industries Ltd - Buronga Landfill - Environmental Management Plan - Composting Trial prepared by GHD and dated December 2012;
- 5) GHD response to EPA Comments - Dated 04/12/2012 Ref: 21/21400/181047
- 6) Wentworth Shire Council - Memorandum - Buronga Landfill Lanfill Use: Issue Date 26/02/2010 prepared by the Manager Governace and Corporate Development;

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

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.

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.

Environment Protection Licence

Licence - 20209

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Groundwater quality		Borehole labelled 'BH02' as shown in the drawing titled "Site Layout" at Appendix "A" of the "Wentworth Shire Council - Buronga Landfill - Environmental Management Plan" dated November 2012 and kept on EPA file FIL07/5811-18
3	Groundwater quality		Borehole labelled 'BH03' as shown in the drawing titled "Site Layout" at Appendix "A" of the "Wentworth Shire Council - Buronga Landfill - Environmental Management Plan" dated November 2012 and kept on EPA file FIL07/5811-18
4	Groundwater quality		Borehole labelled 'BH04' as shown in the drawing titled "Site Layout" at Appendix "A" of the "Wentworth Shire Council - Buronga Landfill - Environmental Management Plan" dated November 2012 and kept on EPA file FIL07/5811-18
5	Water quality	Water quality	Discharge point from the sediment basin as shown in the drawing titled "Site Layout" at Appendix "A" of the "Wentworth Shire Council - Buronga Landfill - Environmental Management Plan" dated November 2012 and kept on EPA file FIL07/5811-18
6	Proposed Leachate Storage Pond		Leachate pond as shown in the drawing titled "Site Layout" at Appendix "A" of the "Wentworth Shire Council - Buronga Landfill - Environmental Management Plan" dated November 2012 and kept on EPA file FIL07/5811-18

3 Limit Conditions

L1 Pollution of waters

- 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.

Environment Protection Licence

Licence - 20209

L2 Waste

- L2.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Building and demolition waste	As defined in the NSW Resource Recovery Exemption titled "Recovered Aggregate Order 2014" and includes material comprising of concrete, brick, ceramics, natural rock and asphalt that can be processed into an engineered material. This does not include refractory bricks or associated refractory materials or asphalt that contains coal tar.	Resource recovery	The total quantity of Recovered Aggregate that can be received in each annual Reporting period is 10,000 tonnes. The total amount of Recovered Aggregate that can be stored at the premises at any one time is 20,000 tonnes.
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA
NA	Waste	Any waste received on site that is below the licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA
J100	Waste mineral oils unfit for their original intended use	Mineral oils unfit for their original intended use; Oil filters; Transformer fluids (excluding PCB's); Waste hydrocarbons	Waste storage	4,000 litres
T140	Tyres		Waste disposal (application to land)	500 tonnes

Environment Protection Licence

Licence - 20209

N220	Asbestos		Waste disposal (application to land)	500 tonnes
NA	General solid waste (non-putrescible and putrescible)	Municipal Solid Waste, Commercial & Industrial	Waste disposal (application to land)	30,000 tonnes

- L2.2 The licensee must not dispose of any tyres on the premises which;
- a) have a diameter of less than 1.2 metres; and
 - b) are delivered at the premises in a load containing more than 5 whole tyres; and
 - c) became waste in the Sydney Metropolitan Area.
- L2.3 Tyres stockpiled on the premises must:
- a) not exceed fifty (50) tonnes of tyres at any one time; and
 - b) be located in a clearly defined area away from the tipping face; and
 - c) be managed to control vermin; and
 - d) be managed to prevent any tyres from catching fire.

L3 Noise limits

- L3.1 All operations and activities occurring on the premises must be conducted in a manner that will not cause or permit offensive noise beyond the boundary of the premises.

L4 Hours of operation

- L4.1 All work at the premises must be conducted between the hours of:

6:00am to 7:00pm Monday to Friday; and

7:00am to 6.00pm Saturdays, Sundays and Public Holidays

L5 Potentially offensive odour

- L5.1 No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997 provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

Environment Protection Licence

Licence - 20209



O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O4 Emergency response

O4.1 Within 3 months of the date of the issue of this licence, the licensee must develop, or update, an emergency response plan which documents the procedures to deal with all types of incidents (e.g. spill, explosions or fire) that may occur at the premises or outside of the premises (e.g. during transfer) which are likely to cause harm to the environment.

O4.2 The licensee must extinguish fires at the premises as soon as possible.

O5 Processes and management

O5.1 The licensee must take all practicable steps to control entry to the premises.

O5.2 The licensee must install and maintain lockable security gates at all access and departure locations.

O5.3 The licensee must ensure that all gates are locked whenever the landfill is unattended.

O5.4 The licensee must ensure that all vehicles containing waste enter and exit the site through the weighbridge.

O5.5 The licensee must implement the litter management program specified in clause 9.3 of the Buronga Landfill Environmental Management Plan dated November 2012.

O5.6 The licensee must ensure that adequately trained staff are available at the premises in order to administer the requirements of this licence.

Environment Protection Licence

Licence - 20209



- O5.7 The licensee must install and maintain a stockproof perimeter fence around the premises.
- O5.8 The licensee must ensure that all weather roads are maintained on site to allow waste to be accepted and disposed of at the landfill in all reasonable weather conditions.

Leachate management

- O5.9 A leachate barrier and collection system must be installed and managed at the landfill as specified in Environmental Guidelines: Solid Waste Landfills or alternative of equal or better environmental performance.
- O5.10 The sediment basin and leachate holding pond must be maintained to ensure that their design capacity is available for the storage of rainfall runoff from a 1 in 20 year, 24 hour Average Recurring Interval rainfall event.
- O5.11 Excess leachate is permitted to be disposed of at a premises which may lawfully receive the leachate for treatment.
- O5.12 Landfill leachate must not be irrigated except as expressly permitted by a condition of this licence.

O6 Waste management

- O6.1 The licensee must have in place and implement procedures to identify and prevent the disposal of any waste not permitted by this licence to be disposed of at the premises.
- O6.2 Surface drainage must be diverted away from any area where waste is being or has been landfilled.
- O6.3 The licensee must manage the disposal of waste at the premises in accordance with the progressive filling plan as described in the Buronga Landfill Environmental Management Plan dated November 2012.
- O6.4 There must be no incineration or burning of any waste at the premises.
- O6.5 An average compaction rate of not less than 650 kg per cubic metre must be achieved for all waste disposed of at the premises.
- O6.6 The licensee must ensure that the achieved compaction rate of landfilled waste (excluding cover material) is stated in the annual report for the waste premises submitted to the EPA.
- O6.7 Cover material must be clean soil, virgin excavated natural material or other suitable waste materials won on the premises or imported to the premises.
 - a) Daily cover
Cover material must be applied to a minimum depth of 150mm over all exposed landfilled waste prior to ceasing operations at the end of each day.
 - b) Intermediate cover
Cover material must be applied to a depth of to a depth of 300mm over surfaces of the landfilled waste at the premises which are to be exposed for more than 90 days.

Environment Protection Licence

Licence - 20209



c) Cover material stockpile

At least two weeks cover material must be available at the premises under all weather conditions. This material may be won on site, or alternatively a cover stockpile must be maintained adjacent to the tip face.

O6.8 Final capping must comprise of: 500mm barrier layer made up of compacted clayey sand, 350mm of soil material, 150mm of mulch/shredded green waste and a minimum 100mm revegetation layer as specified in the LEMP.

O6.9 The licensee must conduct a filling plan survey consistent with Section 6 of the "Wentworth Shire Council, Buronga Landfill - Landfill Filling Plan" prepared by MRA Consulting Group and dated January 2015.

A report detailing the results of the survey must be submitted to the EPA within 1 month of completion of the survey.

O7 Other operating conditions

O7.1 The licensee must have in place and operate a calibrated weighbridge to record the volume of all waste brought into the premises.

O7.2 The weighbridge must have a valid Calibration Certificate at all times.

O7.3 The EPA must be notified immediately if the weighbridge becomes inoperative and it must be repaired as soon as practicable.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:

- a) in a legible form, or in a form that can readily be reduced to a legible form;
- b) kept for at least 4 years after the monitoring or event to which they relate took place; and
- c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:

- a) the date(s) on which the sample was taken;
- b) the time(s) at which the sample was collected;
- c) the point at which the sample was taken; and
- d) the name of the person who collected the sample.

Environment Protection Licence

Licence - 20209

M2 Requirement to monitor concentration of pollutants discharged

M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Water and/ or Land Monitoring Requirements

POINT 2,3,4

Pollutant	Units of measure	Frequency	Sampling Method
Alkalinity (as calcium carbonate)	milligrams per litre	Yearly	Representative sample
Standing Water Level	metres	Every 6 months	In situ

POINT 2,3,4,6

Pollutant	Units of measure	Frequency	Sampling Method
Arsenic	milligrams per litre	Yearly	Representative sample
Benzene	milligrams per litre	Yearly	Representative sample
Calcium	milligrams per litre	Yearly	Representative sample
Chloride	milligrams per litre	Yearly	Representative sample
Conductivity	microsiemens per centimetre	Every 6 months	In situ
Fluoride	milligrams per litre	Yearly	Representative sample
Lead	milligrams per litre	Yearly	Representative sample
Magnesium	milligrams per gram	Yearly	Representative sample
Manganese	milligrams per litre	Yearly	Representative sample
Nitrate + nitrite (oxidised nitrogen)	milligrams per litre	Yearly	Representative sample
Nitrogen (ammonia)	milligrams per litre	Yearly	Representative sample
pH	pH	Every 6 months	In situ
Potassium	milligrams per litre	Yearly	Representative sample
Sodium	milligrams per litre	Yearly	Representative sample
Sulfate	milligrams per litre	Yearly	Representative sample
Total organic carbon	milligrams per litre	Yearly	Representative sample
Total Phenolics	milligrams per litre	Yearly	Representative sample

POINT 5

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	millisiemens per centimetre	Yearly	Representative sample

Environment Protection Licence

Licence - 20209

Nitrate + nitrite (oxidised nitrogen)	milligrams per litre	Yearly	Representative sample
Nitrogen (ammonia)	milligrams per litre	Yearly	Representative sample
pH	pH	Yearly	In situ
Total organic carbon	milligrams per litre	Yearly	Representative sample
Total suspended solids	milligrams per litre	Yearly	Representative sample

M3 Testing methods - concentration limits

- 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.

M4 Recording of pollution complaints

- M4.1 The licensee 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.
- M4.2 The record must include details of the following:
- a) the date and time of the complaint;
 - b) the method by which the complaint was made;
 - c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the licensee, the reasons why no action was taken.
- M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

- M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.
- M5.3 The preceding two conditions do not apply until 3 months the date of the issue of this licence.

Environment Protection Licence

Licence - 20209



M6 Other monitoring and recording conditions

M6.1 The licensee must monitor the remaining disposal capacity (in cubic metres) of the landfill.

M6.2 The licensee must develop and implement a Waste Control Program in accordance with the LEMP. The licensee must update and submit the updated Waste Control Program to the EPA for approval if any significant changes are made by the licensee.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 Monitoring report

The licensee must supply with the Annual Return a report, which provides:

- a) an analysis and interpretation of monitoring results; and
- b) actions to correct identified adverse trends.

R1.3 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.4 Where this licence is transferred from the licensee to a new licensee:

- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
- b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

Environment Protection Licence

Licence - 20209



- R1.5 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
- a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
 - b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.
- R1.6 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').
- R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.
- R1.8 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
- a) the licence holder; or
 - b) by a person approved in writing by the EPA to sign on behalf of the licence holder.
- R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- a) where this licence applies to premises, an event has occurred at the premises; or
 - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

Environment Protection Licence

Licence - 20209



- R3.3 The request may require a report which includes any or all of the following information:
- a) the cause, time and duration of the event;
 - b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
 - f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
 - g) any other relevant matters.
- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

- R4.1 The licensee must record the following data in relation to fires occurring at the premises:
- a) Time and date when the fire started.
 - b) Whether the fire was authorised by the licensee, and, if not, the circumstances which ignited the fire.
 - c) The time and date that the fire burnt out or was extinguished.
 - d) The location of fire (eg. clean timber stockpile, putrescible garbage cell, etc).
 - e) Prevailing weather conditions at the time of the fire.
 - f) Observations made in regard to smoke direction and dispersion.
 - g) The amount of waste that was combusted by the fire.
 - h) Action taken to extinguish the fire;
 - i) Action taken to prevent a reoccurrence.

The data must be recorded on each day that the fire is burning.

- R4.2 The licensee or its employees or agents must notify the occurrence of all fires on the premises in accordance with conditions R2.1 and R2.2 as soon as practical after becoming aware of the fire.

7 General Conditions

G1 Copy of licence kept at the premises or plant

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the

Environment Protection Licence

Licence - 20209



premises.

Environment Protection Licence

Licence - 20209

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 20209

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

Environment Protection Licence

Licence - 20209

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Darren Wallett

Environment Protection Authority

(By Delegation)

Date of this edition: 05-April-2013

End Notes

2	Licence varied by notice	1519910 issued on 12-May-2014
3	Licence varied by notice	1526662 issued on 12-Dec-2014
4	Licence varied by notice	1528653 issued on 06-Mar-2015
5	Licence varied by notice	1532101 issued on 17-Jul-2015
6	Licence varied by notice	1535200 issued on 09-Nov-2015
7	Licence varied by notice	1536741 issued on 21-Dec-2015
8	Licence varied by notice	1536820 issued on 05-Jan-2016
9	Licence varied by notice	1539729 issued on 12-Apr-2016
10	Licence varied by notice	1546513 issued on 10-Nov-2016
11	Licence varied by notice	1551718 issued on 23-May-2017
12	Licence varied by notice	1558634 issued on 24-Nov-2017



Appendix B. Secretary's Environmental Assessment Requirements (SEARS) for SSD- 10096818

Mr Geoffrey Webster
Director
Waste and Management Services Pty Ltd
PO Box 394
WALKERVILLE SA 5081

11/11/2020

Dear Mr Webster

Buronga Landfill Expansion (SSD-10096818)
Planning Secretary's Environmental Assessment Requirements

Please find attached a copy of the Planning Secretary's environmental assessment requirements (SEARs) for the preparation of an environmental impact statement (EIS) for the Development Application (DA). These requirements have been prepared in consultation with relevant public authorities (see **Attachment 2**) and are based on the information you have provided to date. Please note that the Planning Secretary may modify these requirements at any time.

If you do not submit a Development Application (DA) and EIS within 2 years, you must consult further with the Planning Secretary in relation to the preparation of the EIS.

Prior to exhibiting the EIS, the Department will review the document in consultation with relevant authorities to determine if it addresses the requirements in Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation). You will be required to submit an amended EIS if it does not adequately address the requirements.

The Department wishes to emphasise the importance of effective and genuine community consultation where a comprehensive open and transparent community consultation engagement process must be undertaken during the preparation of the EIS. This process must ensure that the community is provided with a good understanding of what is proposed, description of any potential impacts and they are actively engaged in issues of concern to them. **Please note, the Department will require clear evidence that this consultation has been undertaken and justification for the proposed consultation method(s) used.**

Please contact the Department at least two weeks before you propose to submit your DA and EIS. This will enable the Department to confirm the:

- applicable fee (see Division 1AA, Part 15 of the Regulation); and
- consultation and public exhibition arrangements, including copies and format requirements of the EIS.

If your development is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any approvals required under NSW legislation and it is your responsibility to contact the Commonwealth Department of Agriculture, Water and the Environment to determine if an approval under the EPBC Act is required.

If you have any questions, please contact David Koppers on 9373 2869 or at david.koppers@planning.nsw.gov.au.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'C. Ritchie', with a stylized flourish at the end.

Chris Ritchie
Director
Industry Assessments
as delegate for the Planning Secretary

Attached: Agency Comments

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD-10096818
Project Name	Buronga Landfill Expansion
Development	Expansion of the Buronga Landfill to develop a regional waste facility which can receive up to 100,000 tonnes of general waste per annum
Location	258 Arumpo Road (Lot 1 DP 1037845 and Lots 197 and 212 DP 756946), Wentworth in the Wentworth local government area.
Applicant	Waste and Management Services Pty Ltd
Date of Issue	11/11/2020
General Requirements	<p>The environmental impact statement (EIS) must be prepared in accordance with, and meet the minimum requirements of clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation).</p> <p>Notwithstanding the key issues specified below, the EIS must include an environmental risk assessment to identify the potential environmental impacts associated with the development.</p> <p>Where relevant, the assessment of key issues below, and any other significant issues identified in the risk assessment, must include:</p> <ul style="list-style-type: none"> - detailed description of the site including any existing or approved operations, site history and planning approvals - a detailed description of the development, including: <ul style="list-style-type: none"> · the need and justification for the development and alternatives considered; · details on how the proposed expansion will integrate with existing onsite operations during the construction and operational phases of the proposed expansion; · likely staging of the development; · likely interactions between the development and any existing, approved and proposed developments in the vicinity of the site; · plans of any proposed works with details of the proposed setbacks, site coverage, car parking, landscaped areas; · details of infrastructure upgrades or items required to facilitate the development, and a description of any arrangements to ensure the upgrades will be implemented in a timely manner and maintained; and · describe the management of the closure of the development and the ongoing management of the development throughout rehabilitation. - consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; - a list of any approvals that must be obtained for example under the <i>Local Government Act 1993</i>, the <i>Roads Act 1993</i>, or any other Act or law before the development may lawfully be carried out; - consideration of key issues identified by Government agencies and Wentworth Shire Council (see Attachment 2); and - a risk assessment of any potential environmental impacts of the development, identifying the issues for further assessment.

	<p>Where relevant, the assessment of key issues below, and any other significant issues identified in the risk assessment, must include:</p> <ul style="list-style-type: none"> - adequate baseline data; - consideration of the potential cumulative impacts due to other developments in the vicinity (completed, underway or proposed); and - measures to avoid, minimise and if necessary, offset predicted impacts, including detailed contingency plans for managing any significant risks to the environment. <p>The EIS must also be accompanied by a report from a qualified quantity surveyor providing:</p> <ul style="list-style-type: none"> - a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived. The report shall be prepared on company letterhead and indicate applicable GST component of the CIV; - an estimate of jobs that will be created during the construction and operational phases of the proposed development; and - certification that the information provided is accurate at the date of preparation.
Key issues	<p>The EIS must include an assessment of potential impacts of the development (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and/or offset these impacts. The EIS must address the following specific matters:</p> <ol style="list-style-type: none"> 1. Statutory and Strategic Context <ul style="list-style-type: none"> - demonstrate that the development is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. The following documents must be addressed: <ul style="list-style-type: none"> o <i>State Environmental Planning Policy No. 33 – Hazardous and Offensive Development</i>; o <i>State Environmental Planning Policy No. 55 – Remediation of Land</i>; o <i>State Environmental Planning Policy (Infrastructure) 2007</i>; o <i>State Environmental Planning Policy (State and Regional Development) 2011</i>; o <i>State Environmental Planning Policy (Koala Habitat Protection) 2019</i>; o <i>Wentworth Local Environmental Plan 2011</i>. 2. Suitability of the Site – including: <ul style="list-style-type: none"> - a detailed justification the site can accommodate the proposed landfill, having regard to the scope of the operations of the existing facility and its environmental impacts and relevant mitigation measures. 3. Community and Stakeholder Engagement – including: <ul style="list-style-type: none"> - a community and stakeholder participation strategy identifying key community members and other stakeholders and details and justification for the proposed consultation approach(s); - clear evidence of how each stakeholder identified in the community and stakeholder participation strategy has been consulted; - issues raised by the community and surrounding landowners and occupiers; - clear details of how issues raised during consultation have been addressed and whether they have resulted in changes to the development; and - details of the proposed approach to future community and stakeholder engagement based on the results of consultation.

4. **Landfill Design** – including:
 - details of the consistency of the proposal with the *Environmental Guidelines: Solid Waste Landfills*, Second edition (EPA, 2016);
 - Description of the proposed cell design and integrity;
 - details around proposed leachate and gas management and monitoring;
 - consideration of proposed water quality control and monitoring;
 - description and justification of proposed daily waste covering; and
 - justification for the proposed final capping, closure measures and rehabilitation of the site, including its final landuse.
5. **Waste Management** – including:
 - identification, classification and quantification of the likely waste streams that would be handled/stored/disposed of at the facility in accordance with the EPA's Waste Classification Guidelines (2014);
 - details of how waste would be treated, stored (including the maximum daily storage capacity of the site), used, disposed and handled on site, and transported to and from the site and the potential impacts associated with these issues. This shall include details of how the receipt of non-conforming waste would be dealt with; and
 - a description of all reasonable and feasible measures that have been or would be implemented to maximise resource recovery from the waste stream and reduce the disposal of waste to landfill in line with the aim, objectives and guidance in the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* and other relevant government policy.
6. **Air Quality and Odour** – including:
 - a quantitative assessment of the potential air quality, dust and odour impacts of the development in accordance with relevant EPA guidelines;
 - the details of any buildings and air handling systems and justification for any material handling, processing or stockpiling external to buildings;
 - a greenhouse gas assessment of the operation of the development, including, but not limited to emissions generated from the waste management cells; and
 - details of proposed mitigation, management and monitoring measures.
7. **Rehabilitation**
 - a detailed description of how the site would be progressively rehabilitated, revegetated and integrated into the surrounding landscape, including measures to ensure that the final landform is free draining;
 - a justification for the proposed final landform and use, taking into consideration any relevant strategic land use planning or resource management plans or policies; and
 - a detailed description of the measures that would be put into place to ensure sufficient resources are available to implement the proposed rehabilitation measures, and the ongoing management of the site following the cessation of landfilling activities.
8. **Traffic and Access** – including:
 - a quantitative Traffic Impact Assessment prepared in accordance with the relevant Council, Austroads and RMS guidelines;
 - details of all daily and peak traffic and transport movements likely to be generated by the development (vehicle type, public transport) during construction

and indicative operation, including cumulative impacts;

- details and a justification of access to, from and within the site (vehicular and pedestrian);
- impacts on the safety and capacity of the surrounding road network and access points, using SIDRA modelling or similar to assess impacts from current traffic counts and cumulative traffic from existing and proposed developments;
- demonstrate that sufficient loading/unloading, car parking and pedestrian and cyclist facilities have been provided for the development; and
- details of road upgrades, new roads or access points required for the development, if necessary.

9. Soil and Water – including:

- characterisation and consideration of potential, salinity and soil contamination;
- a description of water demands of the development and a breakdown of water supplies;
- identify any water licensing requirements under the *Water Act 1912* or *Water Management Act 2000*;
- details of proposed erosion and sediment controls during construction;
- detailed plans and a description of the surface and stormwater management system, including on-site detention, designed in accordance with Water Sensitive Urban Design principles;
- details of the proposed leachate management system including the capacity of the system to treat and dispose of leachate;
- an assessment of potential surface water, flooding and groundwater impacts, including impacts on nearby waterbodies, surrounding properties, any licensed water users, landholder rights or groundwater dependent ecosystems;
- a detailed and contemporary hydrogeological impact assessment that documents local and regional groundwater features for all sites and includes a comprehensive description of the potential impacts and mitigation measures that will be implemented at the site to protect groundwater; and
- a description and appraisal of impact mitigation, management, maintenance and monitoring measures.

10. Hazards and Risks – including:

- a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33* (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the development is “potentially hazardous” a preliminary hazard analysis (PHA) must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi-Level Risk Assessment* (DoP, 2011); and
- an assessment on the potential risk of onsite fire generation from the landfill facility and a description of management and mitigation measures to alleviate any identified risks.

11. Biodiversity – including:

- details of the number of trees to be removed and the number of trees to be planted on the site; and
- including an assessment of the proposal's biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016*, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted.

12. Heritage – including:

- consideration of heritage items within the vicinity of the site and any potential heritage impacts associated with the development; and

	<ul style="list-style-type: none"> - identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). <p>13. Noise and Vibration – including:</p> <ul style="list-style-type: none"> - a quantitative noise and vibration impact assessment in accordance with the relevant EPA guidelines; - consideration of annoying characteristics of noise and prevailing meteorological conditions in the study area; - cumulative impact assessment, inclusive of impacts from other existing and proposed developments; and - details and analysis of the effectiveness of proposed mitigation measures to adequately manage identified impacts, including a clear identification of residual noise and vibration following application of mitigation measures, and monitoring measures. <p>14. Social and Economic – including:</p> <ul style="list-style-type: none"> - identifying and analysing the potential social impacts of the development from the point of view of the affected community and other relevant stakeholders; - assessment of the significance of positive, negative and cumulative social impacts; - mitigation measures and monitoring of likely negative social impacts; and - an analysis of potential economic impacts of the development, including a discussion of any potential economic benefits. <p>15. Visual and Design</p> <p>Measures to minimise the visual impacts of the development, including:</p> <ul style="list-style-type: none"> - a detailed assessment of any buildings associated with the proposal including height, colour, scale, building materials and finishes, signage and lighting, particularly from nearby residential receivers; and - detailed plans showing suitable landscaping.
Plans and Documents	<p>The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Regulation. Provide these as part of the EIS rather than as separate documents.</p>
Consultation	<p>During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.</p> <p>In particular you must consult with:</p> <ul style="list-style-type: none"> - Wentworth Regional Council; - Transport for New South Wales; - Environment Protection Authority; - Environment, Energy and Science of DPIE; - Heritage NSW; - Water Group of DPIE; - Fire and Rescue; - NSW Rural Fire Service; - WaterNSW; - Regional NSW; - surrounding landowners and the local community; and - any other public transport or community service providers. <p>The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>

Further consultation after 2 years	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Planning Secretary in relation to the preparation of the EIS.
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.

ATTACHMENT 1

Technical and Policy Guidelines

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:

<http://www.planning.nsw.gov.au>

<http://www.epa.nsw.gov.au>

<http://www.environment.nsw.gov.au>

<http://www.dpi.nsw.gov.au>

Plans and Documents

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*. Provide these as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

1. An existing site survey plan drawn at an appropriate scale illustrating:
 - the location of the land, boundary measurements, area (sq.m) and north point;
 - the existing levels of the land in relation to buildings and roads;
 - location and height of existing structures on the site;
 - location and height of adjacent buildings and private open space; and
 - all levels to be to Australian Height Datum (AHD).
2. A locality/context plan drawn at an appropriate scale indicating:
 - significant local features;
 - the location and uses of existing buildings, shopping and employment areas; and
 - traffic and road patterns, pedestrian routes and public transport nodes.
3. Drawings at an appropriate scale illustrating:
 - detailed earthworks plan;
 - stormwater concept plan;
 - landscape plan; and
 - Construction Management Plan, inclusive of a Construction Traffic Management Plan and construction methodology and staging.

Documents to be Submitted

Documents to submit include:

- 1 hard copy and 1 electronic copy of all the documents and plans for review prior to exhibition; and
- Additional copies as determined by the Department once the development application is lodged.

Policies, Guidelines and Plans	
Aspect	Policy /Methodology
Social	
	Social Impact Assessment Guideline (Department of Planning and Environment)
Traffic and Access	
	Roads Act 1993
	Austroads Guide to Traffic Management – Part 12: Traffic Impacts of Development
	Planning Guidelines for Walking and Cycling
	Guide to Traffic Generating Development (RTA)
	Cycling Aspects of Austroads Guides
	Road Design Guide (RTA)
	NSW 2021
	NSW Long Term Transport Master Plan
	Sydney's Walking Future
	Sydney's Cycling Future
Noise and Vibration	
	Interim Construction Noise Guideline (DECC)
	Assessing Vibration: a technical guide (DEC)
	NSW Noise Policy for Industry 2017 (EPA)
	NSW Road Noise Policy (EPA)
Soil and Water	
<i>Surface Water</i>	National Water Quality Management Strategy: Water quality management - an outline of the policies (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Policies and principles - a reference document (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Implementation guidelines (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC)

		State Water Management Outcomes Plan
		Water Guidelines for Controlled Activities (DPI)
		NSW Government Water Quality and River Flow Environmental Objectives (DECC)
		Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)
		Managing Urban Stormwater: Soils & Construction (Landcom)
		Managing Urban Stormwater: Treatment Techniques (DECC)
		Managing Urban Stormwater: Source Control (DECC)
		Technical Guidelines: Bunding & Spill Management (DECC)
		Floodplain Development Manual (DIPNR)
		Floodplain Risk Management Guideline (DECC)
		A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
		Technical Guidelines: Bunding & Spill Management (DECC)
		Council's Stormwater Management Policy 2017
<i>Erosion Sediment</i>	<i>and</i>	Managing Urban Stormwater: Soils & Construction (Landcom)
		Design Manual for Soil Conservation Works - Technical Handbook No. 5 (Soil Conservation Service of NSW)
		Soil and Landscape Issues in Environmental Impact Assessment (DLWC)
		Wind Erosion – 2nd Edition
<i>Groundwater</i>		National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
		NSW State Groundwater Policy Framework Document (DLWC)
		NSW State Groundwater Quality Protection Policy (DLWC)
		NSW State Groundwater Quantity Management Policy (DLWC) Draft
		The NSW State Groundwater Dependent Ecosystem Policy (DLWC)
		Guidelines for the Assessment and Management of Groundwater Contamination (DECC) Draft
		NSW Aquifer Interference Policy (NOW)
<i>Soil</i>		Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC)
		National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC)
		State Environmental Planning Policy No. 55 – Remediation of Land
		Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (DOP)

Hazards and Risk	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
Biodiversity	
	NSW Biodiversity Assessment Method (OEH, 2017)
	The NSW State Groundwater Dependant Ecosystem Policy (DLWC)
Heritage	
	<i>Heritage Act 1977</i>
Waste	
	Waste Avoidance and Resource Recovery Strategy 2014-2021 (EPA 2014)
	EPA's Waste Classification Guidelines
	Environmental Guidelines: Assessment Classification and Management of Non-Liquid and Liquid Waste (NSW EPA)
Air Quality	
	Protection of the Environment Operations (Clean Air) Regulation 2002
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC)

ATTACHMENT 2

Government Authority Responses to Request for Key Issues
For Information Only



DOC20/854317-2

David Koppers
Senior Environmental Assessment Officer
Industry Assessments
Department of Planning, Industry and Environment

By Major Projects Portal

Dear Mr Koppers

Re Buronga landfill expansion – SSD 10096818 (SEAR's)

I refer to your advice through the major project portal dated 16 October 2020 to the Environment Protection Authority (EPA) about our information requirements for the Secretary's Environmental Assessment Requirements for the proposed expansion of the Buronga landfill.

We note the proposed expansion will increase the quantity of waste that can be received at the landfill to 100,000 tonnes per year and involve the construction of multiple landfill cells and ancillary infrastructure over a 30-year period.

We have considered the details of the proposal as described in the information provided and we have identified the information we require for the Environmental Assessment (EA) is specified in Attachment 'A'. The EPA's key information requirements for the project are as follows.

1. Justification for and a complete description of the expansion, including how the expanded landfill will meet or exceed the requirements outlined in the EPA's *Environmental Guidelines: Solid Waste Landfills, Second edition* (EPA, 2016).
2. A detailed description of each waste stream proposed to be received and its classification.
3. A comprehensive hydrogeological impact assessment of site, local and regional groundwaters.
4. An air quality impact assessment that models the potential odour, particulate and other air impacts from the expansion.
5. A comprehensive assessment of the leachate and contaminated storm water collection systems.

In carrying out the assessment the proponent should refer to the relevant guidelines identified at Attachment 'B'.

The proponent should be made aware that any commitments made in the EA may be formalised as approval conditions and may also be included as formal EPA licence conditions.

The Proponent should also be aware that, consistent with provisions under Part 9.4 of the *Protection of the Environment Operations Act 1997* (the Act) the EPA may require a financial assurance and/or assurance for all potential environmental liabilities. The final amount of the financial assurance

required by the EPA will take into consideration the potential risks and liabilities associated with the proposed development.

If you have any further enquiries about this matter please contact Jason Price by telephoning 02 6969 0700 or by electronic mail at riverina.farwest@epa.nsw.gov.au.

Yours sincerely

A handwritten signature in dark ink, appearing to read 'D Wallett', with a stylized flourish at the end.

30 October 2020

DARREN WALLETT
Unit Head Regional West Operations
Regulatory Operations Regional

ATTACHMENT 'A'

The Buronga landfill expansion must implement best practice waste management, including handling, processing, storage, disposal and control strategies in accordance with relevant legislation and NSW requirements. How this will be achieved should be documented in the EPA's following information requirements.

Description of the proposal

The description of the proposal should be clearly stated in the Environmental Assessment (EA) to be prepared supporting the proposal and refer to.

- a) A full description of the proposed activities and infrastructure with maps of the site's configuration (in stages if staging is proposed).
- b) The construction activities required, the size and type of any transfer stations related to the proposal, waste processing facilities and/or cells required.
- c) A site characterisation assessment including local and regional geology, topography, geomorphology (landform change over time), hydrology, geochemistry, groundwater, ecological information, meteorological data and surrounding land uses.
- d) All waste operations to be undertaken, the types of wastes received and their source, their classification, details about all transfer stations, the proposed transport, handling, storage and deposit of waste, resource recovery activities, the nature of any processes, filling plans and site rehabilitation and any products, by-products or wastes produced by the project.
- e) The proposal's use or recycling of by-products.
- f) The staging and timing of the whole proposal including storage (short and long term), handling, processing, treatment and disposal.
- g) The proposal's relationship to any other industry or facility and how these will interact with the Buronga landfill.
- h) Discussion around the closure plan, proposed rehabilitation and a final site layout, post closure monitoring and relinquishment criteria.
- i) How the proposal will meet or exceed the requirements outlined in the EPA's Environmental Guidelines: Solid Waste Landfills, Second edition.

Justification

Justification for the proposal must be made. The EA must address where the waste demand is generated from and the need for a large landfill expansion in Buronga.

Circular economy and 20-year waste strategy

NSW has committed to a moving to a circular economy through its Circular Economy Policy Statement. The policy is designed to provide long-term economic, social and environmental benefits for NSW, embedding circular economy consideration in NSW government decision making and planning the transition to a circular economy. The circular economy definition and principles include valuing resources by keeping products and materials in use for as long as possible, maximising the use and value of resources brings major economic, social and environmental benefits, and contribution to innovation, growth and job creation, while reducing the impact on the environment. The circular economy framework will include principles such as designing out waste and pollution and will incorporate the waste hierarchy which underpins the objectives of the Waste Avoidance and Resource Recovery Act 2001.

The EPA is leading the development of a 20-year Waste Strategy for NSW. The Strategy will provide a vision for reducing waste, driving sustainable recycling markets and identifying and improving the state and regional waste infrastructure network. This Strategy will be underpinned by circular economy principles and will set goals and incentives, so the right policy interventions and infrastructure investments are made to meet community and industry needs.

The waste hierarchy is a set of priorities for the efficient use of resources and provides a base to foster the transition to a circular economy. The waste hierarchy defines disposal of waste as the least preferable option. With respect to many types of hazardous waste, higher order outcomes to disposal of the waste either current exist or are feasible. These include in order of preference, reuse, recycle, energy recovery, treatment to recover or remove hazardous chemicals or components, treatment to permanently destroy persistent contaminants, and treatment to immobilise/fix chemical contaminants and prevent their future release into the environment.

The project must describe how it compliments a circular economy and meets the vision of our waste strategy.

The NSW waste levy is being considered as a part of the 20-Year Waste Strategy for NSW. The facility is proposed to receive and store liquid and solid waste from interstate and has the potential to increase the attractiveness of the transport of waste from interstate, including if waste levy costs can be avoided by disposal at the facility. Where this is the case there is the potential to cause a distortion or change in the market and a loss of levy revenue for the originating jurisdiction. Jurisdictions with a waste levy currently include Queensland, Victoria and South Australia, all of which are proposed to be potential sources of waste for the Tellus Broken Hill facility.

Levies are designed to provide funding to improve waste management, and thus the facility has the potential to undermine jurisdictions' efforts to improve waste management.

The project must justify the facility will not result in levy avoidance and in doing so undermine jurisdictions' efforts to improve waste management outcomes.

Potential environmental impacts of the project

The following potential environmental impacts and their baseline conditions need to be assessed, quantified and reported on.

- Air;
- Noise;
- Water;
- Land; and
- Waste and chemicals.

The EA should address how the required environmental goals will be met for each potential impact at the transfer station and the sub surface repository site and at any ancillary waste storage or processing sites.

The EA must describe mitigation and management options that will be used to prevent, control, abate or mitigate identified potential environmental impacts associated with the project and to reduce risks to human health and prevent degradation of the environment in perpetuity.

This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

Potential impacts on air quality

The goals of the project in relation to air quality should be to ensure sensitive receptors are protected from adverse impacts from dust, odour and particulate emissions.

The project must create an emissions inventory that identifies all potential air pollutants at their source and discharge point. Measures to prevent or control the emission of dust, odour and particulates must be detailed based on the outcome of an assessment of air pollutants undertaken in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air*

Pollutants in New South Wales (EPA, 2016). All potentially impacted residential or sensitive premises likely to be impacted by the development must be identified and included in the assessment.

Emissions from any plant must meet the design criteria detailed in the *Protection of the Environment Operations (Clean Air) Regulation 2010*. Details need to be provided on the proposed air pollution control techniques from any air emission points, including proposed measures to manage and monitor efficiency and performance.

Potential impacts of noise, vibration and blasting

The goals of the project should include design, construction, operation and maintenance of the facility in accordance with relevant EPA policy, guidelines and criteria, and in order to minimise potential impacts from noise.

The EPA expects that potential noise sources are assessed in accordance with the *Noise Policy for Industry* (EPA, 2017) and where required mitigation measures are proposed (eg appropriate equipment chosen to minimise noise levels). All residential or noise sensitive premises likely to be impacted by the development must be identified and included in the assessment.

The proposed development may result in an increase in traffic movements associated with the transport of waste. The number of traffic movements associated with the proposal should be quantified and the potential noise impacts associated with these traffic movements need to be assessed in accordance with the *NSW Road Noise Policy* (DECCW, 2011).

An assessment of vibration from all activities (including construction and operation) to be undertaken on the premises and this should be assessed using the guidelines contained in the document *Assessing Vibration: a technical guideline* (DEC, 2006).

Where any blasting is proposed an assessment of potential blast impacts should be undertaken and this should be assessed against the guidelines contained in the document *Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZECC, 1990).

Potential impacts on water quantity and quality

A detailed and contemporary hydrogeological impact assessment must be undertaken that documents local and regional groundwater features for all sites and includes a comprehensive description of the potential impacts and mitigation measures that will be implemented at the repository to protect groundwaters

The hydrogeological assessment must.

- a) Comprehensively determine the site, local and regional geological and hydrogeological settings, to determine whether the landfill cells can be intercepted by groundwater or if leachate from deposited waste (whether anticipated or not) could move through the strata profile and local geology to generate perched layers or impact groundwaters.
- b) Identify surrounding groundwater users that may be affected by any adverse impact on groundwater quantity or quality.
- c) Quantify the impacts that any proposed water extraction may have on the groundwater source and include details of project water requirements and sources, water flows and a water balance analysis. Uncertainties and variability in water resource availability and water balance components must be identified and assessed
- d) Identify appropriate measures that will be undertaken to mitigate any potential adverse impact.

The goals of the project should include the following.

- No pollution of waters (including surface and groundwater), except to the extent authorised by EPA (i.e in accordance with an Environment Protection Licence);
- Contaminated water (including effluent, leachate, process waters, wash down waters, polluted stormwater or sewage) is captured on the site and collected, treated and beneficially reused, where this is safe and practicable to do so;
- Anticipate wet weather impacts and develop contingencies into the design of all contaminated water (including leachate) infrastructure and clean water diversions; and
- It is acceptable in terms of the achievement or protection of the NSW River Flow Objectives and Water Quality Objectives.

The EA should document the measures that will achieve the above goals.

Details of the site drainage and any natural or artificial waters within or adjacent to the development (including all facilities associated with the project) must be identified and the surface water management systems measures proposed to mitigate potential impacts of the development on these waters. The proposed surface water management system must detail how these waters could adversely impact the repository in the short and long term and the mitigation measures proposed.

Potential impacts on land

The EA must describe the proposed location in terms of soil types and properties and soil contamination. Any likely impacts resulting from the construction or operation of the proposal must be identified, including the likelihood of.

- a) Disturbing any existing contaminated soil.
- b) Contamination of soil by operation of the activity.
- c) Subsidence or instability.
- d) Soil erosion.
- e) Disturbing acid sulfate soils or potential generation of acid sulfate.

The EA must describe the management of the closure of all facilities associated with project at the end of their operational life and including the rehabilitation measures that will be implemented and what the ongoing land use will be.

The goals of the project should include the following.

- No pollution of land, except to the extent authorised by EPA (ie in accordance with an Environment Protection Licence);
- Any contaminated sites encountered or created are appropriately managed and rehabilitated.
- The potential impact of land erosion from the development is mitigated.
- The land impacts by the project is appropriately monitored and managed in accordance with relevant EPA guidelines.

The EA should document the measures that will achieve the above goals.

Waste and chemicals

The EA must provide details of solid and liquid waste management associated with the project and identify potential impacts, including.

- a) Identify and characterise each waste stream or type of waste, nominate the maximum volume/quantity and rate to be received, identify its source and/or generation and classify all wastes in accordance with the NSW *Waste Classification Guidelines*.
- b) A justification that the wastes proposed to be received cannot be subjected to a higher order(s) and more preferable treatment methods, in accordance with the waste hierarchy,

and NSW circular economy and WARR Act objectives and principles. The assessment should demonstrate there are not higher order/preferred treatment methods that can be applied to the waste or its contaminants other than burial-disposal, for each type of waste proposed to be received at the facility.

- c) A comprehensive description of the method of collection, transportation, assessment and handling of waste received at project facilities.
- d) Any stockpiling of wastes, or long-term storage of wastes or recovered materials.
- e) The waste processing related to the project, detailing any potential reuse, recycling, reprocessing (including composting) or treatment both on and off-site.
- f) The air or water emissions arising from the handling, storage, processing and reprocessing or deposit of waste and leachate management consistent with NSW guidelines.
- g) Waste cover composition, suitability, where it will be sourced and the timing of covering.
- j) The proposed controls for managing the potential environmental impacts of the activity and a comparison of these controls against best practice.

The goals of the project should include the following.

- It is in accordance with the principles of the waste hierarchy and cleaner production;
- Where potential impacts associated with the handling, processing and storage of all waste materials generated at the premises are identified, these be satisfactorily mitigated;
- The beneficial reuse of all wastes generated at the premises are maximised where it is safe and practical to do so; and
- No waste disposal occurs on site except in accordance with an Environment Protection Licence.

The EA needs to identify the proposed type, quantity and location of all chemicals to be stored at project facilities. Spill management measures, including items such as bunding, and emergency procedures should be clearly outlined.

Monitoring, Assurance and Reporting Programs

1. The EA must include a detailed assessment of any noise, air quality, groundwater and surface water quality or waste monitoring required during the construction phase and on-going operation to prevent or minimise any adverse environmental impacts from the development.
2. Appropriate baseline data requirements are to be identified as part of the EA, to form the basis for baseline and ongoing monitoring of environmental parameters.
3. It must be demonstrated that the proposed methods for baseline and subsequent monitoring are scientifically robust and statistically sound.
4. The EA must also identify and describe monitoring programs, compliance assurance programs and reporting requirements and arrangements.
5. The EA must, in addition to outlining proposed programs, clearly identify what is to be monitored and audited and why. This should include identification of monitoring locations, parameters to be monitored, sample analysis methods, the level of reporting proposed. The EA should also include information on frequency and type of audits proposed to assure compliance with applicable requirements,
6. The EA should demonstrate that monitoring and audit programs have been designed appropriately, according to best practice, to provide objective evidence regarding activities associated with the development and have regard to whether these activities are adversely impacting on the environment in the short, medium and/or long term.

Cumulative impacts

The EA should provide an assessment of the cumulative impacts of the project during construction and operation of the proposal. Assessment of cumulative impacts must consider each environmental impact (air, land, noise, water and waste) and past, current and future activities in the area surrounding the project and impacts associated with components of this project.

Contingencies and strategies for project failure, disruption or other risks

The EA must identify and assess all possible scenarios where the project may fail, be disrupted, or be impacted by other significant risk factors (landfill fire in particular), including during each stage of the project. The assessment must include details of contingencies and strategies that will be implemented under these circumstances.

The EA must include details of environmental management, maintenance, and operating strategies to manage each element of the facility. The strategies must cover all aspects and stages of maintenance and operation over the life of the facility. The strategies must be designed so they are consistent with current best practice, include continual improvement and transition strategies, address identified issues and can identify and incorporate future advances and knowledge.

Applied research strategies to key uncertainties must be implemented and completed.

ATTACHMENT 'B'

<u>Title</u>	<u>Web address</u>
Relevant Legislation	
Environmental <i>Planning and Assessment Act 1979</i>	https://www.legislation.nsw.gov.au/#/view/act/1979/203
<i>Protection of the Environment Operations Act 1997</i>	https://www.legislation.nsw.gov.au/#/view/act/1997/156/full
<i>Contaminated Land Management Act 1997</i>	https://www.legislation.nsw.gov.au/#/view/act/1997/140
<i>Environmentally Hazardous Chemicals Act 1985</i>	https://www.legislation.nsw.gov.au/#/view/act/1985/14
<i>Waste Management Act 2000</i>	https://www.legislation.nsw.gov.au/#/view/act/2000/92
Licensing	
Guide to Licensing	http://www.epa.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
POEO (Clean Air) Regulation 2010	https://www.legislation.nsw.gov.au/#/view/regulation/2010/428/historical2016-11-01/full
Approved methods for modelling and assessment of air pollutants in NSW (2016)	http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf
Assessment and management of odour from stationary sources in NSW (DEC, 2006)	Technical framework: https://www.environment.nsw.gov.au/resources/air/20060440framework.pdf Technical notes: https://www.environment.nsw.gov.au/resources/air/20060441notes.pdf
Noise and Vibration	
Interim Construction Noise Guidelines (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/interim-construction-noise-guideline
Noise Policy for Industry (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)
NSW Road Noise Policy (EPA, 2011)	https://www.epa.nsw.gov.au/publications/noise/2011236-nsw-road-noise-policy

Assessing Vibration: a technical guideline (DEC 2006)	https://www.epa.nsw.gov.au/noise/vibrationguide.htm
Australian and New Zealand Environment Council: Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC 1990)	https://www.epa.nsw.gov.au/resources/noise/ANZECBlasting.pdf

Soils	
Managing Urban Stormwater: Soils and Construction (Landcom, 2004)	https://www.environment.nsw.gov.au/stormwater/publications.htm
Waste	
Waste Classification Guidelines (EPA, 2014)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines
Protection of the Environment Operations (Waste) Regulation 2014	https://www.legislation.nsw.gov.au/regulations/2014-666.pdf
Environmental Guidelines: Solid Waste Landfills, Second edition (EPA, 2016)	https://www.epa.nsw.gov.au/~media/EPA/Corporate%20Site/resources/waste/solid-waste-landfill-guidelines-160259.ashx
EPA's Energy from Waste Policy Statement	https://www.epa.nsw.gov.au/wastestrategy/energy-from-waste.htm
NSW Waste Avoidance and Resource Recovery Strategy 2014-2021	https://www.epa.nsw.gov.au/wastestrategy/warr.htm
NSW Resource Recovery Orders and Exemptions	https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption
Water	
Water quality monitoring – NSW Approved Methods	https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/licensing-under-poeo-act-1997/licensing-to-regulate-water-pollution/approved-methods-for-sampling-and-analysing-water-pollutants
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
National Water Quality Management Strategy: Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-2000-guidelines-vol2.pdf
National Water Quality Management Strategy: Australian Guidelines for Water	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-monitoring-reporting.pdf

Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)	
Using the ANZECC Guidelines and Water Quality Objectives in NSW (EPA, 2006)	https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/anzeccandwqos06290.pdf
Environmental Guidelines: Storage and Handling of Liquids (EPA, 2007)	https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/compliance-audit-program/chemical-storage-handling-and-spill-management/storing-and-handling-liquids-trainers-manual
The NSW State Groundwater Policy Framework Document (DLWC, 1997)	http://www.water.nsw.gov.au/_data/assets/pdf_file/0008/547550/avail_ground_nsw_state_groundwater_policy_framework_document.pdf
The NSW State Groundwater Quality Protection Policy (DLWC, 1998)	http://www.water.nsw.gov.au/_data/assets/pdf_file/0006/548286/nsw_state_groundwater_quality_policy.pdf
National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC, 1995)	https://www.water.wa.gov.au/_data/assets/pdf_file/0020/4925/8728.pdf



Our ref: DOC20/857725

Senders ref: SSD 10096818

David Koppers
Department of Planning, Industry and Environment
12 Darcy Street
PARRAMATTA NSW 2150

Via email: david.koppers@planning.nsw.gov.au

29 October 2020

Dear Mr Koppers

Subject: Request for Secretary's Environmental Assessment Requirements – Buronga landfill expansion (SSD 10096818)

Thank you for your email dated 16 October 2020 seeking input from the Biodiversity and Conservation Division (BCD) into the Department of Planning, Industry and Environment (the Department) Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the Buronga landfill expansion (SSD 10096818).

BCD has reviewed the documentation and provides SEARs for the proposed development in **Attachment A**. Guidance material is listed in **Attachment B**.

BCD recommends that the EIS appropriately address impacts on biodiversity. The EIS should fully describe the proposal, the existing environment, including threatened species habitat not associated with vegetation communities, and impacts of the development including the location and extent of all proposed works that may impact on biodiversity. The scale and intensity of the proposed development should dictate the level of investigation. It is important that all conclusions are supported by adequate data. The assessment must include all ancillary infrastructure associated with the project such as roads, water and power supplies, and Rural Fire Service requirements for asset protection.

The proposed landfill footprint covers land that is already disturbed but also contains remnant vegetation. The proposal should aim to avoid the remnant vegetation, particularly areas that are identified as threatened species habitat. Any clearing must be assessed using the Biodiversity Assessment Method and measures proposed to mitigate impacts on biodiversity.

Please note that the Scoping Report incorrectly states that the development is subject to the requirements of Part 5 of the *Environmental Planning and Assessment Act 1979*. The correct part of that act is Division 4.7.

If you have any questions about this advice, please contact Simon Stirrat, Senior Conservation Planning Officer via rog.southwest@environment.nsw.gov.au or 03 5021 8930.

Yours sincerely

Andrew Fisher
Senior Team Leader Planning
South West Branch
Biodiversity and Conservation Division
Department of Planning, Industry and Environment

ATTACHMENT A – Recommended Environmental Assessment Requirements for Buronga landfill expansion (SSD 10096818)

ATTACHMENT B – Guidance material

Attachment A – Recommended Environmental Assessment Requirements for Buronga landfill expansion (SSD 10096818)

Sources of guidance material for terms in [blue](#) are in Attachment B

Biodiversity
<p>1. Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 using the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM, unless DPIE determines that the proposed development is not likely to have any significant impact on biodiversity values.</p>
<p>2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.</p>
<p>3. The BDAR must include details of the measures proposed to address the offset obligation as follows;</p> <ul style="list-style-type: none"> a. The total number and classes of biodiversity credits required to be retired for the development/project; b. The number and classes of like-for-like biodiversity credits proposed to be retired; c. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; d. Any proposal to fund a biodiversity conservation action; e. Any proposal to make a payment to the Biodiversity Conservation Fund. <p>If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.</p>
<p>4. The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix K of the BAM.</p>
<p>5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the <i>Biodiversity Conservation Act 2016</i>.</p>

Attachment B – Guidance material

Title	Web address
<u>Relevant Legislation</u>	
<i>Biodiversity Conservation Act 2016</i>	www.legislation.nsw.gov.au/#/view/act/2016/63/full
<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>	www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
<i>Environmental Planning and Assessment Act 1979</i>	www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
<u>Biodiversity</u>	
Biodiversity Assessment Method 2020 (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-2020
Biodiversity Offsets Scheme Entry Threshold Tool	www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap
BAM Assessor Resources (including links to Survey Guidelines, Registers and Databases)	https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accredited-assessors/assessor-resources
BAM Assessor FAQ	https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accredited-assessors/assessor-questions-and-answers
Biodiversity Values Map	www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap
Guidance to assist a decision maker to determine a serious and irreversible impact (DPIE 2019)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf
Ancillary rules: biodiversity conservation actions	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-biodiversity-actions-170496.pdf
Ancillary rules: reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-reasonable-steps-170498.pdf
DPIE Threatened Species Profiles	www.environment.nsw.gov.au/threatenedspeciesapp/
BioNet Atlas	www.environment.nsw.gov.au/wildlifeatlas/about.htm
BioNet Vegetation Classification – see NSW Plant Community Type (PCT) classification link for PCT database login page.	http://www.environment.nsw.gov.au/research/Visclassification.htm
NSW SEED Data Portal (access to online spatial data)	https://www.seed.nsw.gov.au/
Fisheries NSW policies and guidelines	www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation



28 October 2020

The Manager
Department of Planning, Industry & Environment
Locked Bag 5022
Parramatta NSW 2124

Attention: David Koppers

SSI-10096818 – REQUEST FOR INPUT TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS FOR A PROPOSED LANDFILL EXPANSION – BURONGA WASTE MANAGEMENT FACILITY, ARUMPO ROAD, BURONGA.

I refer to correspondence forwarded to Transport for NSW (TfNSW) requesting the provision of key issues and assessment requirements to be included in the Secretary's Environmental Assessment Requirements.

From review of the information provided it is understood that the proposal is for expansion of the existing Buronga landfill facility. The proposed development is to include the construction of multiple landfill cells with a volume of approximately 4.8 million cubic metres and associated infrastructure for an anticipated operation life of 30 years. The subject site is located with frontage to Arumpo Road, which is classified "regional" road.

The preliminary information supplied provides limited detail in relation to potential traffic generation for the proposed development. The information supplied does not provide any preliminary detail in relation to the potential traffic generation for the construction or operation of the proposed facility, or the proposed access arrangements from the public road network to the development.

TfNSW is interested in the characteristics of the traffic generated by the development and the potential impact of the development on the safety and efficiency of the road network, particularly the interaction of the development with public road network. TfNSW emphasises the need to minimise the impacts of any development on the existing road network and maintain the level of safety, efficiency and maintenance along the road network. To provide for an informed assessment of the traffic implications of the development proposal a Traffic Impact Assessment (TIA) is to be prepared. Any Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network.

The scale and content of the TIA is dependent on the scale and potential traffic generation of the proposed development. For guidance in the preparation and content of the TIA the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Part 13: Traffic Studies and Analysis and the "Guide to Traffic Generating Developments" prepared by the RTA.

As a minimum the TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, vehicle types and volumes including peak traffic volumes, travel routes for vehicles accessing the development site. Consideration of the cumulative impacts of the potential traffic generation when added to existing traffic volumes upon the surrounding road network shall be undertaken. In particular the TIA shall address, and provide recommendations for any mitigation measures necessary to address traffic related impacts generated by this development upon the surrounding road network during the lifetime of the project.

From the information available it is considered that the establishment and operational phases of the development have the potential to impact on the transport infrastructure required to service the development. TfNSW advises that in relation to traffic related issues the development should be considered and addressed in 2 distinct stages as follows;

- Establishment phase – the transport of materials and equipment/components for the establishment of the facility and ancillary infrastructure, the movement and parking of construction related vehicles, including personal vehicles, during the construction period.
- Operational phase – the ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the project.

Transport for NSW emphasises the need to appropriately consider and minimise the impacts of the total traffic generation due to the development on the existing road infrastructure and maintain the safety, efficiency and standard of maintenance along the existing road network through the design, construction and operation of the development and any road works required to support the operation of the development.

Any enquiries regarding this correspondence may be referred to the Manager, Land Use - TfNSW (South Region), Maurice Morgan, phone (02) 6923 6611.

Yours faithfully



Per:
Jonathan Tasker
Acting Director South West



OUT20/12757

David Koppers
Planning and Assessment Group
NSW Department of Planning, Industry and Environment

david.koppers@planning.nsw.gov.au

Dear Mr Koppers

**Buronga Landfill Expansion (SSD-10096818)
Comment on the Secretary's Environmental Assessment Requirements (SEARs)**

I refer to your email of 16 October 2020 to the Department of Planning, Industry and Environment (DPIE) Water and the Natural Resources Access Regulator (NRAR) about the above matter.

The following recommendations are provided by DPIE Water and NRAR.

The SEARS should include:

- The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface and groundwater monitoring activities and methodologies.
- Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at <https://www.industry.nsw.gov.au/water>).

Any further referrals to DPIE – NRAR & Water can be sent by email to:
landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Alistair Drew
Project Officer, Assessments
Water – Strategic Relations
21 October 2020



Your reference: SSD-10096818
Our reference: DOC20/853846

David Koppers
Senior Environmental Assessment Officer
Industry Assessments
Department of Planning, Industry and Environment
Email: david.koppers@planning.nsw.gov.au

Advice provided via the Major Projects Portal

Dear Mr Koppers

**HERITAGE NSW – ABORIGINAL CULTURAL HERITAGE REGULATION
SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)**

Project: Buronga Landfill Expansion (Wentworth LGA)
SSD/SSI application no: SSD-10096818

Thank you for your referral dated 16 October 2020 requesting our input on the draft Planning Secretary's Environmental Assessment Requirements (SEARs) for the above state significant development (SSD) project.

In support for the request for SEARs, Heritage NSW received a copy of the 'Preliminary Scoping Report for the Buronga Landfill Proposed Expansion' (Tonkin, 8 October 2020). The preliminary scoping report (PSR) states an Aboriginal Cultural Heritage Assessment was previously undertaken across the area of the site not currently occupied by the waste facility by Landsape in October 2016. The PSR also states that Wentworth Shire Council (WSC) holds an Aboriginal Heritage Impact Permit (C0002579) allowing them to move or harm the Aboriginal site identified (AHIMS 46-3-0192) during the previous assessment as part of the proposed development.

Heritage NSW advise that the AHIP (C0002579) previously issued to WSC commenced on 30 March 2017, was only for the duration of 1 year and subsequently expired after 30 March 2018 and is no longer valid. While the Buronga Landfill Proposed Expansion project is considered as a SSD and an Aboriginal Heritage Impact Permit is not required, it is a requirement that the EIS demonstrates consideration for Aboriginal cultural heritage including conducting consultation with the Aboriginal community in accordance with the 'Aboriginal cultural heritage consultation requirements for proponents 2010'.

Although a previous Aboriginal cultural heritage assessment was carried out in relation to the Buronga Landfill - this was in relation to previous Borrow Pit Upgrades. The 2016 Aboriginal cultural heritage assessment report (ACHAR) was provided to WSC to support an application for development approval and an application for an AHIP which did not relate to the current expansion of the landfill footprint from 19ha to 40ha and increase from the currently licensed 30,000 tonnes of waste to 100,000 tonnes of waste per annum. The 2016 ACHAR also did not cover the proposed ground disturbance works including the resource recovery areas and proposed stormwater management area that form part of this proposal.

Further detail regarding SEARs for the proposed development in relation to Aboriginal cultural heritage matters is provided in **Attachment A**.

If you have any questions regarding these comments, please contact me on (02) 6229 7089 or by email: jackie.taylor@environment.nsw.gov.au.

Yours sincerely



Jackie Taylor
Senior Team Leader, Aboriginal Cultural Heritage Regulation - South
Heritage NSW
28 October 2020

Enclosure – Attachment A: Recommended SEARs for Buronga Landfill Proposed Expansion SSD-10096818 - Aboriginal Cultural Heritage

ATTACHMENT A: HERITAGE NSW – Aboriginal Cultural Heritage - SEARs

Project Name: Buronga Landfill Proposed Expansion (Wentworth LGA)

SSD/I #: SSD-10096818

1. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the [Code of Practice for Archaeological Investigation in NSW](#) (OEH 2010), and be guided by the [Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales](#) (DECCW 2011) and consultation with Heritage NSW regional officers.
2. Consultation with Aboriginal people must be undertaken and documented in accordance with the [Aboriginal Cultural Heritage Consultation Requirements for Proponents](#) (DECCW 2010). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.
3. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to Heritage NSW.
4. The assessment of Aboriginal cultural heritage values must include a surface survey undertaken by a qualified archaeologist. The result of the surface survey is to inform the need for targeted test excavation to better assess the integrity, extent, distribution, nature and overall significance of the archaeological record. The results of surface surveys and test excavations are to be documented in the ACHAR.
5. The ACHAR must outline procedures to be followed if Aboriginal objects are found at any stage of the life of the project to formulate appropriate measures to manage unforeseen impacts.
6. The ACHAR must outline procedures to be followed in the event Aboriginal burials or skeletal material is uncovered during construction to formulate appropriate measures to manage the impacts to this material.

NOTE: The process described in the *Due Diligence Code of Practice for the protection of Aboriginal objects in NSW* (DECCW 2010) is not sufficient to assess the impacts on Aboriginal cultural heritage of Major Projects.

David Koppers
Department of Planning, Industry and Environment
320 Pitt Street
SYDNEY NSW 2000

By email: David.Koppers@planning.nsw.gov.au

Dear Mr Koppers

**Request for Secretary's Environmental Assessment Requirements (SEARS) for
Buronga Landfill Expansion (SSD-10096818)**

Thank you for your referral dated 16 October 2020 inviting SEARS input from the Heritage Council of NSW on the above State Significant Development proposal.

The subject site is not listed on the State Heritage Register (SHR), nor is it in the immediate vicinity of any SHR items. Further, the site does not contain any known historical archaeological deposits. Therefore, no referral to the Heritage Council of NSW is required. The Department does not need to refer subsequent stages of this proposal to the Heritage Council of NSW.

If you have any questions regarding the above advice, please contact Gary Hinder, A/Senior Heritage Assessment Officer, at Gary.Hinder@environment.nsw.gov.au or on 9873 8547.

Yours sincerely



Anna London
A/Senior Team Leader, Customer Strategies
Heritage NSW
Department of Premier and Cabinet
As Delegate of the Heritage Council of NSW
29 October 2020

David Koppers
Department of Planning, Industry and
Environment
4 Parramatta Square
12 Darcy Street
Parramatta NSW 2150

Our ref: DOC20/875501

Your ref: SSD 10096818

Emailed: via Planning portal

30 October 2020

Dear David

Subject: Buronga Landfill Expansion (SSD 10096818) – Request for Secretary's Environmental Assessment Requirements (SEARs).

Thank you for the opportunity to provide advice on the above matter. This is a response from the NSW Department of Regional NSW – Mining, Exploration & Geoscience (MEG).

MEG is responsible for providing strategic advice relating to the current and potential future uses of land in NSW pursuant to the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 and the Environmental Planning & Assessment Act 1979. Our role is to ensure that proposals do not unnecessarily preclude access to known resources or exploration for future resource discovery and extraction. MEG will also assess the application with respect to biodiversity offset considerations.

MEG has identified Exploration License (EL) 8500 held by Morello Earthmoving Pty Ltd overlies the project site.

MEG requests the following project-specific requirements to be addressed in the EIS:

- The Environmental Impact Statement (EIS) must include a dated mineral, coal and petroleum titles and applications search through the MEG MinView application, with results shown on a map(s) including the location and extent of the project site. Current mining and exploration titles and applications can be viewed at:
<https://minview.geoscience.nsw.gov.au/>
- The proponent must consult with Morello Earthmoving Pty Ltd. This should include a letter of notification of the proposal to the title holder including a map indicating the Buronga Landfill Expansion proposal area in relation to the exploration title boundary.
- The proponent must consult with all affected title holders. This should include a letter of notification of the proposal to the title holders including a map indicating the Landfill Expansion proposal area in relation to the title boundaries.
- MEG specifically requires the proponent to check for new mineral and energy titles that may be granted in the vicinity of the subject site during all decision-making stages of the project to ensure that other stakeholders (such as title holders) with interest in the area are aware of the proposed landfill expansion project.
- MEG requests to be consulted in relation to the proposed location of any biodiversity offset areas (both on and off site) or any supplementary biodiversity measures to ensure there is

no consequent reduction in access to prospective land for mineral exploration, or potential for sterilisation of mineral or extractive resources.

Queries regarding the above information should be directed to the GSNSW - Land Use team at landuse.minerals@geoscience.nsw.gov.au.

Yours sincerely,



Steven Palmer

Manager, Land Use Assessment

Geological Survey of NSW – Mining, Exploration & Geoscience.



NSW RURAL FIRE SERVICE

Department of Planning and Environment (Sydney Offices)
GPO Box 39
Sydney NSW 2001

Your reference: SSD 10096818
Our reference: DA20201026003930-SEARS-1

ATTENTION: David Koppers

Date: Thursday 29 October 2020

Dear Sir/Madam,

Development Application

State Significant – SEARS – Industry

Buronga Landfill Expansion 258 Arumpo Road Buronga NSW AUS, 197//DP756946, 212//DP756946, 1//DP1037845

I refer to your correspondence regarding the above proposal which was received by the NSW Rural Fire Service on 16/10/2020.

The NSW RFS has considered the information submitted and notes that the proposed development has the potential to increase the level of bush fire risk within the landscape and, the development may be impacted upon during a bush fire event. As such, the environmental assessment for the proposed Buronga Landfill Expansion should address the following bush fire criteria:

- the aim and objectives of *Planning for Bush Fire Protection 2019*;
- identification of potential ignition sources during construction and operation of the development;
- storage of fuels and other hazardous materials;
- proposed bush fire protection measures for the development, including vegetation management and fire suppression capabilities;
- operational access for fire fighting appliance to the site; and
- emergency and evacuation planning.

For any queries regarding this correspondence, please contact Bradley Bourke on 1300 NSW RFS.

Yours sincerely,

Martha Dotter

**Team Leader, Dev. Assessment & Planning
Planning and Environment Services**

Postal address

NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address

NSW Rural Fire Service
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127

T (02) 8741 5555
F (02) 8741 5550
www.rfs.nsw.gov.au

WATER NSW

Response History



Public Authority Response

Tuesday, 20 October 2020 5:03:24 PM AEDT

Notes:

Thank you for requesting WaterNSW's input to the SEARs for the Buronga Landfill Expansion (SSD 10096818). WaterNSW notes that the subject site includes a bore that is part of the part of the groundwater monitoring system for the Buronga Salinity Interception Scheme, which is run by DPIE as part of the MDBA Joint Venture. WaterNSW take a manual read on this bore 4 times per year.

Our interest lies in maintaining access to this bore for monitoring and maintenance, and ensuring the bore infrastructure is not damaged, and protected from unauthorised access. This access may also be required by anyone contracted to WaterNSW to undertake this work, or independent monitoring for which we authorise an access agreement.

As DPIE is the client for the data gathered by WaterNSW, the EIS must also address any potential impacts to groundwater levels, seepage, earthworks etc.

NRAR

Response History



Public Authority Response

Tuesday, 20 October 2020 12:20:53 PM AEDT

Notes:

This is a pre-approval matter that needs to be sent to landuse.enquiries@dpi.nsw.gov.au to collate a combined response from both NRAR and DPIE Water.

Kind Regards

Deb



Appendix C. Buronga Landfill Concept Design – Basis of Design Report (Tonkin, 2021)

202597L01RevB

5 July 2021

Director Finance and Policy
Wentworth Shire Council
26-28 Adelaide Street
WENTWORTH NSW 2648

Attention: Simon Rule

Dear Simon,

BURONGA LANDFILL CONCEPT DESIGN – BASIS OF DESIGN REPORT

Objectives

Tonkin has been engaged by Wentworth Shire Council (Council) to prepare an Environmental Impact Statement (EIS) for the proposed expansion of the Buronga Landfill. The EIS is required as a part of the Development Application for the expansion of the existing facility. As a part of the preparation of the EIS Tonkin have been engaged to prepare a concept design for the landfill facility.

The site is owned by Council and comprises approximately 124 Ha. The site is subject to Environmental Protection Licence (EPL) #20209 which covers the full 124 Ha extent of the site. The existing landfill operation occupies approximately 19 Ha in the southern area of the site, with one lined landfill cell operational and a historical, unlined landfill adjacent. The proposed expansion will include a staged expansion of the landfill to occupy the central area of the site, expected to comprise approximately an additional 56 Ha.

This concept design includes the design of the site in accordance with the *Environmental Guidelines: Solid Waste Landfills*, Second Edition (NSW EPA, 2016) (The Landfill Guideline) and concept layouts and detailing of the site. The concept design also includes a description and context for the design, operational measures including management of stormwater and leachate, monitoring requirements and proposed rehabilitation and post-closure management requirements.

This report has been prepared to establish the basis of design for the concept design of the Buronga Landfill expansion.

Key Design References and Criteria

The following site background information and input data have been referenced in undertaking this design:

Project Brief

- Tonkin (2020). *Buronga Landfill Expansion – Engagement and Management of Specialists for Environmental Impact Statement Inputs and Preparation of EIS*, Revision 2, 18 December 2020, Ref: 202597P001Rev2

Development Application Requirements

- Department of Planning, Industry and Environment (2020). *Planning Secretary's Environmental Assessment Requirements*, 11 November 2020, Application Number: SSD-10096818



Regulatory Requirements

- NSW Environment Protection Authority (2016). *Environmental Guidelines: Solid waste landfills*, Second Edition, April 2016, Ref: EPA 2016/0259.
- NSW Environment Protection Authority (2017). *Environment Protection Licence, Licence - 20209*, 24 November 2017.

Site Survey

- Price Merrett Consulting (2021). *Buronga Landfill, Contour and Feature Plan*, Revision 0, 4 March 2021, Ref: F8648-6257-1-Rev0

Other Input Data

- Tonkin (2017). *Buronga Landfill New Cell, Issued for Construction Drawing Set*, Revision A, January 2017, Ref: 20155461
- Tonkin (2020). *Buronga Landfill Proposed Expansion, Preliminary Scoping Report*, Revision 2, 8 October 2020, Ref: 20180746R001
- Tonkin (2021). *Geotechnical Investigation Report, Buronga Landfill Expansion*, Revision A, 14 April 2021, Ref: 202597R02A
- Tonkin (2021). *Groundwater Impact Assessment, Buronga Landfill Expansion*, Revision 0, 22 April 2021, Ref: 202597R03Rev0

Expected Waste Streams

The existing Buronga Landfill facility has experienced increased waste tonnages in recent years, with 23,800 tonnes received in 2017-18 increasing to a projected 29,000 tonnes of waste in 2019-20. Tonnages are expected to continue to increase in future years. The site is currently licenced to accept up to 30,000 tonnes of general waste for disposal per annum, the proposed development will be designed to allow the acceptance of up to 100,000 tonnes of general solid waste per year.

The Buronga Landfill currently provides facilities for public drop-off of recyclable wastes into separate areas to facilitate resource recovery. The proposed expansion to the facility will improve these facilities and allow for the acceptance of additional recyclable material. It is expected that recyclable wastes accepted will include:

- Construction & demolition waste such as concrete, tiles and masonry;
- Waste oils;
- Clean soils;
- Green waste;
- Scrap metal;
- Glass and plastic containers; and
- Cardboard and paper.

The site also currently has a Community Recycling Centre (CRC) constructed under a NSW EPA Initiative. This facility accepts hazardous waste from the public including paints, waste oils, household batteries, car batteries, fluorescent lighting, gas cylinders and smoke detectors. The proposed expansion will retain drop off facilities for these household hazardous wastes.



Key Site Constraints Identified

Existing Waste Disposal Areas

The southern area of the site is an existing landfill operation. The site was first used for waste disposal in 1934, and in 1967 the site was trusted to the Wentworth Shire Council for use in landfilling. The site has been operated by various parties but has been operated by Council since 2015. Historically landfilling has been undertaken on the eastern portion of the existing landfill site, with the majority of the filling occurring above ground. The first lined landfill cell was completed in 2017 in accordance with The Landfill Guideline and is the current active landfill cell at the site.

The proposed expansion is to occur to the north of the existing waste disposal operation. The design of the expansion is expected to consist of filling against the existing waste batter slopes and away from the existing landfill. This approach will allow for a consistent landform across the site instead of two isolated landfill footprints. This facilitates efficient usage of the site for waste disposal and minimises environmental impact.

The Landfill Guideline sets out requirements for landfilling over an existing closed landfill cell, these requirements include:

- The proposed cell should be self-contained and operate separately from the old cell on which it is placed, and should not compromise ongoing collection and management of leachate and gas from the old cell.
- The leachate barrier should not be damaged by settlement of waste in the old cell.
- There should be a stiff foundation or bridging layer below the leachate barrier to protect it from deformations.
- The liner system should have adequate slope stability and should not compromise the stability of existing slopes.
- The cell design should consider the generation of landfill gas beneath the barrier system.

The extent of historical waste filling is not well understood. It is likely that the expansion will include filling over the closed cells in the southern area of the site. This will require consideration during detailed design to better understand the extent of waste and any requirements for lining over existing landfilled waste. The concept design will nominate the approximate extent of landfilled waste and piggyback lining required, but this will need to be further investigated during detailed design of the facility.

Existing Infrastructure and Services

The site currently has several buildings and structures associated with the landfill operation located in the south western corner of the site. Buildings include a weighbridge on the access road to the site, small site offices and sheds and a community recycling centre. The weighbridge is proposed to remain in the same location; however all other sheds and structures can be moved as a part of the development.

Telecommunications services run along Arumpo Road and enter the site along the access road. A Dial-Before-You-Dig (DBYD) search suggests that the telecommunications services that enter the site are inactive. TransGrid fibre optic communications services run along Arumpo Road. According to mapping available through a DBYD search, this cable runs within the site along its extreme western margin in some areas. The concept design will avoid impacting the area as shown from the DBYD mapping, however the location of this cable should be confirmed by Council prior to construction or detailed design.



Hydrogeology & Groundwater

A groundwater impact assessment (GIA) was prepared by Tonkin as a part of the EIS preparation (Tonkin, 2021). No piezometers are present at the site to indicate standing water levels (SWLs) however groundwater was encountered in boreholes produced as a part of geotechnical investigations undertaken by Tonkin in 2021. Groundwater was observed between 6.8 m below ground level (mBGL) and 9.7 mBGL, with one day stabilisation at between 5.9 mBGL and 9.5 mBGL in boreholes that did not collapse. The GIA suggests that true groundwater levels may be within the order of 5.0 to 7.5 m BGL based on the investigations undertaken and the regional groundwater levels. It was identified that groundwater levels are controlled by regional and local recharge, and prolonged heavy rainfall periods could see rises in the groundwater level.

The facility design will consider the groundwater surface identified as a part of the GIA. In line with best practice the design will provide 2 m separation to the lowest point of the floor of the cell, with the leachate sumps being 300 mm below this level.

Geotechnical Conditions

A geotechnical investigation was undertaken by Tonkin in early 2021 consisting of 12 boreholes advanced across the proposed expansion footprint. Investigations extended to up to 10 metres below ground level.

Geotechnical conditions are not expected to present an issue to the expansion of the landfill with favourable conditions for excavatability and excavation stability. Clay and Sandy Clay soils described in the report may be suitable for use in cell lining works. Clay and Sandy Clay soils were encountered at various depths across the site; with the top of the unit encountered between 3.5 mBGL and 7.1 mBGL across the site, with the exception of the north eastern corner of the site where these soils were encountered from within 0.1 m of the surface. The selection of the liner profile will consider the available quantities of material within the cell excavations.

Site Topography

The site has been modified by the existing landfill operation in the southern area of the site and by historical quarry and borrow pit activities in the central area of the site. The southern area of the site that has been filled has a peak of approximately 56 mAHD with batters at grades of approximately 1V:5H to the surrounding ground level. The existing landfill cell is currently being filled and is at levels similar to the surrounding ground level. Filling will continue in this cell to reach similar levels to the surrounding historical landfill.

Several low points and ridges are present in the central area of the site. This area has been disturbed by former quarrying activities and is currently used as a borrow source for soil for the landfill operations. In general, the western side of the site falls from high points in the centre and the south-west near the entrance from Arumpo Road to the north western corner of the site. The eastern side of the site falls away from high points in the centre and south east of the site to the north east. Overall elevation change across the site (with the exception of landfilled and quarried areas) are relatively small.

Climate Conditions

Per the data presented in the Preliminary Scoping Report, Buronga has a warm (persistently dry) grassland climate, with hot dry summers and cold winters. Climate data required for the concept design will be sourced from the Bureau of Meteorology Mildura Airport climate station.



Resource Recovery

The current site provides drop off areas for recyclable wastes to be diverted for resource recovery as detailed above. Some materials (crushed bricks, concrete and tiles and clean soils) are used for operational purposes as appropriate. Other recyclables are removed from site by contractors for resource recovery. Appropriate areas for drop off and storage of recyclables will be provided on site.

The proposed development will include a 'zero-cost items' area where reusable items can be dropped off for no fee. This area will be located at the front end of the site where it can be accessed without entering the waste drop off areas of the site via the weighbridge. This area will also provide facilities for the resale of these items.

Proposed Site Layout

Waste Drop-off Facilities

Facilities for waste drop off will be provided in the south western area of the site. A zero-cost items area will be located off the access road prior to the weighbridge, with all vehicles accessing other areas of the site to pass over the weighbridge. Heavy vehicles will drop waste off directly at the tipface, with public vehicles turning to access a public waste drop-off area. This area will have separate drop off areas for various waste streams. A bulk-up area will be located near to the public waste drop off facility where commercial loads of recyclables can be dropped off and waste can be stored prior to removal from site for resource recovery. Council does not have accurate records of the volumes of recyclables to use in accurately sizing these areas so estimates will attempt to overestimate the likely footprint with further investigations required prior to design.

Separation Distances

200 m minimum separation distances will be provided from the proposed landfill cells to the site boundary to attenuate noise, odour and dust impacts to surrounding receptors and to allow supporting infrastructure and operational areas to be located outside of the landfill footprint. Existing vegetation within the site along Arumpo Road will be retained to screen operations, with additional planting to occur to improve screening if required.

Cell Layout

The proposed expansion to the landfill will be separated into several discrete cells to facilitate the staged construction, operation, and closure of the landfill cells. Cells will be sized to provide a lifespan of 4 to 5 years of filling in each cell, based upon a filling rate of 60,000 tonnes per annum at a density of 0.85 t/m³. Cells are expected to extend to approximately 5 metres below ground level with the exact depths dictated by the groundwater separation requirements. The design will provide 2 m separation to the lowest point of the floor of the cell, with the leachate sumps being 300 mm below this level. All cells will be lined with engineered lining and leachate collection systems consistent with the requirements of The Landfill Guideline.

Cell staging is proposed to progress from south to north on the western side of the site, followed by progress from west to east on the eastern side of the site. This staging is proposed to facilitate the two final landforms and to screen progressive filling works from Arumpo Road. This staged approach will also facilitate the capping and closure of the site to an appropriate landform should the site be closed prior to the full waste disposal capacity being exhausted.



Final Landform

The final landform will be designed in accordance with the requirements of The Landfill Guideline to facilitate the rehabilitation of the site following closure. The final landform is anticipated to extend to a height slightly higher than the landform of the existing waste disposal operations (approximately 59 mAHD). The final landform will be designed with grades no steeper than 1V:5H (20%) and no flatter than 5% to facilitate the drainage of stormwater and minimise the risk of erosion and scour of cover materials. A landform similar to parallel dunes in an east-west orientation has been selected as being sympathetic to other regional landforms.

The landform has been separated into two stages divided by a water management corridor to allow for final heights to remain below approximately 59 mAHD. This approach also allows for the first stage of the landform to be fully developed with minimal impacts to the remnant vegetation present in the eastern side of the site.

Leachate Management

The site currently has a single lined leachate pond which receives leachate collected from within the existing lined landfill cell for disposal via evaporation. The historical landfill area is unlined and does not contain a leachate collection system. The mean annual evaporation (2,190 mm) in Buronga greatly exceeds the mean annual rainfall (285 mm) leading to conditions that are favourable for the disposal of leachate through evaporation.

All future cells will include an engineered lining and leachate collection system meeting the requirements of The Landfill Guideline. The selection of the liner profile will consider the availability of suitable clay resources for clay liner construction. Leachate will be pumped from the cell sumps to a leachate basin or basins for disposal via evaporation. The basin/basins shall be lined to a standard equivalent to that of the landfill cells in accordance with the requirements of The Landfill Guideline. Landfill cells will be designed to exclude stormwater ingress and separate all leachate from uncontaminated stormwater.

A high-level leachate balance will be undertaken in accordance with the methodology nominated in The Landfill Guideline. This methodology consists of a leachate balance based upon assumed infiltration parameters and climate data to develop an appropriate sizing for the leachate basin/basins as a part of the concept design. The basins shall be sized to ensure compliance with the requirements for pond capacity under EPL 20209. Leachate basins will be located outside of the footprint of the landfill.

Stormwater Management

The LEMP requires that all stormwater runoff from disturbed areas is detained on site to prevent the discharge of any sediment laden water from site, stormwater shall only be released from site once the water quality is suitable for discharge.

As a part of the concept design, conceptual stormwater controls shall be nominated to prevent stormwater run-on to landfilled areas and to capture and detain stormwater on site. It is anticipated that these conceptual controls will identify the locations of drains and ponds but will not include sizing of these structures. The controls will be nominated to meet the required outcomes of Section 3 of The Landfill Guideline. These controls will be in accordance with the principles of Sections 3.1 and 3.2 of The Landfill Guideline for erosion control and sedimentation control respectively. It is proposed to estimate stormwater requirements for two stages of the landfill being completion of the western portion and then completion of the landfill.



Capping and Closure

The concept design will detail the final capping of each cell and the closure and rehabilitation of the landfill. Concept design for the final capping will be developed to achieve the outcomes for final capping and revegetation as nominated by The Landfill Guideline. A final cap profile will be nominated in accordance with the requirements of Section 9.1 of The Landfill Guideline. Staging of final capping will be nominated based upon the cell layout and expected rates of filling to facilitate the final capping and revegetation of cells shortly following the final delivery of waste to each cell.

The concept design will also nominate high level post-closure management and monitoring measures to ensure the continued integrity of environmental protection measures at the site. General post-closure management measures will be nominated to achieve the outcomes nominated in Section 10 of The Landfill Guideline. Monitoring measures will be nominated in accordance with the relevant sections and outcomes of The Landfill Guideline and will consist of high-level monitoring measures for:

- Landfill cap integrity and performance
- Groundwater
- Surface water
- Air (Landfill gas)

Yours sincerely,

Melissa Salt

Discipline Principal – Waste and Environment

Tonkin

202597L01RevB

5 July 2021

Director Finance and Policy
Wentworth Shire Council
26-28 Adelaide Street
WENTWORTH NSW 2648

Attention: Simon Rule

Dear Simon,

BURONGA LANDFILL CONCEPT DESIGN – BASIS OF DESIGN REPORT

Objectives

Tonkin has been engaged by Wentworth Shire Council (Council) to prepare an Environmental Impact Statement (EIS) for the proposed expansion of the Buronga Landfill. The EIS is required as a part of the Development Application for the expansion of the existing facility. As a part of the preparation of the EIS Tonkin have been engaged to prepare a concept design for the landfill facility.

The site is owned by Council and comprises approximately 124 Ha. The site is subject to Environmental Protection Licence (EPL) #20209 which covers the full 124 Ha extent of the site. The existing landfill operation occupies approximately 19 Ha in the southern area of the site, with one lined landfill cell operational and a historical, unlined landfill adjacent. The proposed expansion will include a staged expansion of the landfill to occupy the central area of the site, expected to comprise approximately an additional 56 Ha.

This concept design includes the design of the site in accordance with the *Environmental Guidelines: Solid Waste Landfills*, Second Edition (NSW EPA, 2016) (The Landfill Guideline) and concept layouts and detailing of the site. The concept design also includes a description and context for the design, operational measures including management of stormwater and leachate, monitoring requirements and proposed rehabilitation and post-closure management requirements.

This report has been prepared to establish the basis of design for the concept design of the Buronga Landfill expansion.

Key Design References and Criteria

The following site background information and input data have been referenced in undertaking this design:

Project Brief

- Tonkin (2020). *Buronga Landfill Expansion – Engagement and Management of Specialists for Environmental Impact Statement Inputs and Preparation of EIS*, Revision 2, 18 December 2020, Ref: 202597P001Rev2

Development Application Requirements

- Department of Planning, Industry and Environment (2020). *Planning Secretary's Environmental Assessment Requirements*, 11 November 2020, Application Number: SSD-10096818



Regulatory Requirements

- NSW Environment Protection Authority (2016). *Environmental Guidelines: Solid waste landfills*, Second Edition, April 2016, Ref: EPA 2016/0259.
- NSW Environment Protection Authority (2017). *Environment Protection Licence, Licence - 20209*, 24 November 2017.

Site Survey

- Price Merrett Consulting (2021). *Buronga Landfill, Contour and Feature Plan*, Revision 0, 4 March 2021, Ref: F8648-6257-1-Rev0

Other Input Data

- Tonkin (2017). *Buronga Landfill New Cell, Issued for Construction Drawing Set*, Revision A, January 2017, Ref: 20155461
- Tonkin (2020). *Buronga Landfill Proposed Expansion, Preliminary Scoping Report*, Revision 2, 8 October 2020, Ref: 20180746R001
- Tonkin (2021). *Geotechnical Investigation Report, Buronga Landfill Expansion*, Revision A, 14 April 2021, Ref: 202597R02A
- Tonkin (2021). *Groundwater Impact Assessment, Buronga Landfill Expansion*, Revision 0, 22 April 2021, Ref: 202597R03Rev0

Expected Waste Streams

The existing Buronga Landfill facility has experienced increased waste tonnages in recent years, with 23,800 tonnes received in 2017-18 increasing to a projected 29,000 tonnes of waste in 2019-20. Tonnages are expected to continue to increase in future years. The site is currently licenced to accept up to 30,000 tonnes of general waste for disposal per annum, the proposed development will be designed to allow the acceptance of up to 100,000 tonnes of general solid waste per year.

The Buronga Landfill currently provides facilities for public drop-off of recyclable wastes into separate areas to facilitate resource recovery. The proposed expansion to the facility will improve these facilities and allow for the acceptance of additional recyclable material. It is expected that recyclable wastes accepted will include:

- Construction & demolition waste such as concrete, tiles and masonry;
- Waste oils;
- Clean soils;
- Green waste;
- Scrap metal;
- Glass and plastic containers; and
- Cardboard and paper.

The site also currently has a Community Recycling Centre (CRC) constructed under a NSW EPA Initiative. This facility accepts hazardous waste from the public including paints, waste oils, household batteries, car batteries, fluorescent lighting, gas cylinders and smoke detectors. The proposed expansion will retain drop off facilities for these household hazardous wastes.



Key Site Constraints Identified

Existing Waste Disposal Areas

The southern area of the site is an existing landfill operation. The site was first used for waste disposal in 1934, and in 1967 the site was trusted to the Wentworth Shire Council for use in landfilling. The site has been operated by various parties but has been operated by Council since 2015. Historically landfilling has been undertaken on the eastern portion of the existing landfill site, with the majority of the filling occurring above ground. The first lined landfill cell was completed in 2017 in accordance with The Landfill Guideline and is the current active landfill cell at the site.

The proposed expansion is to occur to the north of the existing waste disposal operation. The design of the expansion is expected to consist of filling against the existing waste batter slopes and away from the existing landfill. This approach will allow for a consistent landform across the site instead of two isolated landfill footprints. This facilitates efficient usage of the site for waste disposal and minimises environmental impact.

The Landfill Guideline sets out requirements for landfilling over an existing closed landfill cell, these requirements include:

- The proposed cell should be self-contained and operate separately from the old cell on which it is placed, and should not compromise ongoing collection and management of leachate and gas from the old cell.
- The leachate barrier should not be damaged by settlement of waste in the old cell.
- There should be a stiff foundation or bridging layer below the leachate barrier to protect it from deformations.
- The liner system should have adequate slope stability and should not compromise the stability of existing slopes.
- The cell design should consider the generation of landfill gas beneath the barrier system.

The extent of historical waste filling is not well understood. It is likely that the expansion will include filling over the closed cells in the southern area of the site. This will require consideration during detailed design to better understand the extent of waste and any requirements for lining over existing landfilled waste. The concept design will nominate the approximate extent of landfilled waste and piggyback lining required, but this will need to be further investigated during detailed design of the facility.

Existing Infrastructure and Services

The site currently has several buildings and structures associated with the landfill operation located in the south western corner of the site. Buildings include a weighbridge on the access road to the site, small site offices and sheds and a community recycling centre. The weighbridge is proposed to remain in the same location; however all other sheds and structures can be moved as a part of the development.

Telecommunications services run along Arumpo Road and enter the site along the access road. A Dial-Before-You-Dig (DBYD) search suggests that the telecommunications services that enter the site are inactive. TransGrid fibre optic communications services run along Arumpo Road. According to mapping available through a DBYD search, this cable runs within the site along its extreme western margin in some areas. The concept design will avoid impacting the area as shown from the DBYD mapping, however the location of this cable should be confirmed by Council prior to construction or detailed design.



Hydrogeology & Groundwater

A groundwater impact assessment (GIA) was prepared by Tonkin as a part of the EIS preparation (Tonkin, 2021). No piezometers are present at the site to indicate standing water levels (SWLs) however groundwater was encountered in boreholes produced as a part of geotechnical investigations undertaken by Tonkin in 2021. Groundwater was observed between 6.8 m below ground level (mBGL) and 9.7 mBGL, with one day stabilisation at between 5.9 mBGL and 9.5 mBGL in boreholes that did not collapse. The GIA suggests that true groundwater levels may be within the order of 5.0 to 7.5 m BGL based on the investigations undertaken and the regional groundwater levels. It was identified that groundwater levels are controlled by regional and local recharge, and prolonged heavy rainfall periods could see rises in the groundwater level.

The facility design will consider the groundwater surface identified as a part of the GIA. In line with best practice the design will provide 2 m separation to the lowest point of the floor of the cell, with the leachate sumps being 300 mm below this level.

Geotechnical Conditions

A geotechnical investigation was undertaken by Tonkin in early 2021 consisting of 12 boreholes advanced across the proposed expansion footprint. Investigations extended to up to 10 metres below ground level.

Geotechnical conditions are not expected to present an issue to the expansion of the landfill with favourable conditions for excavatability and excavation stability. Clay and Sandy Clay soils described in the report may be suitable for use in cell lining works. Clay and Sandy Clay soils were encountered at various depths across the site; with the top of the unit encountered between 3.5 mBGL and 7.1 mBGL across the site, with the exception of the north eastern corner of the site where these soils were encountered from within 0.1 m of the surface. The selection of the liner profile will consider the available quantities of material within the cell excavations.

Site Topography

The site has been modified by the existing landfill operation in the southern area of the site and by historical quarry and borrow pit activities in the central area of the site. The southern area of the site that has been filled has a peak of approximately 56 mAHD with batters at grades of approximately 1V:5H to the surrounding ground level. The existing landfill cell is currently being filled and is at levels similar to the surrounding ground level. Filling will continue in this cell to reach similar levels to the surrounding historical landfill.

Several low points and ridges are present in the central area of the site. This area has been disturbed by former quarrying activities and is currently used as a borrow source for soil for the landfill operations. In general, the western side of the site falls from high points in the centre and the south-west near the entrance from Arumpo Road to the north western corner of the site. The eastern side of the site falls away from high points in the centre and south east of the site to the north east. Overall elevation change across the site (with the exception of landfilled and quarried areas) are relatively small.

Climate Conditions

Per the data presented in the Preliminary Scoping Report, Buronga has a warm (persistently dry) grassland climate, with hot dry summers and cold winters. Climate data required for the concept design will be sourced from the Bureau of Meteorology Mildura Airport climate station.



Resource Recovery

The current site provides drop off areas for recyclable wastes to be diverted for resource recovery as detailed above. Some materials (crushed bricks, concrete and tiles and clean soils) are used for operational purposes as appropriate. Other recyclables are removed from site by contractors for resource recovery. Appropriate areas for drop off and storage of recyclables will be provided on site.

The proposed development will include a 'zero-cost items' area where reusable items can be dropped off for no fee. This area will be located at the front end of the site where it can be accessed without entering the waste drop off areas of the site via the weighbridge. This area will also provide facilities for the resale of these items.

Proposed Site Layout

Waste Drop-off Facilities

Facilities for waste drop off will be provided in the south western area of the site. A zero-cost items area will be located off the access road prior to the weighbridge, with all vehicles accessing other areas of the site to pass over the weighbridge. Heavy vehicles will drop waste off directly at the tipface, with public vehicles turning to access a public waste drop-off area. This area will have separate drop off areas for various waste streams. A bulk-up area will be located near to the public waste drop off facility where commercial loads of recyclables can be dropped off and waste can be stored prior to removal from site for resource recovery. Council does not have accurate records of the volumes of recyclables to use in accurately sizing these areas so estimates will attempt to overestimate the likely footprint with further investigations required prior to design.

Separation Distances

200 m minimum separation distances will be provided from the proposed landfill cells to the site boundary to attenuate noise, odour and dust impacts to surrounding receptors and to allow supporting infrastructure and operational areas to be located outside of the landfill footprint. Existing vegetation within the site along Arumpo Road will be retained to screen operations, with additional planting to occur to improve screening if required.

Cell Layout

The proposed expansion to the landfill will be separated into several discrete cells to facilitate the staged construction, operation, and closure of the landfill cells. Cells will be sized to provide a lifespan of 4 to 5 years of filling in each cell, based upon a filling rate of 60,000 tonnes per annum at a density of 0.85 t/m³. Cells are expected to extend to approximately 5 metres below ground level with the exact depths dictated by the groundwater separation requirements. The design will provide 2 m separation to the lowest point of the floor of the cell, with the leachate sumps being 300 mm below this level. All cells will be lined with engineered lining and leachate collection systems consistent with the requirements of The Landfill Guideline.

Cell staging is proposed to progress from south to north on the western side of the site, followed by progress from west to east on the eastern side of the site. This staging is proposed to facilitate the two final landforms and to screen progressive filling works from Arumpo Road. This staged approach will also facilitate the capping and closure of the site to an appropriate landform should the site be closed prior to the full waste disposal capacity being exhausted.



Final Landform

The final landform will be designed in accordance with the requirements of The Landfill Guideline to facilitate the rehabilitation of the site following closure. The final landform is anticipated to extend to a height slightly higher than the landform of the existing waste disposal operations (approximately 59 mAHD). The final landform will be designed with grades no steeper than 1V:5H (20%) and no flatter than 5% to facilitate the drainage of stormwater and minimise the risk of erosion and scour of cover materials. A landform similar to parallel dunes in an east-west orientation has been selected as being sympathetic to other regional landforms.

The landform has been separated into two stages divided by a water management corridor to allow for final heights to remain below approximately 59 mAHD. This approach also allows for the first stage of the landform to be fully developed with minimal impacts to the remnant vegetation present in the eastern side of the site.

Leachate Management

The site currently has a single lined leachate pond which receives leachate collected from within the existing lined landfill cell for disposal via evaporation. The historical landfill area is unlined and does not contain a leachate collection system. The mean annual evaporation (2,190 mm) in Buronga greatly exceeds the mean annual rainfall (285 mm) leading to conditions that are favourable for the disposal of leachate through evaporation.

All future cells will include an engineered lining and leachate collection system meeting the requirements of The Landfill Guideline. The selection of the liner profile will consider the availability of suitable clay resources for clay liner construction. Leachate will be pumped from the cell sumps to a leachate basin or basins for disposal via evaporation. The basin/basins shall be lined to a standard equivalent to that of the landfill cells in accordance with the requirements of The Landfill Guideline. Landfill cells will be designed to exclude stormwater ingress and separate all leachate from uncontaminated stormwater.

A high-level leachate balance will be undertaken in accordance with the methodology nominated in The Landfill Guideline. This methodology consists of a leachate balance based upon assumed infiltration parameters and climate data to develop an appropriate sizing for the leachate basin/basins as a part of the concept design. The basins shall be sized to ensure compliance with the requirements for pond capacity under EPL 20209. Leachate basins will be located outside of the footprint of the landfill.

Stormwater Management

The LEMP requires that all stormwater runoff from disturbed areas is detained on site to prevent the discharge of any sediment laden water from site, stormwater shall only be released from site once the water quality is suitable for discharge.

As a part of the concept design, conceptual stormwater controls shall be nominated to prevent stormwater run-on to landfilled areas and to capture and detain stormwater on site. It is anticipated that these conceptual controls will identify the locations of drains and ponds but will not include sizing of these structures. The controls will be nominated to meet the required outcomes of Section 3 of The Landfill Guideline. These controls will be in accordance with the principles of Sections 3.1 and 3.2 of The Landfill Guideline for erosion control and sedimentation control respectively. It is proposed to estimate stormwater requirements for two stages of the landfill being completion of the western portion and then completion of the landfill.



Capping and Closure

The concept design will detail the final capping of each cell and the closure and rehabilitation of the landfill. Concept design for the final capping will be developed to achieve the outcomes for final capping and revegetation as nominated by The Landfill Guideline. A final cap profile will be nominated in accordance with the requirements of Section 9.1 of The Landfill Guideline. Staging of final capping will be nominated based upon the cell layout and expected rates of filling to facilitate the final capping and revegetation of cells shortly following the final delivery of waste to each cell.

The concept design will also nominate high level post-closure management and monitoring measures to ensure the continued integrity of environmental protection measures at the site. General post-closure management measures will be nominated to achieve the outcomes nominated in Section 10 of The Landfill Guideline. Monitoring measures will be nominated in accordance with the relevant sections and outcomes of The Landfill Guideline and will consist of high-level monitoring measures for:

- Landfill cap integrity and performance
- Groundwater
- Surface water
- Air (Landfill gas)

Yours sincerely,

Melissa Salt

Discipline Principal – Waste and Environment

Tonkin



Appendix D. Quantity Survey



Project Name: Buronga Landfill Expansion

Report: Concept Design Estimate No. 2

Introduction

- A Capisce Qs has been requested by Tonkin to provide a Concept Design Estimate based upon current documentation for the Buronga Landfill Expansion Wentworth Shire Council, New South Wales.
- B Works comprise of the following:
- Stage 1 & Stage 2
- Excavation and stockpile of material materials to form landfill area
 - Lining of landfill base in accordance with NSW guidelines (as advised)
 - Incorporation of stormwater pond including swale drainage channels
 - Forming leachate pond including pipework
- Cell Cap (to entire site)
- 1000m subsoil / overburden
 - 200mm topsoil
 - Light vegetation covering
- Additional Facilities
- 35m x 20m Front End Recycling Facility / Resource Recover area (rubble hardstand, 150m² enclosure with 15m² carport adjacent)
 - 35m x 25m Community Transfer Area (concrete hardstand with 15m x 10m unenclosed open canopy)
 - Relocation of transportable Administration Building (to alternate location within site)
 - New Administration Building and Amenities (ATCO transportables or similar)
 - 20m x 15m Maintenance Area (concrete hardstand with 150m² unenclosed open canopy)
 - 4,200m of unsealed haul road around perimeter of landfill
 - 15m x 20m Residual Drop-Off Area (concrete hardstand)

Assumption

- A Our estimate is based on a single construction utilising Lump Sum procurement approach and excludes GST;
- B We have priced the works based on current rates. We have not been informed when works will commence or to be completed therefore we have made no allowance for escalation costs;
- C We have allowed for an approximate site area of 280,000m² (Stage 1) and 215,000m² (Stage 2) as measured on plan from the Proposed Cell Layout Drawing;
- D We assume a cell lining for the entire Stage 1 area is carried out concurrently, and Stage 2 site area is carried out concurrently (ie. no allowance for individual staged cell lining within Stage 1 and Stage 2);
- E We assume there is sufficient area on site to stockpile excavated material;
- F We have included cut volumes of 2,103,453m³ (Stage 1) and 1,185,441m³ (Stage 2) as advised by Tonkin;
- G We have included PC Sum allowance for the clearance of vegetation (trees / shrubs, etc.) within Stage 1 and Stage 2 works - pending investigation;
- H We have assume a 1:3 batter (based on a 2m depth) to the perimeter of Stage 1 and Stage 2 areas;
- I We assume compacted engineered fill material is locally sourced - pending investigation;
- J We have included a cell cap to the entirety of stage 1 and stage 2. This does not take into consideration staging of capping works or escalation in costs to the date of capping completion (timeline or program of capping not defined). This is an indicative figure only in order to understand cost implications for capping;

P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Basis of Estimate**

- K We assume stormwater drainage will be in the form of open swales (no allowance for in-ground pipework and pits);
- L We have assumed thicknesses of pavements for the Additional Infrastructure areas as detailed within the Cost Estimate;
- M We assume a width of 8m for the unsealed haulage road;
- N We have made no allowance for locality loading - we assume all contractors will be locally based;
- O We have made the following allowances for the project and they are:
- P - 5% of construction cost for Design Development Contingency;
- Q - 8% of construction cost for Contractors Preliminaries and Supervision;
- R - 3% of construction cost for Contractors Margin and Overheads;
- S - 5% of construction cost for construction contingency;
- T Refer to estimate for detailed assumptions;

Exclusion

- A Professional fees;
- B Statutory fees;
- C Interest & Holding charges;
- D Land & Legal costs;
- E Escalation cost;
- F Latent conditions;
- G Hazardous and contaminated material removal (such as asbestos);
- H Contaminated material removal or rectification works;
- I De-watering / site drainage (construction drainage);
- J Gross pollutant traps / silt traps;
- K Soil stabilisation;
- L Dust control;
- M Filtering Stations;
- N Processing Plants;
- O Weigh Stations.
- P Costs associated within services infrastructure such as electrical, communication, water, gas etc;
- Q Gas management / LFG Flare location - as the gas generation rates are unknown, it is not possible to quantify required gas flares;
- R Removal or modification to Aboriginal Artifact Site;
- S Locality Loading;
- T After hours work;
- U Goods & Services Taxation (GST);
- V Refer to Estimate for other detailed exclusions;

Documents Used

- A This estimate is based on the following documentation received:
- B 202597 - 011 - Proposed Cell Layout
- C 202597 - 012 - Proposed Top of Cap Contours
- D 202597 - 013 - Stormwater Management Stage 1
- E 202597 - 014 - Stormwater Management Stage 2
- F Subsequent scope of works discussions with Tonkin;
- G 202597 - 010 Concept Design of Upgraded Recycling & Resources Recovery Areas

P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Project Summary**

<i>Ref</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Rate</i>	<i>Total</i>
N	Basis of Estimate				0
1	Stage 1	1	Item		46,382,157
2	Stage 2	1	Item		30,988,203
3	Additional Infrastructure	1	Item		1,486,894
4	Cell Cap to Entire Site	1	Item		21,292,938
	Civil Works Sub-Total (Excl. GST)				100,150,192
5	Design Development Contingency	5	%	100,150,192	5,007,510
6	Contractors Preliminaries and Supervision	8	%	105,157,701	8,412,616
7	Contractors Margin and Overheads	3	%	113,570,318	3,407,110
	Civil Works Total (Excl. GST)				116,977,427
8	Construction Contingency	5	%	116,977,427	5,848,871
9	Professional Fees	1	Item	Excl.	Excl.
	Project Total (Excl. GST)				122,826,299
	Cost Range				
10	Cost Range +10%				135,110,000
11	Cost Range -10%				111,670,000

P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

Ref	Description	Quantity	Unit	Rate	Total
1	<u>Stage 1</u>				46,382,157
1.1	<u>Site Preparation</u>				
1.2	PC Sum allowance to clear site of vegetation (grubbing up trees / shrubs and stockpile as mulch)	1	Item	50,000.00	50,000
1.3	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	280,846	m2	1.75	492,808
1.4	Allowance to excavate / cut to form landfill area including stockpile on site (quantity as advised by Tonkin)	2,103,453	m3	7.50	15,775,898
1.5	Allowance for fill (quantity as advised by Tonkin)	693	m3	5.00	3,465
1.6	Allowance to form batter (assumed 1:3) to perimeter of Stage 1 area	2,187	m	20.00	43,745
1.7	<u>Cell Lining</u>				
1.8	Level and grade subgrade ready to receive sub-base	280,846	m2	1.50	421,269
1.9	Supply and place 300mm compacted engineered fill including trimming and compacting (assume material locally sourced)	280,846	m2	27.00	7,582,842
1.10	Supply and place geosynthetic clay liner	280,846	m2	11.20	3,144,456
1.11	Supply and place 2.0mm HDPE geomembrane	280,846	m2	9.00	2,527,614
1.12	Supply and place cushion geotextile	280,846	m2	6.20	1,740,788
1.13	Supply and place 300mm leachate drainage gravel	280,846	m2	29.00	8,144,534
1.14	Supply and place separation geotextile	280,846	m2	6.20	1,740,788
1.15	Allowance for leachate pipework to cells - assumes DN110 PN8 PE 100 pipe including excavation and backfill (quantity as advised by Tonkin + wastage)	15,785	m	120.00	1,894,200
1.16	No allowance for dust control - TBA	1	Item	Excl.	0.00
1.17	Allowance for compaction testing	1	Item	80,000.00	80,000
1.18	Allowance for site surveys	1	Item	30,000.00	30,000
1.19	Allowance for independent HPDE testing	1	Item	80,000.00	80,000
1.20	Allowance for supervision for testing being carried out	1	Item	84,000.00	84,000
1.21	<u>Drainage</u>				
1.22	No allowance for cap drain - included in Cell Cap to Entire Site	2,549	m	Incl.	0.00
1.23	Allowance for stormwater drainage - assumed open swale	2,866	m	50.00	143,320
1.24	Allowance for grassing to swales including topsoil (assumes swales 1500mm W)	2,866	m	26.40	75,674
1.25	No allowance for AG drains / soakage pits (TBC)	1	Item	Excl.	0.00
1.26	No allowance for junction boxes / pits (open swale)	1	Item	Excl.	0.00
1.27	PC Sum allowance for pumping / de-watering - RISK ITEM - potential latent condition	1	Item	50,000.00	50,000
1.28	<u>Stormwater Pond</u>				
1.29	Allowance for excavation / cut to form stormwater pond (assume 1.5m deep) including stockpile material on site	16,669	m3	7.50	125,020
1.30	Allowance to form levee to perimeter of stormwater pond	770	m	40.00	30,817
1.31	Allowance for pond base (details unknown)	11,113	m2	40.00	444,515
1.32	No allowance for headwalls / pits (served by open swale drainage)	1	Item	Excl.	0.00

Capisce QS

P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

Ref	Description	Quantity	Unit	Rate	Total
1	<u>Stage 1</u>				46,382,157
1.33	<u>Leachate Pond</u>				
1.34	Allowance for excavation / cut to form leachate pond (assume 1.5m deep)	27,428	m3	7.50	205,708
1.35	Allowance to form levee to perimeter of leachate pond	546	m	70.00	38,189
1.36	Trim and compact sub-grade ready for works	18,285	m2	1.50	27,428
1.37	Supply and place 300mm compacted engineered fill (assume material locally sourced)	18,285	m2	27.00	493,700
1.38	Supply and place geosynthetic clay liner	18,285	m2	11.20	204,814
1.39	Supply and place 2.0mm HDPE geomembrane	18,285	m2	9.00	164,567
1.40	No allowance for filtering stations	1	Item	Excl.	0.00
1.41	<u>Leachate Pipework</u>				
1.42	Allowance for leachate pipework including excavation, supply and place DN110 PN8 PE 100 pipe and backfill (quantity as advised by Tonkin)	2,600	m	120.00	312,000
1.43	Allowance for leachate pipework pumps (quantity as advised by Tonkin) - assumed skid-mounted pump - details TBA	18	No	10,000.00	180,000
1.44	Provisional allowance for pits, junctions, headwalls, etc. - TBA	1	Item	50,000.00	50,000
1.45	No allowance for generators / power supplies / switchboards to pumps (assumed operational cost) - TBA	1	Item	Excl.	0.00
1.46	<u>Cell Cap (entire site)</u>				
1.47	Indicative cost included in Cell Cap for Entire Site cost breakdown	1	Note	Excl.	0.00
2	<u>Stage 2</u>				30,988,203
2.1	<u>Site Preparation</u>				
2.2	PC Sum allowance to clear site of vegetation (grubbing up trees / shrubs and stockpile as mulch)	1	Item	50,000.00	50,000
2.3	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	216,030	m2	1.75	378,000
2.4	Allowance to excavate / cut to form landfill area including stockpile on site (quantity as advised by Tonkin)	1,185,441	m3	7.50	8,890,808
2.5	No allowance for fill - not required as advised by Tonkin	1	Note	Excl.	0.00
2.6	Allowance to form batter (assumed 1:3) to perimeter of Stage 1 area	1,833	m	20.00	36,657
2.7	<u>Cell Lining</u>				
2.8	Level and grade subgrade ready to receive sub-base	216,030	m2	1.50	324,045
2.9	Supply and place 300mm compacted engineered fill including trimming and compacting (assume material locally sourced)	216,030	m2	27.00	5,832,810
2.10	Supply and place geosynthetic clay liner	216,030	m2	11.20	2,418,870
2.11	Supply and place 2.0mm HDPE geomembrane	216,030	m2	9.00	1,944,270
2.12	Supply and place cushion geotextile	216,030	m2	6.20	1,339,152
2.13	Supply and place 300mm leachate drainage gravel	216,030	m2	29.00	6,264,870

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P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

Ref	Description	Quantity	Unit	Rate	Total
2	<u>Stage 2</u>				30,988,203
2.14	Supply and place separation geotextile	216,030	m2	6.20	1,339,152
2.15	Allowance for leachate pipework to cells - assumes DN110 PN8 PE 100 pipe including excavation and backfill (quantity as advised by Tonkin + wastage)	12,177	m	120.00	1,461,240
2.16	Allowance for dust control	1	Item	Excl.	0.00
2.17	Allowance for compaction testing	1	Item	65,000.00	65,000
2.18	Allowance for site surveys	1	Item	30,000.00	30,000
2.19	Allowance for independent HPDE testing	1	Item	65,000.00	65,000
2.20	Allowance for supervision for testing being carried out	1	Item	70,000.00	70,000
2.21	<u>Drainage</u>				
2.22	No allowance for cap drain - included in Cell Cap to Entire Site cost	431	m	Incl.	0.00
2.23	Allowance for stormwater drainage - assumed open swale	1,078	m	50.00	53,881
2.24	Allowance for grassing to swales including topsoil	1,078	m	26.40	28,449
2.25	No allowance for cell drainage - assume operational cost	1	Item	Excl.	0.00
2.26	No allowance for junction boxes / pits (open swale)	1	Item	Excl.	0.00
2.27	PC Sum allowance for pumping / de-watering - RISK ITEM - potential latent condition	1	Item	50,000.00	50,000
2.28	<u>Stormwater Pond</u>				
2.29	No allowance for stormwater pond (completed in Stage 1 works)	1	Item	Incl.	0.00
2.30	<u>Leachate Pond</u>				
2.31	No allowance for leachate pond (completed in Stage 1 works)	1	Item	Incl.	0.00
2.32	<u>Leachate Pipework</u>				
2.33	Allowance for leachate pipework including excavation, supply and place DN110 PN8 PE 100 pipe and backfill (quantity as advised by Tonkin)	1,300	m	120.00	156,000
2.34	Allowance for leachate pipework pumps (quantity as advised by Tonkin)	15	No	10,000.00	150,000
2.35	Allowance for pits, junctions, headwalls, etc. - TBC	1	Item	40,000.00	40,000
2.36	<u>Cell Cap (entire site)</u>				
2.37	Indicative cost included in Cell Cap for Entire Site cost breakdown	1	Note	Excl.	0.00
3	<u>Additional Infrastructure</u>				1,486,894
3.1	<u>Front End Recycling Facility (30m x 15m)</u>	1			
3.2	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	450	m2	5.00	2,250
3.3	Allowance to supply and place quarry rubble (assume 100mm thk) including trimming and compacting (assumed locally sourced)	450	m2	15.00	6,751
3.4	No allowance for concrete handstand - as advised	1	Item	Excl.	Excl.

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P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

Ref	Description	Quantity	Unit	Rate	Total
3	<u>Additional Infrastructure</u>				1,486,894
3.5	Allowance for perimeter fencing including entry and exit gates	1	Item	20,000.00	20,000
3.6	Allowance for covered area and enclosure to Front End Recycling Facility - allowed 150m2 enclosed shed with 15m2 covered carport area adjacent - design details TBA	1	Item	120,000.00	120,000
3.7	No allowance for power, lighting or water supply to Front End Recycling Facility	1	Item	Excl.	0.00
3.8	Allowance for RORO Bin Storage Area (8m x 15m) - allowed clearing of site, supply and place of quarry rubble (assume 100mm thk) including trimming and compacting	120	m2	25.00	3,000
3.9	Allowance for Drum Muster Drop-Off Area (12m x 12m) - allowed clearing of site, supply and place of quarry rubble (assume 100mm thk) including trimming and compacting	144	m2	25.00	3,600
3.10	<u>Community Transfer Station / Resource Recovery Shed (35m x 25m)</u>	1			
3.11	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	875	m2	5.00	4,375
3.12	Allowance to supply and place sub-base (assume 100mm thk) including trimming and compacting	875	m2	14.00	12,251
3.13	Allowance for concrete hardstand (assume 100mm thk) including surface finish	875	m2	90.00	78,750
3.14	Allowance for joints (extent TBC)	1	Item	2,500.00	2,500
3.15	Allowance for stormwater drainage to hardstand - allowed 5 No. GIPs + 50m pipework and connection to existing - details TBA	1	Item	25,000.00	25,000
3.16	Allowance for canopy to Community Transfer Station - allowed 15m x 10m steel framed canopy including metal roof sheeting, columns and roof drainage (not enclosed - assume no power / lighting)	1	Item	40,000.00	40,000
3.17	Allowance for directional signage (extent TBA)	1	Item	5,000.00	5,000
3.18	No allowance for power or lighting to Community Transfer Station	1	Note	Excl.	Excl.
3.19	<u>Administration Building (assumed transportable building)</u>				
3.20	Allowance to relocate existing transportable Administration Building (to be located somewhere within property boundaries - location TBA) - assume crane and transport vehicle locally sourced	1	Item	18,500.00	18,500
3.21	Allowance for new site office / lunchroom and amenities - allowed 1 x transportable office building and 1 x small amenities block (ATCO or similar) including delivery to site and craneage	1	Item	95,000.00	95,000
3.22	<u>Maintenance Area (20m x 15m) - location TBA (not shown on drawing)</u>				
3.23	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	300	m2	5.00	1,500
3.24	Allowance to supply and place sub-base (assume 100mm thk) including trimming and compacting	300	m2	14.00	4,200

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P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

<i>Ref</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Rate</i>	<i>Total</i>
3	<u>Additional Infrastructure</u>				1,486,894
3.25	Allowance for concrete hardstand (assume 100mm thk) including surface finish	300	m2	90.00	27,000
3.26	Allowance for joints (TBC)	1	Item	1,500.00	1,500
3.27	Allowance for stormwater drainage to hardstand - allowed 2 No. GIPs + 20m pipework and connection to existing - details TBA	1	Item	12,000.00	12,000
3.28	Allowance for directional signage (extent TBA)	1	Item	5,000.00	5,000
3.29	Allowance for canopy to Maintenance Area - allowed 15m x 10m steel framed canopy including metal roof sheeting, columns and roof drainage (not enclosed)	1	Item	40,000.00	40,000
3.30	<u>Unsealed Haulage Road (4200m as advised)</u>				
3.31	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	33,600	m2	5.00	168,000
3.32	Allowance to supply and place fill for unsealed road including trimming and compacting (length of road as advised by Tonkin - assume width of 8m) - assume to remain in position (ie. no allowance for removal upon completion of works)	33,600	m2	22.00	739,216
3.33	<u>Residual Drop-Off Area (15m x 20m)</u>	1			
3.34	Allowance to clear area of topsoil and debris ready for works (assume stockpile on site)	300	m2	5.00	1,500
3.35	Allowance to supply and place sub-base (assume 100mm thk) including trimming and compacting	300	m2	15.00	4,500
3.36	Allowance for concrete hardstand (assume 100mm thk) including surface finish	300	m2	90.00	27,000
3.37	Allowance for joints (TBC)	1	Item	1,500.00	1,500
3.38	Allowance for stormwater drainage to hardstand - allowed 2 No. GIPs + 20m pipework and connection to existing - details TBA	1	Item	12,000.00	12,000
3.39	Allowance for directional signage (extent TBA)	1	Item	5,000.00	5,000
3.40	<u>Excluded Areas:</u>				
3.41	No allowance for Future LFG Management Area - as the gas generation rates are unknown, it is not possible to quantify gas flare / LFG management facility	1	Item	Excl.	0.00
3.42	No allowance for carpark - assume existing	1	Item	Excl.	0.00
3.43	No allowance for Inert C&D Storage - excluded as advised	1	Item	Excl.	0.00
3.44	No allowance for Scrap Metal Storage - excluded as advised	1	Item	Excl.	0.00
3.45	No allowance for Greenwaste Storage - excluded as advised	1	Item	Excl.	0.00
3.46	No allowance for Tyres area - excluded as advised	1	Item	Excl.	0.00
3.47	No allowance for Weigh Bridge and Gate House - assume existing structures (to remain)	1	Item	Excl.	0.00
4	<u>Cell Cap to Entire Site</u>				21,292,938
4.1	Allowance to form 1000mm thk sub-soil cap (to entire site) - assumes use of stockpiled material from Stage 1 and Stage 2 (no allowance for imported fill)	521,720	m2	19.00	9,912,680

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P0292 - Buronga Landfill Expansion**Project: P0292 - Buronga Landfill Expansion****Cost Plan: Concept Design Estimate No. 2****Rev: Initial****Detailed Breakdown**

Ref	Description	Quantity	Unit	Rate	Total
4	<u>Cell Cap to Entire Site</u>				21,292,938
4.2	Allowance to supply and place 200mm topsoil including levelling	521,720	m2	12.00	6,260,640
4.3	Allowance for ground cover including planting (average cost - details TBA)	496,876	m2	9.00	4,471,884
4.4	Provisional allowance for small shrub covering - assumes 1 No. per 10m2 - required spacing / planting density TBA (no allowance for trees)	1	Item	450,000.00	450,000
4.5	Allowance for cap drainage - details TBA - assumed open swale	3,042	m	65.00	197,734
4.6	No allowance for escalation - estimated timeline / program for capping of entire landfill area is not known		Note	Excl.	0.00



Appendix E. Community and Stakeholder Participation Report (PlanCom Consulting, 2021)

Community and Stakeholder Participation Report

Buronga Landfill Expansion

**Engagement prior to the submission of the
Environmental Impact Statement (EIS)**

PlanCom Consulting Pty Ltd

August 2021



Contents

1.	Overview of this report.....	3
2.	The project.....	3
3.	Plans for engagement as part of this stage	3
4.	Objectives of the engagement.....	4
5.	Stakeholders	5
6.	Engagement activities and outcomes.....	5
	Notification by Letter.....	5
	Phone Calls.....	6
	Online interviews /meeting / responses on the phone.....	6
7.	Key issues and response to those issues	7
8.	Future approach to community and stakeholder engagement	10

Appendix A - List of Stakeholder organisations

Appendix B - Letter from Council General Manager to property owners and organisations

Appendix C - Details of the consultations and issues raised

1. Overview of this report

This is a report of the engagement with the community in advance of the submission of the Environmental Impact Statement (EIS) to accompany a Development Application (DA) for the proposed Buronga Landfill.

Wentworth Shire Council engaged PlanCom Consulting (PlanCom), a company based in NSW that specialises in planning and community engagement. PlanCom has extensive experience in engaging community and other stakeholders for environmental impact assessments and in particular State Significant Infrastructure and State Significant Development.

This is a report of the engagement activities and outcomes of these activities. PlanCom engaged with identified stakeholders to fulfill the requirements of the SEARs and act in the interest of Wentworth Shire Council (Council) to make the community aware of the proposed expansion of the landfill. As a result of the consultation there were several issues raised that the team has confirmed have either been addressed in the EIS or there has been further focus on these issues through what was learned in the consultation.

See section 7 of this report for more detail of the issues raised by stakeholders and responses to those issues.

2. The project

Buronga Landfill is owned by Council and is located on Arumpo Road Buronga approximately 4.5 km north northeast of the township of Buronga, NSW. Access to the Landfill is via Arumpo Road and Silver City Highway. The landfill operations currently occur in an area of approximately 19 ha, with the landfill footprint covering approximately 5 ha. The landfill is zoned SP2 (Waste or Resource Management Facility) and is surrounded by agricultural activities and remnant vegetation.

There are two businesses on Arumpo Road and the nearest residential property is about one kilometre north of the site on Arumpo Road. There are a number of agricultural and fruit growing properties that surround the site.

There has been few complaints about the operation on the existing site. Complaints related to existing operations by Council have been about litter, dust, and odour. There has been concern about incidents related to the previous landfill operator.

The landfill is currently reaching its capacity. That is, there will be no space for future waste without this proposed expansion. It is this proposal to increase its size that leads to the need for the preparation of an EIS to accompany a DA at this time. The public will be invited to make formal submissions during the exhibition of the EIS.

3. Plans for engagement as part of this stage

The Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Industry and Environment (DPIE) requested that engagement be planned for and conducted in advance of the submission of the EIS. Council and Tonkin, the environmental consultants, endorsed this as good practice to ensure that issues are identified and addressed and to potentially minimise the requirement to

address some of these as additional issues through the EIS exhibition period and in response to submissions.

In accordance with the SEARs PlanCom developed and submitted to Council and the Tonkin team a 'Community and Stakeholder Participation Strategy' identifying key community members and other stakeholders and details and justification for the proposed consultation approach(s). It identified the activities, a list of companies or organisations in proximity to the site and identified those to receive emails and phone calls.

PlanCom has compiled in this 'Community and Stakeholder Engagement Report':

- Evidence of how each stakeholder identified in the strategy was consulted and the issues raised by the community and surrounding landowners and occupiers
- Information about how issues raised during consultation have been addressed and whether they have resulted in changes to the development
- Suggestion for the approach to future community and stakeholder engagement based on what was learned from this consultation.

The key messages in communication with the community and other stakeholders included that:

- Council is proposing to expand the Buronga Landfill to meet local and regional needs for the next 30 years.
- The expanded landfill provides for expanded recycling facilities and waste reduction in line with the NSW government Waste and Resource Recovery Strategy and the National Waste Action Plan which aims to reduce the amount of waste going to landfill.
- Council is preparing and will place on exhibition an EIS that will outline how potential environmental and social impacts will be managed.
- This EIS will aim to address issues raised by the community in relation to the expansion, so we are seeking feedback from the public at this time to identify issues.

4. Objectives of the engagement

The engagement plan was delivered in keeping with Council's Community Engagement Strategy 2016-2020. Specifically in line with this it aimed to engage effectively with a range of stakeholders and draw on peoples' knowledge to build support for, and involvement in the landfill expansion.

In line with the Core Values of Council and underlying principles of the strategy this engagement aimed to be:

- Inclusive and targeted
- Transparent
- Innovative and accessible, and
- Informative and respectful.

Council's Community Participation Plan outlines how the community might expect to be able to participate in the planning system. As this project is a State Significant Development it requires the preparation and exhibition of the EIS for 28 days. Prior to and during that exhibition Council will Inform, Consult and Consider as per Table 3 of Council's Community Participation Plan. Submissions from the public in response to the

EIS will be received by DPIE and considered in determining whether the landfill expansion should be approved.

The objectives of the engagement and associated actions are as follows:

Objective/ Approach	Justification/ Action
Create broad awareness of the planned expansion and the planning process.	Making people aware of the proposal, its objectives and the opportunities for input
Identify particular issues and impacts	Seek early input from the nearby community and other stakeholders into the issues that they may experience because of the project. We will actively seek input of those closest to the site.

5. Stakeholders

Consideration was given to the stakeholders who might be interested and impacted by this project. The focus of the consultation was to ensure those most directly impacted are aware of the proposed expansion and had the opportunity to identify issues for consideration in the EIS. Care was taken to ensure stakeholders knew there was further opportunity to make formal submissions to the DPIE in response to the EIS.

The consultation led by PlanCom focussed on trying to identify and reach:

- Surrounding landowners/neighbours
- Businesses in the vicinity and especially those likely to be impacted
- Community service providers
- Advocacy groups.
- Previous complainants.

The EIS project team led the consultation with government stakeholders and the outcomes of this consultation will be reported in other parts of the EIS. Aboriginal groups were targeted separately through the Cultural Heritage Study for the EIS.

Council took responsibility for engagement with Internal Council departments.

A list of stakeholder organisations that were contacted is provided in Appendix A.

6. Engagement activities and outcomes

The consultation took place over the months of April and May 2021. Meetings and discussions were predominantly with near neighbours and mostly businesses. They were aware of the existence of the landfill, and some were aware of the proposal to expand the landfill. The closest residential property is one kilometre to the north.

The consultation involved the following:

Notification by Letter

A letter from the General Manager of Council was sent by:

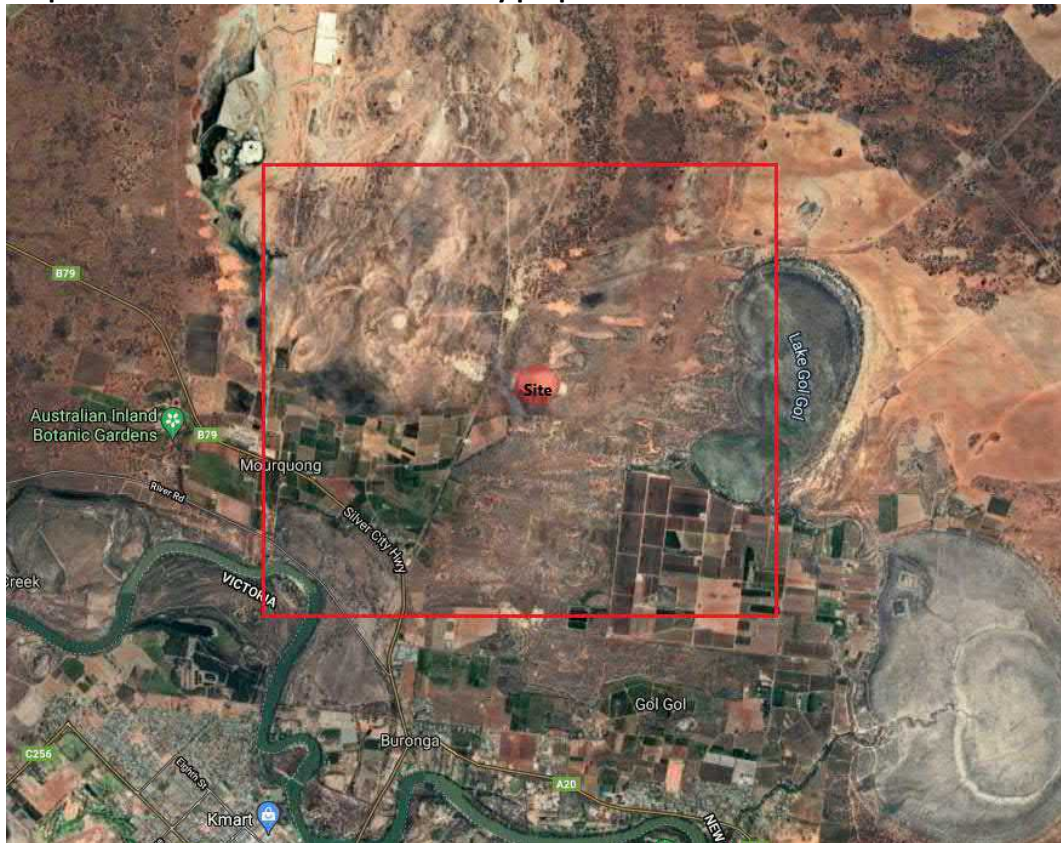
- post to 40 properties within 3 kilometres of the site. The map below shows the area that was used to generate letters from Council's General Manager to property owners.
- email to 14 identified organisations and potentially impacted stakeholders (about 5 of these were also captured by the postal distribution).

A copy of the letter from the General Manager to property owners is provide in Appendix B, the letter to organisations was the same but addressed differently.

The purpose of the letter was to make neighbours and other organisations aware of the proposal and invite them to make contact if they want to discuss the proposal and/or meet with the team.

There was no stakeholders that contacted the project team in response to the invitation to do so presented in the letter sent.

Map 1 -Area that Council used to identify properties to send notifications



Phone Calls

Some individuals and organisations were identified to follow up with a phone call and invitation to meet. They were selected because of the proximity of their property to the landfill or the nature of their business such that they may have impact and or interest in the proposal. There was effort to speak with food producers, businesses on Arumpo Road and the resident to the north. There was success in reaching most of these apart from Morello Gypsum on Arumpo Road. Phone calls and messages did not lead to a response.

Online interviews /meeting / responses on the phone

There were a total of two meetings arranged via Zoom. The purpose was to brief people about the plans and timing of the EIS process and learn of any issues in relation to the proposal.

There were five responses provided over the phone, one an arranged appointment and two were subsequent calls that followed emails to the stakeholders and giving them time to consider their responses and potential concerns.

7. Key issues and response to those issues

The following table is a summary of the issues raised through this consultation and responses from the team to the issues raised. A more complete summary of each of the meetings and phone calls is detailed in Appendix C.

Issue raised	Response - address of issues and any changes to the proposal
Need for local waste management services – improved capacity for recycling, increased pick-up services have resulted in less illegal dumping, want to retain local services	<p>The project proposes to improve community recycling facilities by providing additional drop off facilities aimed at improving diversion of recyclables from the waste stream. We note the request for additional drum muster storage and have accommodated this into the concept design.</p> <p>The project will also provide surety of local community services into the future. Current projection has the site closing in approximately 5 years' time with no alternative disposal facilities identified. Approval of the project site will provide security for diversionary and disposal options for the community for many years to come.</p>
Nature of the material to be accepted by the landfill and need to control what is accepted in the interest of other industry including agriculture	<p>The same waste streams are proposed to be accepted as are part of the current licence. There is no plan to change this as part of this project.</p> <p>All quarantine waste, regardless of its origin, is handled and immediately buried in accordance with Commonwealth and State guidelines to minimise any potential to impact the surrounding agricultural industry.</p> <p>All waste able to be accepted at Buronga that cannot be reused or recycled, is placed within engineered landfill cells designed in accordance with NSW EPA Solid Waste Landfill Guidelines. The cell is lined with bentonite clay (known as geosynthetic clay liner, GCL) and high density polyethylene (HDPE) which is under the constant supervision of an independent geotechnical inspection and testing authority to provide quality control. This encapsulates the waste and prevents contaminants entering the surrounding environment</p>
Need for control over the operations	<p>Site operations are strictly controlled through EPA licence conditions and a detailed Landfill Environmental Management Plan (LEMP). WSC carefully manages site operations to achieve compliance with these requirements and will continue to do so moving into the future.</p>
Traffic increase and need for improvement to roads as part of the project - Arumpo Road being one in the interest of	<p>A traffic assessment has been undertaken which has recommended improvements to Arumpo Road at the entrance to the Buronga Landfill to maintain a safe environment for local residents and waste transporters. It is noted that widening of shoulders has also been requested to improve residents' safety and it is noted that although the road width meets current standards, the sealed shoulder</p>

shared use and safety	width can be improved. Further consultation will be held with local residents to discuss timeframes for completion of shoulder sealing.
Access to the site and in appropriate use of certain roads	Morquong Road was noted to be used by large trucks. It is unclear if these trucks are related to the landfill or to other industries. WSC will undertake further consultation on this matter to determine an appropriate response, which may include options such as load limits. Improvement made to Arumpo Road should also assist in encouraging large trucks to use this road rather than smaller roads.
Dust from traffic, landfill, and other existing industry	<p>Dust from construction and during operations is minimised as required by the licence. The LEMP identifies the following measures to assist in minimising dust:</p> <ul style="list-style-type: none"> • Immediate burial of dusty loads • Entrance and site access roads to be maintained and watered if required • Speed limits enforced on site • Earthworks avoided on days with moderate winds or stronger where practical • Soil dampened during excavation • Water truck used as required for operations likely to cause dust, e.g. crushing concrete, chipping green waste. <p>The project proposes to retain the vegetation along Arumpo Road and set back the landfill operations over 200 m from the boundaries to assist in minimises the impact of dust generated on road users and surrounding residents.</p>
Odour	<p>As described in the LEMP, odour from the landfill is controlled by compacting the waste as it is received, minimising the size of the waste placement area, immediately covering malodorous waste and covering the exposed waste surface with daily cover (soil) at the end of each day.</p> <p>As stated, the project proposes to keep a minimum 200 m buffer from the boundary to further minimise the potential for odour to be a nuisance to neighbours.</p>
Litter	<p>Litter is managed in accordance with the licence with the control measures specified in the LEMP, including:</p> <ul style="list-style-type: none"> • Maintaining a small active waste placement area; • Compacting and covering the waste; • Deploying litter fences around the active tipping area as required; • Fencing the site. <p>The project proposes a 200 m buffer from the landfill, bulking up areas and waste transfer station to the site boundary and</p>

	will retain and protect existing vegetation along Arumpo Road.
Fires in the landfill and resulting impact on air quality and odour	Landfill fires may occur due to the inappropriate disposal of spontaneously combustible waste, such as batteries, in the municipal solid waste. They are controlled as far as practical by limiting the acceptance of flammable wastes. The project proposes to improve the handling and sorting of recyclable waste such as green waste. Improved handling and limitations on the volume of potential flammable wastes retained on-site will assist in reducing the frequency of fires.
Land use - potential for conflicts with agricultural land use	No rezoning of land is proposed as part of this project. The site is currently appropriately zoned and the surrounding areas are zoned rural. This project does not propose to rezone surrounding land.
Visual impact as result of the height of the filled area	The existing height of the landfill is 56 m AHD with the expanded landfill proposed to reach a maximum height of 59 m AHD. The landform has been designed as a series of rolling dunes to replicate similar east-west dunes in this area. In addition, it is proposed to revegetate the final landform with endemic native species which includes a range of grasses, forbs, shrubs and potentially trees to soften the landform outline and match in with the local colour palette.
Commercial interest - supply to the landfill, use of the service, expansion of nearby industrial development	WSC will undertake further discussion with the specific parties in relation to their interests that were expressed through the consultation.
Future consultation and desire to be informed about the release of the EIS	WSC has undertaken to continue to inform, consult and consider feedback from the community in accordance with the Community Engagement Plan. All parties contacted during this EIS development phase have been provided these responses and will be notified when the EIS has been submitted and the public exhibition commences. They will be provided with information about how to make a submission to Department of Planning, Industry and Environment.

8. Future approach to community and stakeholder engagement

Formal submissions to the EIS may raise further issues that impact recommendations about future consultation. Based on the consultation at this stage the future engagement should give information to all but be focussed on the needs of immediate commercial neighbours.

Recommendations for future consultation would be:

- Ensuring that all those contacted as part of this stage are notified by email when the EIS is on exhibition.
- Information about the proposal should be provided through Council newsletters and communication and via the website.
- Further meetings or information session should be offered during the EIS exhibition period. This may be just an advertised time when people can attend at Council, view maps, and have any questions answered with Council staff available.
- Ensuring that all near neighbours have a contact name and number for a person in Council who can address any operational concerns on site or incidents such as illegal dumping.
- Information should be provided to the agricultural community but available to all stakeholders about the operations and controls. This is to reassure those with concerns about the impact on local activities including food production.

Appendix A - List of Stakeholder organisations

Stakeholders	Consultation Mechanism	Address
Businesses		
Arumpo Bentonite (mining)	Online Meeting	
Antony Grape Farm	Online Meeting	1187 Arumpo Road, Buronga NSW 2739
AW & JA Barnfield	Phone call	PO Box 246 Buronga NSW 2739
Duxton Buronga Winery	Phone call	1131 Silver City Hwy, Buronga NSW 2739
Mawsons Garden Centre	Email	Silver City Hwy, Buronga VIC 2379
Orange World	Phone call	93 Link Rd, Mourquong NSW 2739
Morello Gypsum	Phone call	
Pickering Transport Group	Email	86 Silver City Hwy, Buronga NSW 2739
Neighbouring Agriculturalist	Phone call	Arumpo Road
Agriculturalist	Phone call	
Community organisations		
Buronga Gol Gol Lions Club	Email	
Rotary Club of Wentworth	Email	
Schools		
Buronga Public School	Email	Chapman St, Buronga NSW 2739
Gol Gol Public School	Email	William St, Gol Gol NSW 2738

Appendix B - Letter from Council General Manager to property owners and organisations



Our Reference: DOC/21/7126
Your Reference:
Prepared By: Office of General Manager
Date: 12 April 2021

Dear Resident

BURONGA LANDFILL EXPANSION - STAKEHOLDER ENGAGEMENT

As an owner/leaseholder of land close to the site of the proposed Buronga Landfill Expansion, there will be future opportunity to make submissions to the NSW Government regarding the proposed development. At this time, Council wants to understand any matters that you would like to be considered as part of the assessment of impacts and preparation of an Environmental Impact Statement (EIS) for the proposed Landfill Expansion.

The Buronga Landfill is owned by Wentworth Shire Council and encompasses the Wentworth Community Recycling Centre. Council is proposing to expand the facility to meet local and regional needs for the next 30 years. It will also provide for expanded recycling facilities and reduction of waste going to landfill in line with the NSW Government Waste and Resource Recovery Strategy and the National Waste Action Plan.

Council is required to prepare an EIS which will be placed on public exhibition. The EIS will outline how potential environmental and social impacts will be managed. This will be assessed by the NSW Department of Planning, Industry and Environment (DPIE) as a State Significant Development.

More information about the project and the assessment process can be found on the DPIE website <https://www.planningportal.nsw.gov.au/major-projects/project/40406>. Via this link you will find the Preliminary Scoping Report that was prepared by Council to inform the Secretary's Environmental Assessment Requirements (SEARs) that are also available on this website.

The EIS is currently scheduled for public exhibition in mid-2021 and we are seeking to understand any community issues requiring consideration. Council has engaged independent consultants to prepare the EIS and PlanCom Consulting are assisting us in engaging with the community. Margaret Harvie is leading this and is interested to speak to anyone with matters of interest that they want to raise.

You are invited to make a time to meet online or via the phone with Margaret or Emma at Plancom.

- ☐ Phone - 1800 228 554
- ☐ Email - emma@plancom.com.au

You are requested to make contact prior to Friday 23 April 2021 so that Plancom representatives can arrange to meet with you prior to the end of April 2021.

Should you require any clarification of the content of this letter please do not hesitate to contact the Office of the General Manager on 03 5027 5027.

Yours sincerely

KEN ROSS
GENERAL MANAGER

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Page | 1

Appendix C - Details of the consultations and issues raised

Nearby businesses/ agriculturalists	
<p>Arumpo Bentonite - Zoom Meeting - CEO</p> <p>Facility opposite the site - produces bentonite - product use includes animal food</p>	<ul style="list-style-type: none"> • Supportive of industrial commercial development in Wentworth Shire • Materials to be accepted by the landfill (Toxic Waste) - the use of the site for dumping of toxic or hazardous waste, i.e., asbestos, or radioactive material. Such activity would impact their production of food grade/stock feed on site • Traffic - there are currently 8 - 12 road trains/B-doubles entering and exiting their facility per day. Would like to keep in contact regarding traffic planning - suggestion of strips leading into the facilities to take trucks off the road. • Commercial interest - would like a commercial agreement with the landfill site to supply bentonite • Future consultation - would like to be notified when EIS is on exhibition
<p>Antony Grape Farm Zoom Meeting with the owner</p> <p>Adjoining agricultural property that his son lives on. It produces table grapes for export (mostly to China)</p>	<ul style="list-style-type: none"> • Dust - with the increase in traffic there will be increase in dust. Dust also comes from Arumpo as well as landfill - all to be exacerbated by the additional activity. • Odour - only a slight issue at present but he is concerned how this may increase with expansion • Visual (height)- concerned about the appearance and in particular the height of the landfill. Can see increase in height of late and does not want to see it get any higher. Would like Council to review their position on the potential height. • Traffic and road- concern about traffic increase on road and the safety issues and the fact it is not up to standard - too narrow and dangerous with passing trucks. Needs to be upgraded as part of the expansion. • Material going to landfill (fruit fly and soil contaminants) - concern that if material is coming from many places this may introduce fruit fly into the area. Also concern that it will be used as destination for soil contaminants
<p>Duxton Buronga Winery Environment Manager - phone call</p>	<ul style="list-style-type: none"> • Capacity of the Landfill - interested in the landfill being able to take additional waste. He believes that the volume for the region relative to demand is limited and there is need more local capacity. He mentioned Drum Muster waste capability needs to be increased (drum recycling program) - Buronga site needs to be able to take more - if not industry is forced to keep waste on site. <i>Referred to 20 litre containers and limit on number landfill can currently take.</i> They are required to call in advance to determine capacity. Need for expansion in both size and range of waste - hazardous waste streams and potentially new waste streams not currently taken. Industry currently needs to use Cleanaway for hazardous waste. Key message was that there are many wine producers in region and there is demand for waste related to this production and more local facilities for this waste. • No other issues - too far away for truck impacts. As they create own odour so no issues with odour

<p>Agricultural property - citrus, avocado, and wine grapes - phone discussion further to email with information.</p> <p>Closest landfill neighbour to gate - property is within 400 metres and 2.5 kilometres from the site.</p>	<ul style="list-style-type: none"> • Traffic and Road - Concern about the quantity of traffic. The lack of capacity and disrepair of the road and in particular the state of the road shoulder. He wants to see the road upgraded as part of the development. • Access to the Landfill - Concern about the use of Mourquong Road for tip trucks - it is not suitable for this - the route should not be used for large trucks. • Traffic and Safety - safety issues associated with the need to compete with trucks along that road including B-triples that go to the landfill. • Material going to landfill (mixed waste and asbestos and waste from out of the area) - mentioned the incident with the Asbestos going to the landfill. Believes that rubbish should be dealt with where it is generated and not brought in. The land fill should only receive waste from Wentworth Shire. • Illegal dumping - sometimes dumping occurs on adjoining farming properties when people drive to the landfill and find that it is not open. Since collection services have started/ increased the incident of this happening has reduced - less people drive there. • Regulation and control - The landfill needs to be well regulated to avoid incidents of the past. There have been B-doubles lined up in the morning waiting for the landfill to open. Pointed to the incident when one rolled over with asbestos. There was lack of regulation which is why Council took back the control from Cleanaway. Council need to maintain scrutiny of the landfill. • Fires - concern about the impact of fires at the land fill - these happen quite often (every 6 month or so) - this leads to people within the local area getting smoked out and creates a terrible smell. Wants to know Council's plans to respond to this issue in the future.
<p>Resident/property owner closest north of the site - phone discussion</p>	<ul style="list-style-type: none"> • Litter - the expansion needs to be not beyond the chain fence as this fence protects against litter - paper is his concern • Odour - in addition to paper he is worried about the smell • Future development - Has been discussing with Council a future development application on the site - a storage facility for trucking companies/heavy industrial subdivision.
<p>Previously local landowner/ producer - phone call</p>	<ul style="list-style-type: none"> • Land Use - was keen that Council understand that this is an agricultural area. • Material going to landfill - concerned about what goes into it in the future -, i.e., incident with asbestos.
<p>Orange World Owner - phone call</p>	<ul style="list-style-type: none"> • Operations are located further down the road so no concern or likely impacts.



Appendix F. Air Quality Assessment (Vipac Engineers & Scientist, 2021)



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Vipac Engineers & Scientists

Tonkin Consulting

Buronga Landfill Expansion

Air Quality Assessment

70B-21-0092-TRP-47306653-1

3 September 2021

Job Title: Buronga Landfill Expansion			
Report Title: Air Quality Assessment			
Document Reference: 70B-21-0092-TRP-47306653-1			
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Date: 3 September 2021			
REVISION HISTORY:			
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Rev. 01	Revision client comments	01/09/2021	S Thomas
Rev. 02			

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EXECUTIVE SUMMARY

Vipac Engineers and Scientists Ltd (Vipac) has been commissioned by Wentworth Shire Council to conduct an Air Quality Impact Assessment in support of the proposed landfill expansion at the Buronga Landfill situated at 258 Arumpo Rd Buronga (the Project). Due to the existing site approaching capacity, the expansion is expected to increase its capacity from 30,000 tonnes per annum to 100,000 tonnes per annum.

The overall approach to the assessment follows the guidance from *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* and the *Optimum CALPUFF modelling guidance for NSW* as follows:

- An emissions inventory of TSP, PM₁₀, PM_{2.5}, and deposited dust for the proposed Project was compiled using National Pollutant Inventory (NPI) and United States Environmental Protection Agency (USEPA) AP-42 emissions estimation methodology for the Project. Odour emissions from the landfill activities were conservatively derived from web-based research of measured data from similar facilities.
- Estimated emissions data was used as input for air dispersion modelling. The modelling techniques were based on a combination of The Air Pollution Model (TAPM) prognostic meteorological model (developed by CSIRO), and the CALMET model suite used to generate a three dimensional meteorological dataset for use in the CALPUFF dispersion model.
- The atmospheric dispersion modelling results were assessed against the air quality assessment criteria as part of the impact assessment. Air quality controls are applied to reduce emission rates where applicable.

As summarised in Table ES-1, the results of the modelling have shown that the odour, TSP and dust deposition predictions are below the relevant criteria for all averaging periods at all sensitive receptors. The annual average PM₁₀ and PM_{2.5} predictions are also below criteria.

The 24 hour average PM₁₀ and PM_{2.5} predictions are above the criteria. The exceedances are driven by the elevated background conservatively adopted for the assessment, which are already above the criteria. No additional exceedances of the criteria are predicted to occur as a result of the proposed Landfill expansion activities and that best management practices will be implemented to minimise emissions as far as is practical. As specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, under these circumstances no additional assessment is therefore required.

A greenhouse gas assessment has also been undertaken for the Project. This assessment determines the carbon dioxide equivalent (CO₂-e) emissions from the Project according to international and Federal guidelines. The estimated annual operational phase emissions (161,680 tonnes CO₂-e) represent approximately 0.03% of Australia's latest greenhouse inventory estimates of 532.5 MtCO₂-E (2019).

It is therefore concluded that air quality should not be a constraint to proposed landfill expansion.

Table ES-1 Summary of Results

Pollutant	Averaging Period	Criteria	Maximum Prediction at Any Receptor		Compliant
			In isolation	Cumulative	
TSP	Annual	90 µg/m ³	1.68 µg/m ³	53.18 µg/m ³	✓
PM10	24 Hour	50 µg/m ³	13.12 µg/m ³	114.7 µg/m ³	✓
	Annual	25 µg/m ³	0.62 µg/m ³	21.22 µg/m ³	✓
PM2.5	24 Hour	25 µg/m ³	2.11 µg/m ³	28.1 µg/m ³	✓
	Annual	8 µg/m ³	0.09 µg/m ³	7.49 µg/m ³	✓
Dust Deposition	Monthly Total	4 g/m ² /month	0.36 g/m ² /month	2.36 g/m ² /month	✓
	Monthly Increase	2 g/m ² /month	0.36 g/m ² /month	0.36 g/m ² /month	✓
Odour		7 OU	2.76 OU	2.76 OU	✓

TABLE OF CONTENTS

1	INTRODUCTION	7
2	PROJECT DESCRIPTION	7
2.1	OVERVIEW.....	7
2.2	SITE LOCATION.....	8
2.3	SITE ACCESS	8
2.4	OPERATIONAL HOURS	9
2.5	PROPOSED EQUIPMENT	9
3	POLLUTANTS OF CONCERN	9
4	REGULATORY FRAMEWORK	10
4.1	NATIONAL LEGISLATION	10
4.2	STATE LEGISLATION AND GUIDELINES	10
4.2.1	NSW EPA PARTICULATE AIR QUALITY STANDARDS	10
4.2.2	NSW EPA ODOUR STANDARDS	10
4.2.2.1	TECHNICAL OVERVIEW	10
4.2.2.2	ODOUR CRITERION.....	11
5	EXISTING ENVIRONMENT	12
5.1	LOCAL SETTING.....	12
5.2	SITE TOPOGRAPHY.....	12
5.3	DISPERSION METEOROLOGY	13
5.3.1	REGIONAL METEOROLOGY.....	13
5.3.2	LOCAL METEOROLOGY.....	14
5.3.2.1	INTRODUCTION	14
5.3.2.2	WIND SPEED AND DIRECTION.....	14
5.3.2.3	ATMOSPHERIC STABILITY	17
5.3.2.4	MIXING HEIGHT.....	18
5.4	EXISTING AIR QUALITY.....	18
6	METHODOLOGY	20
6.1	EMISSIONS INVENTORY	21
6.1.1	PARTICULATE MATTER EMISSIONS.....	21
6.1.2	ODOUR EMISSIONS	21
6.2	EMISSION CONTROLS	22
6.2.1	PARTICULATE MATTER.....	22
6.2.2	ODOUR	22
6.3	SOURCE EMISSION LOCATIONS	22

6.4	AIR DISPERSION MODELLING	23
6.4.1	TAPM.....	23
6.4.2	CALMET.....	23
6.4.3	CALPUFF	23
6.4.4	OTHER MODELLING INPUT PARAMETERS	24
6.4.4.1	PARTICLE SIZE DISTRIBUTION.....	24
6.4.4.2	SENSITIVE RECEPTORS.....	24
7	ASSESSMENT OF IMPACTS.....	25
7.1	TSP.....	25
7.2	PM10.....	25
7.3	PM2.5.....	26
7.4	DUST DEPOSITION.....	27
7.5	ODOUR.....	27
8	GREENHOUSE GAS	29
8.1	INTRODUCTION	29
8.2	BACKGROUND	29
8.3	LEGISLATION OVERVIEW.....	29
8.4	METHODOLOGY.....	29
8.5	QUANTIFICATION OF EMISSIONS	31
8.6	SUMMARY AND CONCLUSION.....	31
9	CONCLUSION.....	32
10	REFERENCES	33
	Appendix A EMISSIONS ESTIMATION METHODOLOGY.....	34
	Appendix B CONTOUR PLOTS	36

1 INTRODUCTION

Vipac Engineers and Scientists Ltd (Vipac) has been commissioned by Wentworth Shire Council (WSC) to prepare an Air Quality Impact Assessment in support of the proposed landfill expansion at the Buronga Landfill at 258 Arumpo Rd Buronga (the Project). Due to the existing site approaching capacity, the expansion is proposed to increase its capacity from 30,000 tonnes general waste per annum to 100,000 tonnes per annum.

The purpose of this assessment is to assess the potential impacts of air pollutants generated from the Project and to provide recommendations to mitigate any potential impacts that might have an effect on any sensitive receptors.

The assessment has been carried out in accordance with the NSW Environment Protection Authority's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.

2 PROJECT DESCRIPTION

2.1 OVERVIEW

The proposed expansion to the landfill will increase the total quantity of waste that WSC is licensed to landfill at the Buronga Landfill from 30,000 tonnes to 100,000 tonnes of general waste per annum. It will consist of the construction of multiple additional landfill cells over the next approximately 70 years comprising a volume of approximately 8.5 million m³ over an area of approximately 395,000 m² (including the current active landfill cell). The proposed expansion is to occur on the same site as the existing facility, but beyond the footprint of the current landfill operation and will operate as a regional landfill facility. Additional sheds, hardstands and associated infrastructure are proposed as a part of the development to facilitate resource recovery, separate general public and commercial clients and capture stormwater.

The design of the landfill cells will be in accordance with current best practices using the layout provided in Figure 2-1, with all cells lined for acceptance of general waste. Detailed design of the landfill cells will occur as required over the lifetime of the site with the design of the first additional cell anticipated to begin after development approval is granted. These cells will be designed in accordance with the NSW Landfill Guidelines and other industry best practices to minimise the environmental impact of the landfill operation. Leachate and stormwater management infrastructure will be provided as a part of the development, including leachate and stormwater ponds. Closure and rehabilitation plans will be developed as required for the landfill cells and implemented as the cells reach end of life. The closure and rehabilitation process involves capping the landfill cells to prevent water ingress and revegetating the site.

Buronga Landfill currently accepts building and demolition waste, general exempted waste, waste mineral oils, tyres, asbestos and general solid waste (both putrescible and non-putrescible) as permitted under the NSW EPA Licence 20209. The facility is licenced to:

- Receive up to 10,000 tonnes/year (t/yr) and store a maximum of 20,000 tonnes recovered aggregate (building & demolition waste);
- store up to 4,000 litres of waste mineral oil;
- Store 50 tonnes of tyres at any one time; and
- Dispose of 500 t/yr tyres, 500 t/yr asbestos and 30,000 t/yr general solid waste.

It will continue to accept the same categories of waste as permitted in the NSW EPA Licence 20209 for the operation of the Buronga Landfill. The proposed development has the following objectives:

- Increase the landfill lifespan by staged construction of additional landfill cells on the current site over a footprint of approximately 40 ha of the 124 ha site;

- Increase the maximum annual quantity of waste permitted to be accepted from 30,000 tonnes/yr to 100,000 t/yr of mixed waste.

2.2 SITE LOCATION

The Project Site comprises of the historical landfill at 258 Arumpo Rd, Buronga, the proposed expansion footprint and the licensed area, having a combined area of approximately 124ha. The environment surrounding the Project Site primarily consists of the following uses:

- Arumpo Bentonite mining company located on the opposite side of Arumpo Road from the project site.
- Morello Gypsum to the north of the Bentonite Mine.
- Southwest of the project site, on both sides of Arumpo Road, are rural lands, consisting of farms, mostly growing grapes and oranges, approximately 350ha.
- Southeast of the project site, is CB Foster Farm, consisting of rural lands.

Figure 2-1 shows the proposed site plan.



Figure 2-1 - Project Site Plan

2.3 SITE ACCESS

Access to the Project Site is directly from Arumpo Road which then connects with Silver City Highway, approximately 5km south of the site. All roads are bitumen sealed. The proposed waste facility will generate additional traffic and on site car parking demands. The primary traffic impact on local roads will be waste truck

delivery movements. The haulage route for truck traffic entering and leaving the waste facility will be Arumpo Road back to the Silver City Highway (and vice versa).

2.4 OPERATIONAL HOURS

The operating hours of the landfill are proposed to remain as currently licenced being:

- 6:00 am to 7:00 pm Monday to Friday; and
- 7:00 am to 6:00 pm Saturdays, Sundays and Public holidays.

2.5 PROPOSED EQUIPMENT

The proposed site equipment would include:

- 826 landfill compactor
- D7 dozer
- water truck (15kL)
- 20t excavator
- 30t tipper truck
- 12t loader
- tractor
- stormwater pump (diesel)
- leachate pumps (submersibles)
- 1 site vehicle
- weighbridge

3 POLLUTANTS OF CONCERN

The main emissions to air from landfill operations are caused by wind-borne dust, vehicle usage, materials handling and transfers. Fugitive air emissions can be estimated using emission factors combined with site-specific information such as the silt and moisture content of material being handled.

Dust is a generic term used to describe fine particles that are suspended in the atmosphere. The dust emissions considered in this report are particulate matter in various sizes:

- Total Suspended Particles (TSP) - Particulate matter with a diameter up to 50 microns;
- PM10 - Particulate matter less than 10 microns in size;
- PM2.5 - Particulate matter less than 2.5 microns in size; and
- Dust Deposition - deposited matter that falls out of the atmosphere.

As the landfill is proposed to accept general solid waste (both putrescible and non-putrescible), there is also potential for offsite odour impact. Odour is of particular concern and interest as a regulatory and community issue because of its ability to have direct sensory effects on people who are exposed to those emissions. This exposure can lead to nuisance and complaints, a situation that is often difficult to address in a purely quantitative manner.

4 REGULATORY FRAMEWORK

4.1 NATIONAL LEGISLATION

Australia's first national ambient air quality standards were outlined in 1998 as part of the National Environment Protection Measure for Ambient Air Quality (National Environment Protection Council, 1998).

The Ambient Air Measure (referred to as Air NEPM) sets national standards for the key air pollutants; carbon monoxide, ozone, sulfur dioxide, nitrogen dioxide, lead and particles (PM₁₀). A revision to the Measure was issued in 2003 with the inclusion of advisory PM_{2.5} standards. The Air NEPM requires the State's governments to monitor air quality and to identify potential air quality problems.

4.2 STATE LEGISLATION AND GUIDELINES

4.2.1 NSW EPA PARTICULATE AIR QUALITY STANDARDS

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW Environment Protection Authority, 2016) detail both the assessment methodology and criteria for air quality assessments. Due to the type of industry and proximity to sensitive receptors, the requirements for a Level 2 assessment have been followed.

The applicable criteria selected for this assessment are presented in *Table 4-1*.

Table 4-1: Project Air Quality Goals

Pollutant	Basis	Criteria	Averaging Time	Source
TSP	Human Health	90 µg/m ³	Annual	Approved Methods
PM ₁₀	Human Health	50 µg/m ³	24-hour	Approved Methods
	Human Health	25 µg/m ³	Annual	Approved Methods
PM _{2.5}	Human Health	25 µg/m ³	24-hour	Approved Methods
	Human Health	8 µg/m ³	Annual	Approved Methods
Dust deposition	Amenity	Maximum incremental increase of 2 g/m ² /month	Annual	Approved Methods
	Amenity	Maximum total of 4 g/m ² /month	Annual	Approved Methods

4.2.2 NSW EPA ODOUR STANDARDS

4.2.2.1 TECHNICAL OVERVIEW

In the context of environmental annoyance and nuisance, it is vital to address the response of individuals to the odour stimulus and the variance in this response across populations. Apart from the response to the physical characteristics of an odour if an individual believes that a specific odour has potential negative health implications, they are more likely to appraise that odour negatively.

The annoyance of an odour is a function of the FIDOL factors, which are Frequency, Intensity, Duration, Offensiveness and Location. The FIDOL factors can be used as a basic means of assessing the potential odour impact of proposed developments.

- Frequency indicates how often a person is exposed to an odour. Even an odour with pleasant hedonic tone can be perceived as a nuisance if exposure is too frequent. At low concentrations a rapidly fluctuating odour is more noticeable than a steady background odour; therefore a high frequency is an aggravating factor.

- Intensity indicates the strength of the odour; it is proportional to the \log_{10} of the odour concentration (Steven's law).
- Duration indicates the time length of an odour episode, i.e. how long the concentration remains consecutively above the odour threshold.
- Offensiveness is a mixture of odour character and hedonic tone at a given odour concentration. Some odours are universally considered offensive, such as decaying animal matter or rotten eggs. Other odours may be offensive only to those who suffer unwanted exposure, for example coffee roasting odour.
- Location indicates the type of land use and nature of human activities in the vicinity of an odour source. Particular attention must be paid to sensitive receptors, which include housing, schools, hospitals, commercial premises (such as restaurants, offices, shops etc.) and outdoor recreational space.

4.2.2.2 ODOUR CRITERION

Odour performance goals are designed to take into account the range in sensitivities to odours within the community and provide additional protection for individuals with a heightened response to odours, using a statistical approach which depends on the size of the affected population. As the affected population size increases, the number of sensitive individuals is also likely to increase, which suggests that more stringent goals are necessary in these situations. The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* include odour assessment criteria as shown in Table 4-2.

Table 4-2: Assessment Criteria for Odour (1 Second Average, 99th Percentile)

Population of Affected Community	Assessment Criteria for Complex Mixtures of Odours (OU)
Urban (>2000) and/or schools and hospitals	2
.500	3
.125	4
.30	5
.10	6
Single rural residence (<2)	7

An odour assessment criterion of 7 OU (peak 1-second average, 99th percentile) would appropriately assess the odour performance of the proposed landfill activities.

5 EXISTING ENVIRONMENT

5.1 LOCAL SETTING

The surrounding environment is primarily industrial sites to the west and north-west and farmland to the south-west. Farmland lies approximately 300m to the South and South West of the site, and two industrial site (bentonite suppliers) approximately 400m to the West and Morello Gypsum 500 m to the North West. The closest residential dwellings are approximately 1km to the South and Lake Gol Gol is approximately 1.8 km to the East. The proposed extension does not move the landfill closer to the residential property or to Lake Gol Gol. Figure 5-1 shows the location of project site, the land zones, the nearest rural dwellings and surrounding developments.



Figure 5-1: Project Site and Surrounding Developments

5.2 SITE TOPOGRAPHY

The natural topography of the site generally slopes to the east from a peak of approximately RL48 in the north-west corner to RL35 at a lower area at the eastern toe of the landfill with the final landform to be a maximum of 59m AHD. The NSW 1:50 000 Topographic Map (Mildura 7329-N, 2017) shows site levels are around 40m AHD. Drainage generally follows the natural gradient through constructed drains to the east around the toe of the previous landfill area to a sediment pond located in the south eastern corner of the site.

The area around the site is generally quite flat, with levels increasing to RL50 on the Eastern side of Lake Gol Gol approximately 4 km away from the site. A gully runs North-East to South-West across the site.

5.3 DISPERSION METEOROLOGY

5.3.1 REGIONAL METEOROLOGY

The nearest Bureau of Meteorology (BOM) station with long term data is at Mildura Airport (Site number 076031), located approximately 15 km southwest of the Project site. This monitoring station has recorded data since 1946 and a summary of the climate is presented in Table 5-1.

The long term mean temperature range is between 4°C and 33°C with the coldest month being July and the hottest months being December to March. Mean rainfall is consistent across the year but is typically higher in late winter to spring, rainfall in summer months typically occurs over a smaller number of higher intensity events, with the highest mean number of days of rain occurring in July. Rainfall reduces the dispersion of air emissions and therefore the potential impact on visual amenity and health.

Table 5-1: Long-term weather data for Mildura Airport [BOM]

Month	Temperature		Rainfall		9 am Conditions			3 pm Conditions		
	Max (°C)	Min (°C)	Mean Rain Days	No. of Days \geq 1 mm	Temp (°C)	RH (%)	Wind Speed (km/h)	Temp (°C)	Mean RH (%)	Wind Speed (km/h)
Jan	32.5	16.8	22.2	2.5	21.7	52	15.7	30.5	27	16.9
Feb	31.8	16.5	21.2	2.1	20.9	56	14.5	29.9	30	16
Mar	28.5	13.9	19.2	2.4	18.5	61	13.4	27.1	33	15.6
Apr	23.7	10.2	19.5	2.8	14.9	68	11.6	22.7	40	15.4
May	19.1	7.4	25.1	4.1	10.8	81	9.5	18.3	50	15.1
Jun	16	5.1	21.8	4.5	7.8	88	9.4	15.3	56	15.6
Jul	15.5	4.3	24.5	5	7.1	86	10.4	14.6	54	17.3
Aug	17.3	5.2	25.4	5.1	9.1	78	12.8	16.4	47	19.3
Sep	20.6	7.4	26.5	4.3	12.7	67	15.7	19.4	40	19.7
Oct	24.2	9.9	28.7	4.4	16.1	57	17.4	22.6	34	19.7
Nov	27.7	12.6	25.6	3.6	18.4	53	16.6	25.9	30	18.4
Dec	30.4	15	25	2.8	20.5	50	16	28.4	27	18.1
Annual	23.9	10.4	285.4	43.6	14.9	67	13.6	22.6	39	17.3

A review of the number of rainfall days per year at Mildura shows that on average rainfall is recorded on 43.6 days per year.

The long term wind roses recorded daily at the Mildura Airport station at 9am and 3pm are provided in Figure 5-2. Winds are shown to be primarily from the south and southeast at 9am and from the south, southwest and west directions at 3pm. Stronger winds ($>40\text{km/hr}$ or $>11.1\text{m/s}$) occur infrequently mostly from the west.

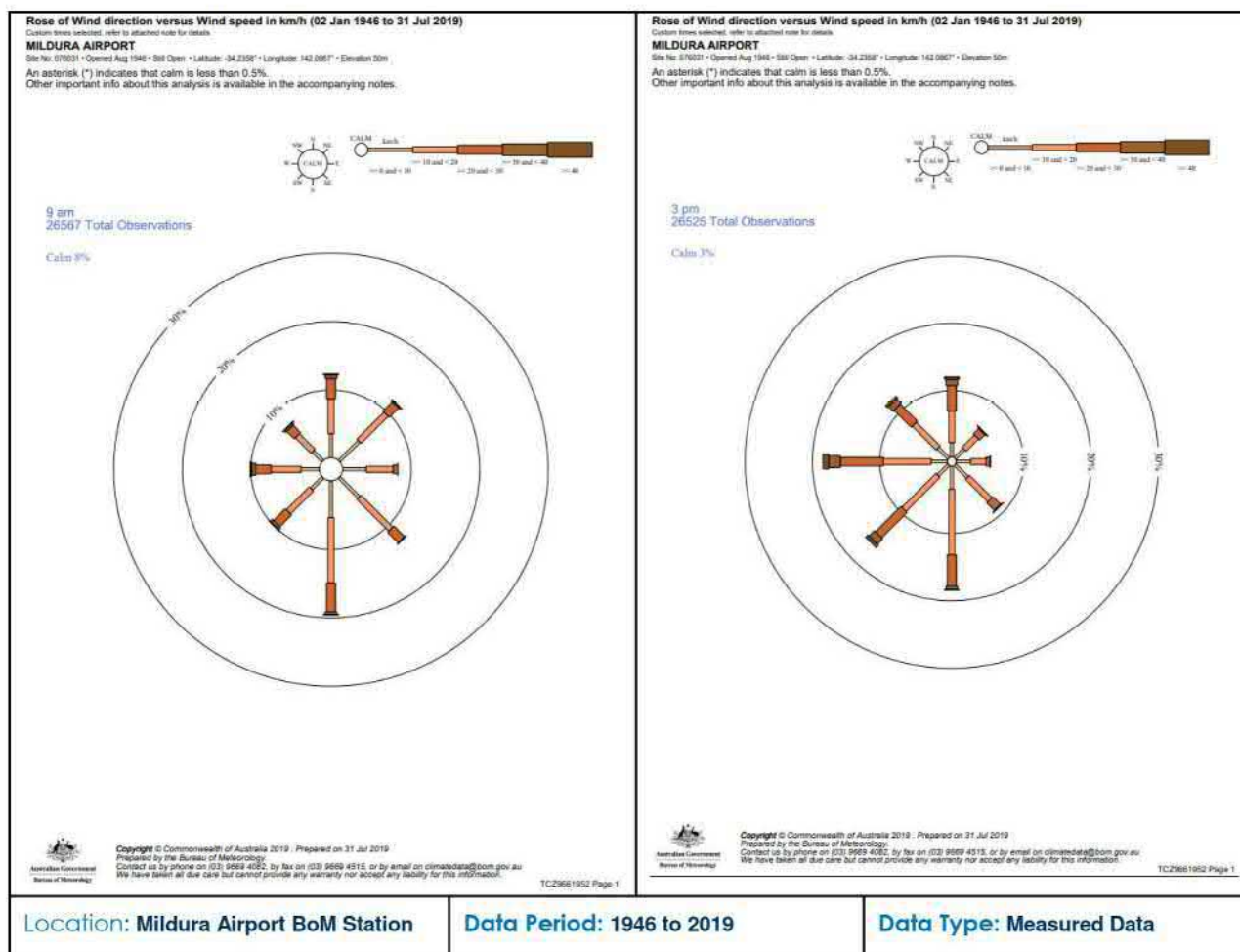


Figure 5-2: Annual wind roses for Mildura Airport Weather Station (1946 to 2019)

5.3.2 LOCAL METEOROLOGY

5.3.2.1 INTRODUCTION

A three dimensional meteorological field was required for the air dispersion modelling that includes a wind field generator accounting for slope flows, terrain effects and terrain blocking effects. The Air Pollution Model, or TAPM, is a three-dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research and can be used as a precursor to CALMET which produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables for each hour of the modelling period. The TAPM-CALMET derived dataset for 12 continuous months of hourly data from the year 2016 and approximately centred at the proposed Project has been used to provide further information on the local meteorological influences. Details of the modelling approach are provided in Section 6.4.

5.3.2.2 WIND SPEED AND DIRECTION

The wind roses from the TAPM-CALMET derived dataset for the year 2016 are presented in Figure 5-3 and Figure 5-4 for the Project site. Figure 5-3 shows that the dominant wind direction is from W during spring, S during the summer and autumn months. In winter, the winds are primarily from the N and W direction. Overall, winds from the E are infrequent.

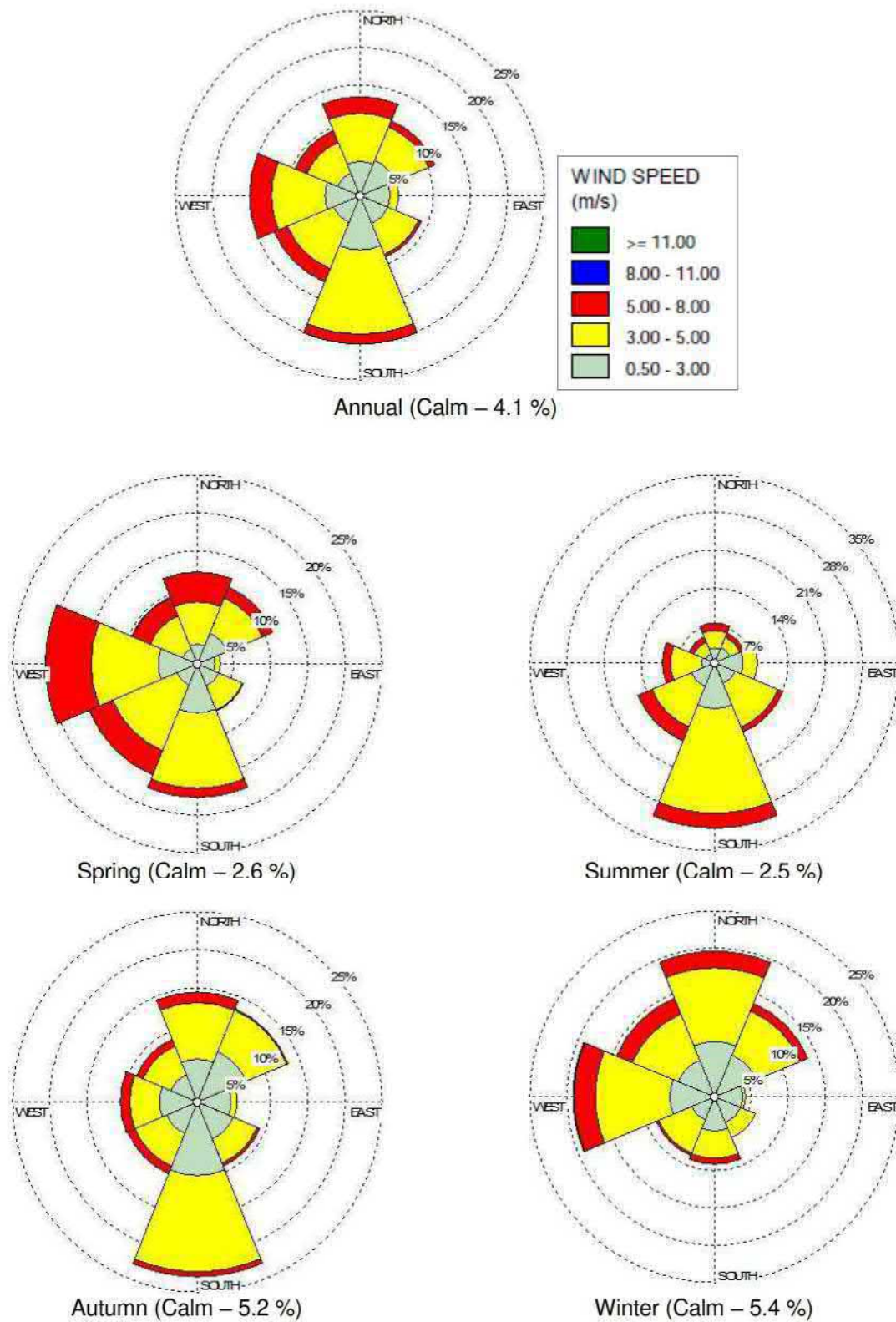


Figure 5-3: Site-specific wind roses by season for the TAPM-CALMET derived dataset, 2016

Figure 5-4 shows the wind roses for the time of day during the year for 2016. It can be seen that there are more frequent winds from the west during the afternoon periods.

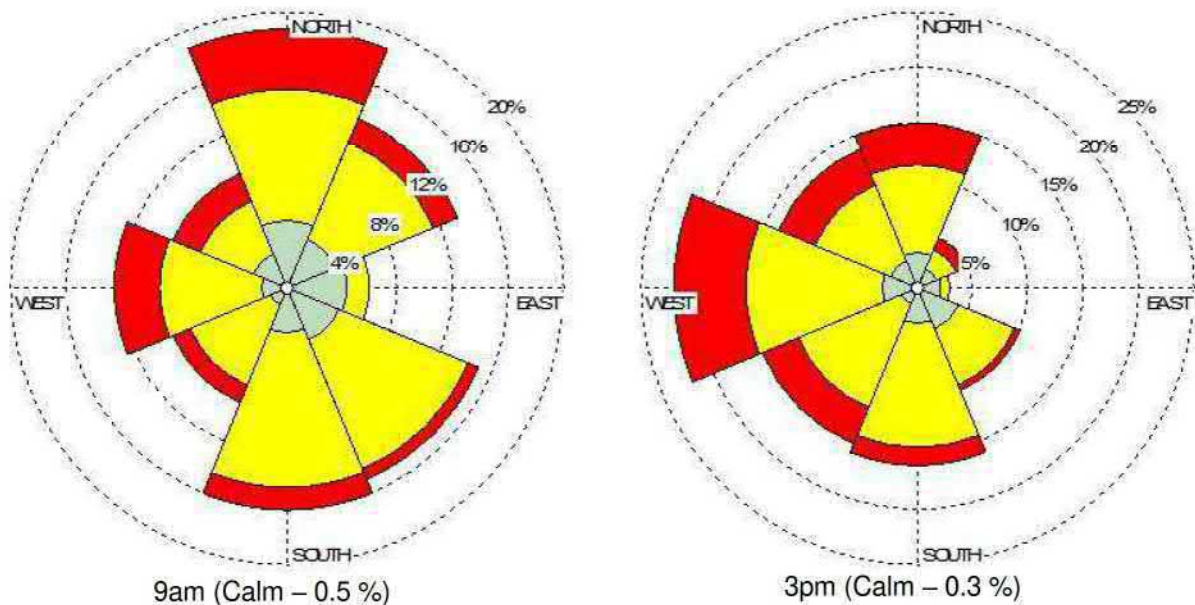


Figure 5-4: Site-specific wind roses by time of day for the TAPM-CALMET derived dataset, 2016

A comparison of the wind roses at 9am and 3pm hours for the TAPM-CALMET derived dataset (Figure 5-4) at the Project site was also undertaken with the BOM long-term wind roses at Mildura (Figure 5-2). There are similarities between the wind roses from BOM and derived dataset, most notably the dominance of winds from the N and S in the morning and W in the afternoon.

In addition, as specified in the Approved Methods (2016), a comparison of the modelled data wind rose generated for 2016 is provided with the most recent five years of available measured data at the BoM monitoring station site. As shown in Figure 5-5, the modelled data is consistent with the measured data for the past five years.

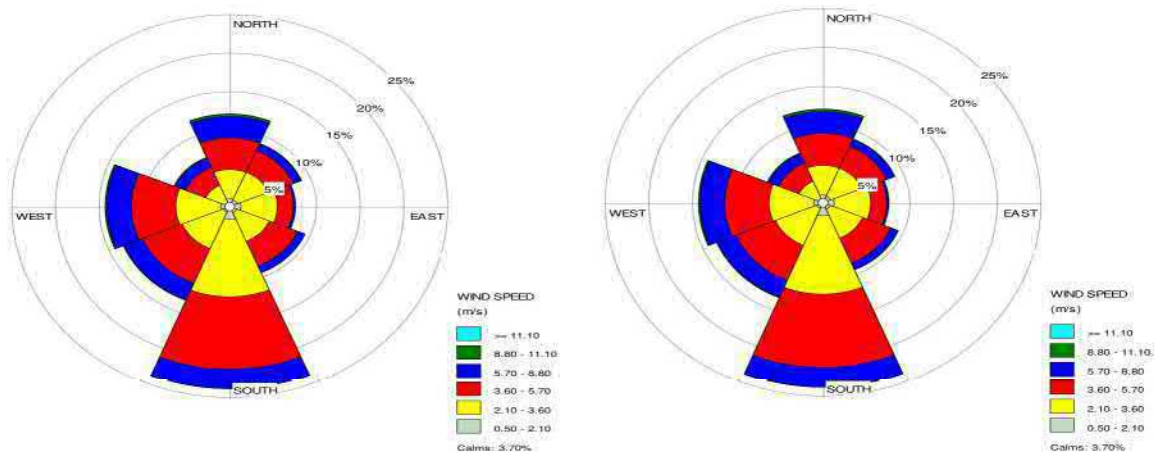


Figure 5-5: Wind roses comparison of modelled 2016 data (left) with Mildura measured data (right)

5.3.2.3 ATMOSPHERIC STABILITY

Atmospheric stability refers to the tendency of the atmosphere to resist or enhance vertical motion of pollutants. The Pasquill-Turner assignment scheme identifies six Stability Classes (Stability Classes A to F) to categorise the degree of atmospheric stability. These classes indicate the characteristics of the prevailing meteorological conditions and are used in various air dispersion models. The frequency of occurrence for each stability class for 2016 is shown in Figure 5-6.

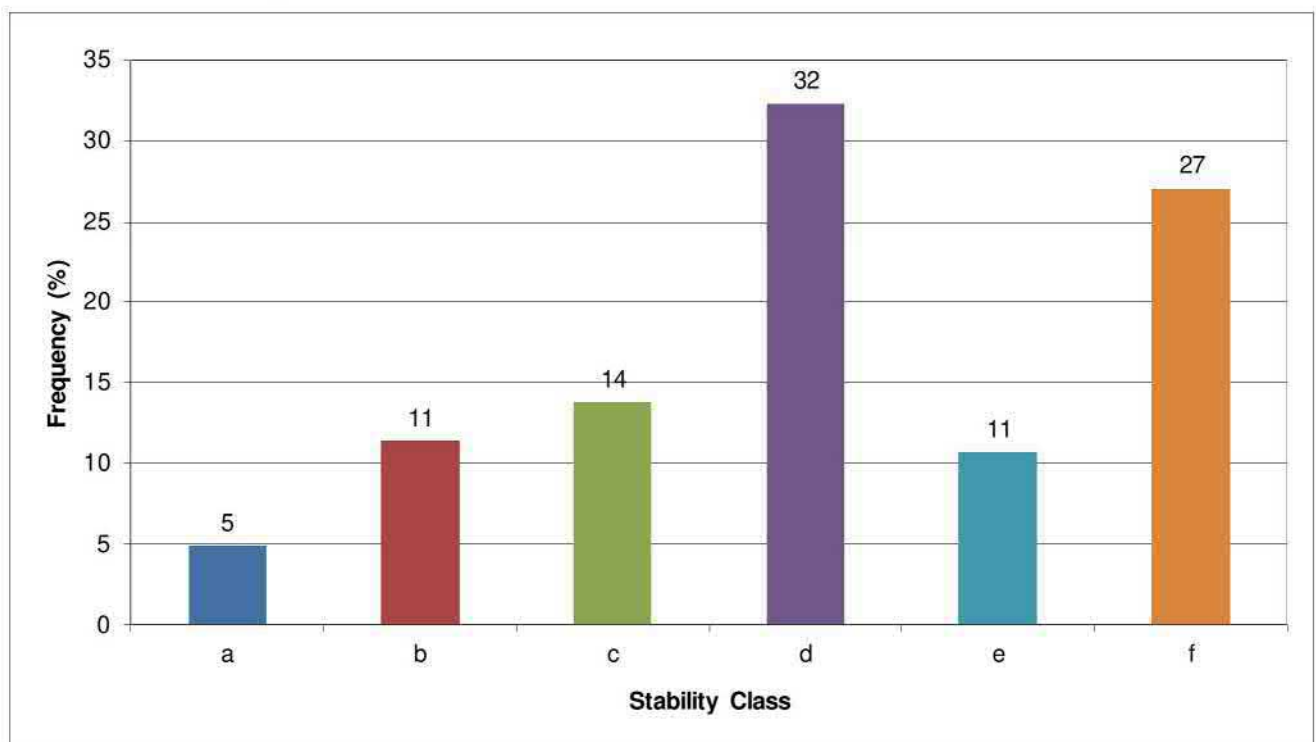


Figure 5-6: Stability class frequency for the TAPM-CALMET derived dataset, 2016

5.3.2.4 MIXING HEIGHT

Mixing height refers to the height above ground within which particulates or other pollutants released at or near ground can mix with ambient air. During stable atmospheric conditions, the mixing height is often quite low and particulate dispersion is limited to within this layer.

Diurnal variations in mixing depths are illustrated in Figure 5-7. As would be expected, an increase in the mixing depth during the morning is apparent, arising due to the onset of vertical mixing following sunrise. Maximum mixing heights occur in the mid to late afternoon, due to the dissipation of ground-based temperature inversions and the growth of convective mixing layer.

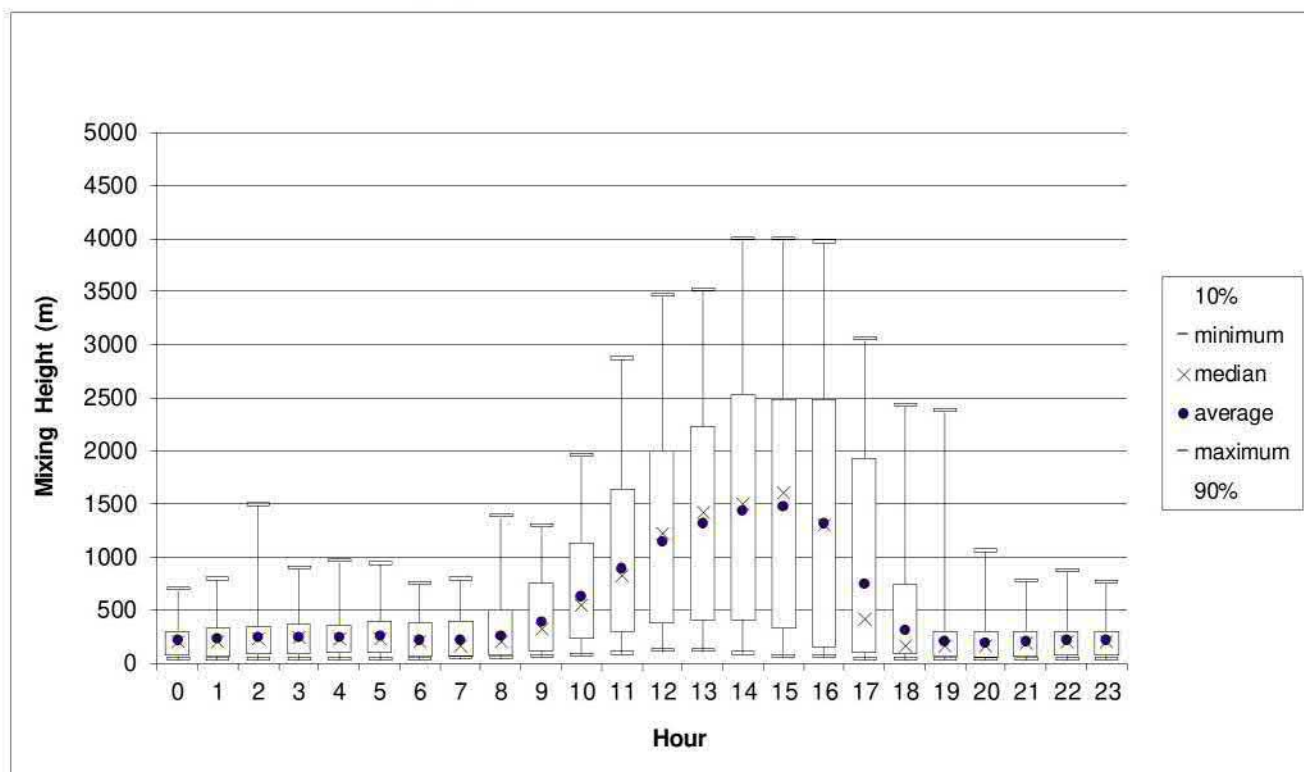


Figure 5-7: Mixing height for the TAPM-CALMET derived dataset, 2016

5.4 EXISTING AIR QUALITY

An extensive network of NATA-accredited air quality monitoring stations which use Standards Australia methods, where available is operated by the NSW EPA. The closest monitoring site to the Project site is at Wagga Wagga North, approximately 500 km to the east. The Wagga Wagga North air quality monitoring site is located near the tennis courts in the Wagga Wagga racecourse adjacent to Beckwith Street in Wagga Wagga. While it is noted that this station is a considerable distance from the Project site, it is also a regional site with similar rural sources of air emissions (e.g. primarily dust from farming activities or wind-borne). Of the pollutants of interest, PM₁₀ and PM_{2.5} are measured at the Tamworth site. Where available, the maximum 24 hour average data collected at this site for 2016 is outlined in Table 5-2 as specified in the Approved Methods (2016). Individual 24-hour average predicted PM₁₀ and PM_{2.5} concentrations paired in time with the corresponding 24-hour concentration within the adopted 2016 monitoring dataset to obtain total impact at each receptor is provided for a Level 2 Assessment. In addition, annual average concentration data are adopted for the background levels of pollutants requiring assessment for these periods (e.g. PM_{2.5} and PM₁₀).

Where unavailable, a conservative assumption is adopted. For example, annual TSP background is derived as 2.5 x measured PM₁₀ based on data collected around Australian mines (ACARP, 1999). No dust deposition data is available, however the results of dust deposition monitoring undertaken at similar locations in central Queensland have been utilised. The average dust deposition from monitoring at these locations is 33 mg/m²/day. This is likely to be typical of annual average dust fallout in rural regions although higher levels may exist in the vicinity of local sources. Therefore, the average background deposition rate for the air quality impact assessment in relation to the Project has been assumed to be double the nominated monitoring result, that is 2.0 g/m²/month (67 mg/m²/day). This methodology is consistent with the Approved Methods, which specifies criteria of 2 g/m²/month without background and 4 g/m²/month including background.

As shown in Table 5-2, the maximum measured 24 hour average PM₁₀ is already above the relevant criteria of 50 µg/m³.

Table 5-2: Assigned Background Concentrations

Parameter	Air Quality Criteria	Period	Maximum Measured	Adopted Background	Comments
TSP	90 µg/m ³	Annual	51.5 µg/m ³	51.5 µg/m ³	Conservative assumption
PM ₁₀	50 µg/m ³	24 Hour	114 µg/m ³	Varies	NSW EPA Measurement
	25 µg/m ³	Annual	20.6 µg/m ³	20.6 µg/m ³	
PM _{2.5}	25 µg/m ³	24 Hour	28.1 µg/m ³	Varies	NSW EPA Measurement
	8 µg/m ³	Annual	7.4 µg/m ³	7.4 µg/m ³	
Dust Deposition	4 g/m ² /month	Month	2 g/m ² /month	2 g/m ² /month	Conservative assumption

6 METHODOLOGY

The overall approach to the assessment follows the guidance from *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Department of Environment & Conservation, 2016) and the *Optimum CALPUFF modelling guidance for NSW* (Barclay & Scire, 2011).

The air quality impact assessment has been carried out as follows:

- An emissions inventory of TSP, PM₁₀, PM_{2.5}, and deposited dust for the Project activities was derived using National Pollutant Inventory (NPI) and United States Environmental Protection Agency (USEPA) AP-42 emissions estimation methodology. Odour emissions from the landfill activities were conservatively derived from web-based research of measured data from similar facilities.
- Estimated emissions data was used as input for air dispersion modelling. The modelling techniques were based on a combination of The Air Pollution Model (TAPM) prognostic meteorological model (developed by CSIRO), and the CALMET model suite used to generate a three dimensional meteorological dataset for use in the CALPUFF dispersion model (see Figure 6-1).
- The atmospheric dispersion modelling results were assessed against the air quality assessment criteria described in Section 4 as part of the impact assessment.

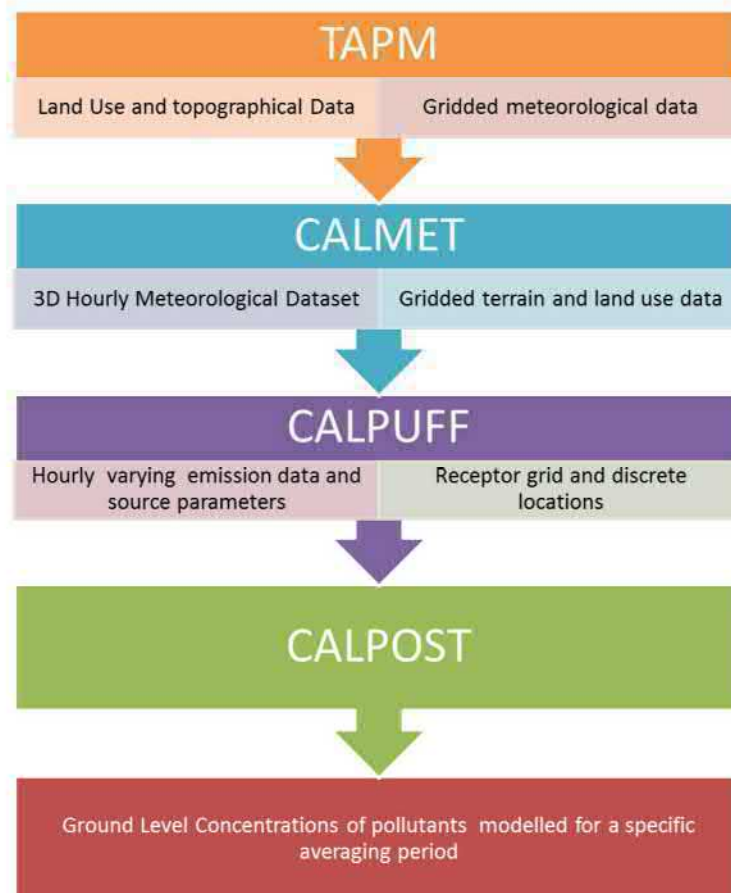


Figure 6-1: Overview of Modelling Process

6.1 EMISSIONS INVENTORY

6.1.1 PARTICULATE MATTER EMISSIONS

The air quality assessment takes into account dust generating activities from landfill activities and disturbed surfaces within the site boundaries. The main emissions to air from the proposed landfill activities are dust and particulate matter generated by the onsite activities which primarily occur as a result of the following activities:

- unloading of trucks
- front end loader and excavator operations
- wind erosion from disturbed areas and stockpiles
- materials handling
- vehicle movements

Estimated emissions were estimated based on anticipated maximum activity for the sources including controls and are summarised in Table 6-1. Further details of the emissions estimation methodology may be found in Appendix A.

Table 6-1: Emissions Input Data Adopted for the Modelling

Activity	Emission Rate (g/s)			Control applied
	TSP	PM ₁₀	PM _{2.5}	
Active Landfill Area				
Excavator/FEL on waste	0.486	0.233	0.051	-
Trucks dumping waste	0.233	0.084	0.025	-
Wind Erosion				
WE – Active landfill	0.311	0.156	0.033	Watering and windbreaks
WE – Inactive landfill	0.036	0.018	0.004	Revegetation
WE – Historical landfill	0.021	0.011	0.002	
Hauling				
Wheel generated dust – Heavy Vehicles	3.290	0.972	0.056	Watering and limiting vehicle speeds < 50km/h
Wheel generated dust – Light Vehicles	0.183	0.064	0.007	
Total	4.56	1.54	0.18	

6.1.2 ODOUR EMISSIONS

It is noted that the landfill is proposed to accept both putrescible and non-putrescible waste material. Odour emissions from any non-putrescible waste material being deposited at the landfill site are not likely to be significant. Measurement of odour generated by waste materials can often be limited to more odorous materials and therefore, emission factors adopted to support this Air Quality Impact Assessment represent putrescible waste sources, which would significantly over-estimate the predicted odour impacts of the non-putrescible portion.

Emission factors adopted here have been adopted from site specific source sampling performed to support the Melbourne Regional Landfill (MRL) Air Quality Assessment (PEL, 2016), which are associated with putrescible waste operations and therefore represent a conservative approximation of likely odour emissions resulting from the landfill. This is also the approach adopted for the Proposed Bangus Quarry Landfill – Tumblong NSW (Northstar, 2017).

Measured odour emission rates at the MRL active tip face were 3.3 OU/m²/s with odour on interim covered waste at the MRL measured to be 0.16 OU/m²/s.

Odour resulting from storage of leachate has been calculated using odour emission rates cited in the Northstar document as measured at the leachate dam within the Woodlawn Bioreactor facility at Tarago, NSW. The odour emission rate associated with leachate storage at that facility was 0.459 OU/m²/s. The leachate generated at the Woodlawn site is associated with putrescible waste, and the leachate collected as part of the Proposal is likely to be significantly less odorous. Table 6-2 outlines the odour emission rates adopted for the modelling.

Table 6-2: Odour emission rates

Source	Area (m ²)	Specific odour emission rate (OU/m ² /s)	Peak to mean ¹	Modelled odour emission rate (OU/m ² /s)
Active tipface	600	3.3	2.5	4950
Interim cover	400,000	0.16	2.5	55760
Leachate pond	12,828	0.459	2.5	1205

1. The peak to mean ratio (P/M60) of 2.5 has been adopted in stability classes A to F (i.e. all stability classes) to provide a conservatively high estimate of peak odour concentrations from an area source.

6.2 EMISSION CONTROLS

A number of emissions controls were adopted in the modelling assessment to mitigate emissions of particulate matter and odour.

6.2.1 PARTICULATE MATTER

Particulate matter emissions controls adopted include:

- Watering and windbreaks for the active landfill cell resulting in emissions reductions of 50% and 30%, respectively;
- Revegetation of inactive landfill cells resulting in emissions reductions of 99%
- Watering of unsealed roads resulting in emissions reductions of 75%; and
- Limiting vehicle speeds on unsealed roads to 50km/h resulting in emissions reductions of 44%.

6.2.2 ODOUR

Emissions will be managed through the adoption of industry best practice as outlined in the NSW Landfill Guidelines (NSW EPA, 2016), including:

- Restriction of the active tip face to 600 m²;
- Placement of daily cover on the active tip face at a depth of 150 mm at the close of business each day;
- The use of intermediate cover on areas awaiting final capping;
- Placement of waste in thin layers to maximise compaction;
- Immediate covering of malodorous wastes; and
- Minimising disturbance of previously filled areas.

6.3 SOURCE EMISSION LOCATIONS

Sources associated with the landfill dust and odour emissions were modelled at the locations shown in Figure 2-1. A worst-case scenario was modelled such that the active tipface sources were in the southwestern corner of the proposed expansion nearest to the residential sensitive receptor.

6.4 AIR DISPERSION MODELLING

6.4.1 TAPM

A 3-dimensional dispersion wind field model, CALPUFF, has been used to simulate the impacts from the Project. CALPUFF is an advanced non-steady-state meteorological and air quality modelling system developed and distributed by Earth Tech, Inc. The model has been approved for use in the '*Guideline on Air Quality Models*' (Barclay and Scire, 2011) as a preferred model for assessing applications involving complex meteorological conditions such as calm conditions.

To generate the broad scale meteorological inputs to run CALPUFF, this study has used the model The Air Pollution Model (TAPM), which is a 3-dimensional prognostic model developed and verified for air pollution studies by the CSIRO.

TAPM was configured as follows:-

- Centre coordinates – 34° 8.0 S, 142° 12.0 E;
- Dates modelled – 30th December 2015 to 31st December 2016 (2 start-up days);
- Four nested grid domains of 30 km, 10 km, 3 km and 1 km;
- 41 x 41 grid points for all modelling domains;
- 25 vertical levels from 10 m to an altitude of 8000 m above sea level;
- Data assimilation using measured meteorological data from the Bureau of Meteorology Station at Mildura Airport; and
- The default TAPM databases for terrain, land use and meteorology were used in the model;

6.4.2 CALMET

CALMET is an advanced non-steady-state diagnostic three-dimensional meteorological model with micro-meteorological modules for overwater and overland boundary layers. The model is the meteorological pre-processor for the CALPUFF modelling system.

The CALMET simulation was run as No-Obs simulation with the gridded TAPM three-dimensional wind field data from the innermost grid. CALMET then adjusts the prognostic data for the kinematic effects of terrain, slope flows, blocking effects and three-dimensional divergence minimisation.

6.4.3 CALPUFF

CALPUFF is a non-steady-state Lagrangian Gaussian puff model. CALPUFF employs the three-dimensional meteorological fields generated from the CALMET model by simulating the effects of time and space varying meteorological conditions on pollutant transport, transformation and removal.

Emission sources can be characterised as arbitrarily-varying point, area, volume and lines or any combination of those sources within the modelling domain.

The radius of influence of terrain features was set at 20 km while the minimum radius of influence was set as 0.1 km. The terrain data incorporated into the model had a resolution of 1 arc-second (approximately 30 m) in accordance with the *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'*.

6.4.4 OTHER MODELLING INPUT PARAMETERS

6.4.4.1 PARTICLE SIZE DISTRIBUTION

CALPUFF requires particle distribution data (geometric mass mean diameter, standard deviation) to compute the dispersion of particulates (Table 6-3).

Table 6-3: Particle size distribution data

Particle size	Mean particle diameter (μm)	Geometric standard deviation (μm)
TSP	15	2
PM10	4.88	1
PM2.5	0.89	1

6.4.4.2 SENSITIVE RECEPTORS

As discussed in Section 5.1, the nearest sensitive receptors are approximately 1km to the South and Lake Gol Gol is approximately 1.8 km to the East.. Figure 6-2 shows the locations of the four sensitive receptors adopted for the modelling assessment.

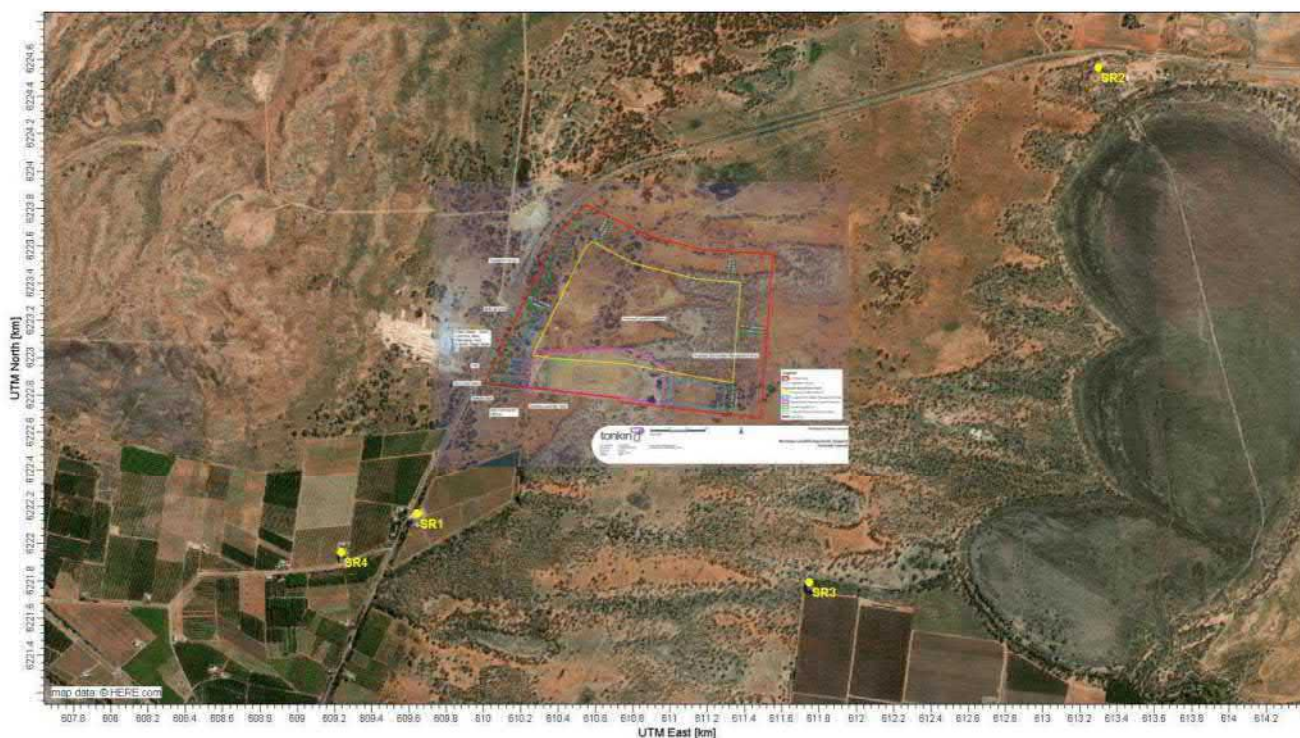


Figure 6-2: Sensitive Receptor Locations

7 ASSESSMENT OF IMPACTS

This section presents the results of the air quality impact assessment for predicted ground level concentrations of TSP, PM10 and PM2.5, dust deposition and odour for the proposed operation of the landfill.

The results of the dispersion modelling include individual sensitive receptor and contour plots that are indicative of ground-level concentrations and deposition. This Level 2 impact assessment requires the predictions to be presented as follows:

- The incremental impact of each pollutant as per the criterion units and time periods;
- The cumulative impact (incremental plus background) for the 100th percentile (i.e. maximum value) in units as per the criterion and time periods.

7.1 TSP

The predicted annual average TSP with and without background (51.5 $\mu\text{g}/\text{m}^3$) are presented in **Table 7-1**.

The model predictions for TSP are well below the criteria of 90 $\mu\text{g}/\text{m}^3$. TSP emissions from the proposed Project are not predicted to adversely impact upon the sensitive receptors. A contour plot is presented in **Appendix B**.

Table 7-1: Predicted Annual Average TSP Concentrations

ID	Predicted Annual Average TSP Concentrations ($\mu\text{g}/\text{m}^3$)	
	Incremental	Cumulative
R1	1.68	53.18
R2	0.09	51.59
R3	0.25	51.75
R4	0.55	52.05
Criteria	90	

7.2 PM10

The maximum predicted 24 hour (including maximum measured background of 114.7 $\mu\text{g}/\text{m}^3$) and annual average (including measured annual background of 20.6 $\mu\text{g}/\text{m}^3$) PM10 are presented in **Table 7-2**.

The model predictions for annual average PM10 are below the criteria of 25 $\mu\text{g}/\text{m}^3$. The model predictions for cumulative 24 hour average PM10 are above the criteria of 50 $\mu\text{g}/\text{m}^3$. As noted in Section 5.4, the measured 24 hour background PM10 of 114.7 $\mu\text{g}/\text{m}^3$ is already above the criteria of 50 $\mu\text{g}/\text{m}^3$. Further investigation of the contemporaneous measured background and predicted data is therefore undertaken. **Table 7-3** provides the maximum cumulative concentrations at each receptor including contemporaneous background concentrations and associated number of exceedances of the criteria for the modelled year. As shown in **Table 7-3**, 16 exceedances of the 24 hour average PM10 criteria (50 $\mu\text{g}/\text{m}^3$) are predicted at each of the receptors modelled. This exceedance corresponds to the dates of the elevated measured background above the 50 $\mu\text{g}/\text{m}^3$ criterion. Furthermore, the maximum contribution of the landfill emissions to the cumulative PM10 is negligible (0.81 $\mu\text{g}/\text{m}^3$) on those days and does not contribute to any additional exceedances of the relevant criteria. As specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, under these circumstances no additional assessment is therefore required.

The 24 hour and annual average PM10 emissions from the proposed Project are not predicted to adversely impact upon the sensitive receptors. Contour plots are provided in **Appendix B**.

Table 7-2: Predicted 24 Hour and Annual Average PM10 Concentrations

ID	Predicted 24 Hour Average PM10 Concentrations ($\mu\text{g}/\text{m}^3$)		Predicted Annual Average PM10 Concentrations ($\mu\text{g}/\text{m}^3$)	
	Incremental	Cumulative	Incremental	Cumulative
R1	13.12	127.12	0.62	21.22
R2	0.51	114.51	0.04	20.64
R3	1.09	115.09	0.10	20.70
R4	4.08	118.08	0.21	20.81
Criteria	50		25	

Table 7-3: Predicted Cumulative 24 Hour Average PM10 Concentrations and Number of Exceedances

ID	Predicted Cumulative 24 Hour Average PM10 Concentrations ($\mu\text{g}/\text{m}^3$)	Number of Exceedances
R1	114.7	16
R2	114.7	16
R3	114.7	16
R4	114.7	16
Criteria	50	

7.3 PM2.5

The maximum predicted 24 hour (including maximum measured background of $28.1 \mu\text{g}/\text{m}^3$) and annual average (including measured annual background of $7.4 \mu\text{g}/\text{m}^3$) PM2.5 are presented in **Table 7-4**.

The model predictions for annual average PM2.5 are below the criteria of $8 \mu\text{g}/\text{m}^3$. The model predictions for cumulative 24 hour average PM2.5 are above the criteria of $25 \mu\text{g}/\text{m}^3$. As noted in Section 5.4, the measured 24 hour background PM2.5 of $28.1 \mu\text{g}/\text{m}^3$ is already above the criteria of $25 \mu\text{g}/\text{m}^3$. Further investigation of the contemporaneous measured background and predicted data is therefore undertaken. **Table 7-5** provides the maximum cumulative concentrations at each receptor including contemporaneous background concentrations and associated number of exceedances of the criteria for the modelled year. As shown in **Table 7-3**, two exceedances of the 24 hour average PM2.5 criteria ($25 \mu\text{g}/\text{m}^3$) are predicted at each of the receptors modelled. This exceedance corresponds to the dates of the elevated measured background above the $25 \mu\text{g}/\text{m}^3$ criterion. Furthermore, the maximum contribution of the landfill emissions to the cumulative PM2.5 is $0 \mu\text{g}/\text{m}^3$ on those days and does not contribute to any additional exceedances of the relevant criteria. As specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, under these circumstances no additional assessment is therefore required.

The 24 hour and annual average PM2.5 emissions from the proposed Project are not predicted to adversely impact upon the sensitive receptors. Contour plots are provided in **Appendix B**.

Table 7-4: Predicted 24 Hour and Annual Average PM2.5 Concentrations

ID	Predicted 24 Hour Average PM2.5 Concentrations ($\mu\text{g}/\text{m}^3$)		Predicted Annual Average PM2.5 Concentrations ($\mu\text{g}/\text{m}^3$)	
	Incremental	Cumulative	Incremental	Cumulative
R1	2.11	30.21	0.09	7.49
R2	0.09	28.19	0.01	7.41
R3	0.30	28.40	0.02	7.42
R4	0.70	28.80	0.04	7.44
Criteria	25		8	

Table 7-5: Predicted Cumulative 24 Hour Average PM2.5 Concentrations and Number of Exceedances

ID	Predicted Cumulative 24 Hour Average PM2.5 Concentrations ($\mu\text{g}/\text{m}^3$)	Number of Exceedances
R1	28.1	2
R2	28.1	2
R3	28.1	2
R4	28.1	2
Criteria	25	

7.4 DUST DEPOSITION

The maximum predicted monthly average dust deposition are presented in **Table 7-6**.

The model predictions for incremental and cumulative monthly average dust deposition are well below the criteria of 2 g/m²/month and 4 g/m²/month. Dust deposition from the proposed Project is not predicted to adversely impact upon the sensitive receptors. Contour plots are provided in **Appendix B**.

Table 7-6: Predicted Monthly Average Dust Deposition

ID	Predicted Monthly Average Dust Deposition (g/m ² /month)	
	Incremental	Cumulative
R1	0.36	2.36
R2	0.02	2.02
R3	0.04	2.04
R4	0.10	2.10
Criteria	2	4

7.5 ODOUR

The predicted 1-second nose response time 99th percentile odour concentrations (OU) resulting from the operation of the proposed landfill are presented in **Table 7-7**. As discussed, these impacts represent the placement and storage of putrescible wastes, where the landfill would only accept non-putrescible wastes which would be significantly less odorous. The results can therefore be viewed as highly conservative.

Despite the conservatism, the predicted 99th percentile odour concentrations are below the 70OU criterion at all sensitive receptors.

Table 7-7: Predicted 99th Percentile Odour

ID	Predicted 1-Second Odour (OU)
	Incremental
R1	2.76
R2	0.43
R3	1.11
R4	1.45
Criteria	7

8 GREENHOUSE GAS

8.1 INTRODUCTION

This assessment determines the carbon dioxide equivalent (CO₂-e) emissions from the Project according to international and Federal guidelines.

8.2 BACKGROUND

Greenhouse gases are a natural part of the atmosphere; they absorb and re-radiate the sun's warmth, and maintain the Earth's surface temperature at a level necessary to support life. Human actions, particularly burning fossil fuels (coal, oil and natural gas), agriculture and land clearing, are increasing the concentrations of the greenhouse gases. This is the enhanced greenhouse effect, which is contributing to warming of the Earth.

Greenhouse gases include water vapour, carbon dioxide (CO₂), methane, nitrous oxide and some artificial chemicals such as chlorofluorocarbons (CFCs). Water vapour is the most abundant greenhouse gas. These gases vary in effect and longevity in the atmosphere, but scientists have developed a system called Global Warming Potential to allow them to be described in equivalent terms to CO₂ (the most prevalent greenhouse gas) called equivalent carbon dioxide emissions (CO₂-e). A unit of one tonne of CO₂-e (t CO₂-e) is the basic unit used in carbon accounting. An emissions inventory, or 'carbon footprint', is calculated as the sum of the emission rate of each greenhouse gas multiplied by the global warming potential.

8.3 LEGISLATION OVERVIEW

The *Commonwealth National Greenhouse and Energy Reporting Act 2007* (NGER Act) established a national framework for corporations to report greenhouse gas emissions and energy consumption. The NGER Act requires corporations to submit an annual report in energy consumption, energy production and greenhouse gas emissions, if any of the following thresholds are met:

- The facility consumes more than 100 terajoules of energy in a financial year or emits greenhouse gases above 25,000 tonnes CO₂-e (facility threshold); and
- All Australian facilities collectively consume more than 200 terajoules of energy in a financial year or emit greenhouse gases above 50,000 tonnes CO₂-e (corporate threshold).

A facility is defined as an activity, or a series of activities (including ancillary activities), if it involves the production of greenhouse gas emissions, the production of energy or the consumption of energy; and forms a single undertaking or enterprise and meets the requirements of the regulations.

8.4 METHODOLOGY

The Department of Industry, Science, Energy and Resources (formerly Department of the Environment and Energy (DotEE)) monitors and compiles databases on anthropogenic activities that produce greenhouse gases in Australia. The DotEE has published greenhouse gas emission factors for a range of anthropogenic activities. The DotEE methodology for calculating greenhouse gas emissions is published in the National Greenhouse Accounts (NGA) Factors workbook (DotEE, 2019). This workbook is updated regularly to reflect current compositions in fuel mixes and evolving information on emission sources.

The scope that emissions are reported, as defined by the NGA Factors Workbook is determined by whether the activity is within the organisation's boundary (Scope 1 – Direct Emissions) or outside the organisation's boundary (Scopes 2 and 3 – Indirect Emissions). The scopes are described as follows:

- Scope 1 Emissions: Direct (or point-source) emission factors give the kilograms of carbon dioxide equivalent (CO₂-e) emitted per unit of activity at the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc.);

- Scope 2 Emissions: Indirect emissions from the generation of the electricity purchased and consumed by an organisation as kilograms of CO₂-e per unit of electricity consumed; and
- Scope 3 Emissions: Indirect emissions for organisations that:
 - a. Burn fossil fuels: to estimate their indirect emissions attributable to the extraction, production and transport of those fuels; or
 - b. Consume purchased electricity: to estimate their indirect emissions from the extraction, production and transport of fuel burned at generation and the indirect emissions attributable to the electricity lost in delivery in the transmission and distribution network.

Scope 1 emissions include those from fuel use by onsite equipment, methane emissions from landfills. Scope 2 emissions are from any purchased electricity. Scope 3 emissions are from the emissions resulting from the energy required to manufacture products such as diesel and equipment.

The definition, methodologies and application of Scope 3 emission factors are currently subject to international discussions and have the potential to cause much confusion. Large uncertainty exists in the accurate quantification of these emissions.

Emission factors used in this assessment have been derived from either the DotEE, site-specific information or from operational details obtained from similar emission sources.

The majority of the emission factors used in this report have been sourced from the NGA Factors Workbook (DotEE, 2020) as indicated in Table 8-1.

Table 8-1: Emission Factors

Scope	Emission Source	Emission Factor	Source
1	Combustion for transport (general)	2.69 t CO ₂ -e / kWh	NGA Factors Workbook, 2020
1	Municipal solid waste disposal	1.6 t CO ₂ -e / t waste	NGA Factors Workbook, 2020

The following emission sources were not included in this assessment:

- Emissions arising from the leachate;
- Emissions arising from waste transport to site; and
- Use of electricity from the grid.

8.5 QUANTIFICATION OF EMISSIONS

Table 8-2 outlines the estimated greenhouse gas emissions for the operational phase of the Project. The following assumptions have been made for this assessment:

- The operational equipment list is in accordance with that specified in Section 2.5;
- It is estimated that heavy vehicle hauling activities of 40 laden and unladen trips per day; and
- Electricity purchased from the grid would be minimal.

Table 8-2: Estimated Greenhouse Gas Emissions (CO₂-e tonnes)

Emission Source	Scope	Annual Emissions (t CO ₂ -e)
		Operation
Waste	1 (direct)	160,000
Equipment	1 (direct)	1,664
Onsite haulage	1 (direct)	16
		161,680

8.6 SUMMARY AND CONCLUSION

The results of the assessment of greenhouse gas emissions from the Project may be summarised as follows:

- During a potential maximum operational phase whereby 100,000 t waste/annum are received, the annual emissions are projected to be 161,680 tonnes CO₂-e; and
- The estimated annual operational phase emissions (161,680 tonnes CO₂-e) represents approximately 0.03% of Australia's latest greenhouse inventory estimates of 532.5 MtCO₂-E (2019).

9 CONCLUSION

An Air Quality and Greenhouse Gas Assessment in support of the proposed expansion to the Buronga landfill from 30,000 tonnes to 100,000 tonnes of general waste per annum has been undertaken to assess the potential impacts of air pollutants and to provide recommendations to mitigate any potential impacts that might have an effect on any sensitive receptors.

The assessment has been carried out in accordance with the NSW Environment Protection Authority's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.

As summarised in **Table 9-1**, the results of the modelling have shown that the odour, TSP and dust deposition predictions are below the relevant criteria for all averaging periods at all sensitive receptors. The annual average PM10 and PM2.5 predictions are also below criteria.

The 24 hour average PM10 and PM2.5 predictions are as above. The exceedances are driven by the elevated background conservatively adopted for the assessment, which are already above the criteria. No additional exceedances of the criteria are predicted to occur as a result of the proposed waste facility activities and that best management practices will be implemented to minimise emissions as far as is practical. As specified in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, under these circumstances no additional assessment is therefore required.

A greenhouse gas assessment has also been undertaken for the Project. This assessment determines the carbon dioxide equivalent (CO₂-e) emissions from the Project according to international and Federal guidelines. The estimated annual operational phase emissions (161,680 tonnes CO₂-e) represent approximately 0.03% of Australia's latest greenhouse inventory estimates of 532.5 MtCO₂-E (2019).

It is therefore concluded that air quality should not be a constraint to proposed landfill expansion.

Table 9-1: Summary of Results

Pollutant	Averaging Period	Criteria	Maximum Prediction at Any Receptor		Compliant
			In isolation	Cumulative	
TSP	Annual	90 µg/m ³	1.68 µg/m ³	53.18 µg/m ³	✓
PM10	24 Hour	50 µg/m ³	13.12 µg/m ³	114.7 µg/m ³	✓
	Annual	25 µg/m ³	0.62 µg/m ³	21.22 µg/m ³	✓
PM2.5	24 Hour	25 µg/m ³	2.11 µg/m ³	28.1 µg/m ³	✓
	Annual	8 µg/m ³	0.09 µg/m ³	7.49 µg/m ³	✓
Dust Deposition	Monthly Total	4 g/m ² /month	0.36 g/m ² /month	2.36 g/m ² /month	✓
	Monthly Increase	2 g/m ² /month	0.36 g/m ² /month	0.36 g/m ² /month	✓
Odour	1-second	7 OU	2.76 OU	2.76 OU	✓

10 REFERENCES

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Appendix A EMISSIONS ESTIMATION METHODOLOGY

The major air emission from the landfill activities is fugitive dust. Emission factors can be used to estimate emissions of TSP, PM₁₀ and PM_{2.5} to the air from various sources. Emission factors relate the quantity of a substance emitted from a source to some measure of activity associated with the source. Common measures of activity include distance travelled, quantity of material handled, or the duration of the activity.

The National Pollutant Inventory Emission Estimation Technique Manual for Mining (January 2012) provides the equations and emission factors to determine the emissions of TSP and PM₁₀ from mining activities. These emission factors incorporate emission factors published by the USEPA in their AP-42 documentation.

PM_{2.5} emission factors were derived from the ratio of PM_{2.5} to TSP published in the relevant US AP42 Chapter tables. Table A-1 summarises the PM_{2.5} to TSP ratio adopted for the emissions estimations.

Table A-1: Ratio of PM_{2.5} to TSP ratio adopted for the emissions estimations

Source	Ratio PM _{2.5} /TSP
Crushing	0.022
Truck loading	0.105
Front End Loaders	0.105
Wheel generated dust	0.017
Wind erosion	0.105

In the absence of measured physical parameters such as moisture and silt content, the default emission factors for all of the various operations as specified in Table 2 of the National Pollutant Inventory Emission Estimation Technique Manual for Mining (January 2012) have been conservatively adopted (Table A-2). Table A-3 outlines the activity data applied in the emissions estimation.

Table A-2: Source type Emission Factors applied

Source type	TSP Emission factor	PM ₁₀ /TSP ratio	Units
Wind erosion:			
stockpiles/ exposed areas	0.4	0.5	kg/ha/h
Handling:			
FEL on waste	0.025	0.48	kg/t
Trucks dumping waste	0.012	0.35	kg/t
Wheel generated dust:			
HDV	4.23	0.3	kg/VKT
LDV	0.94	0.35	kg/VKT

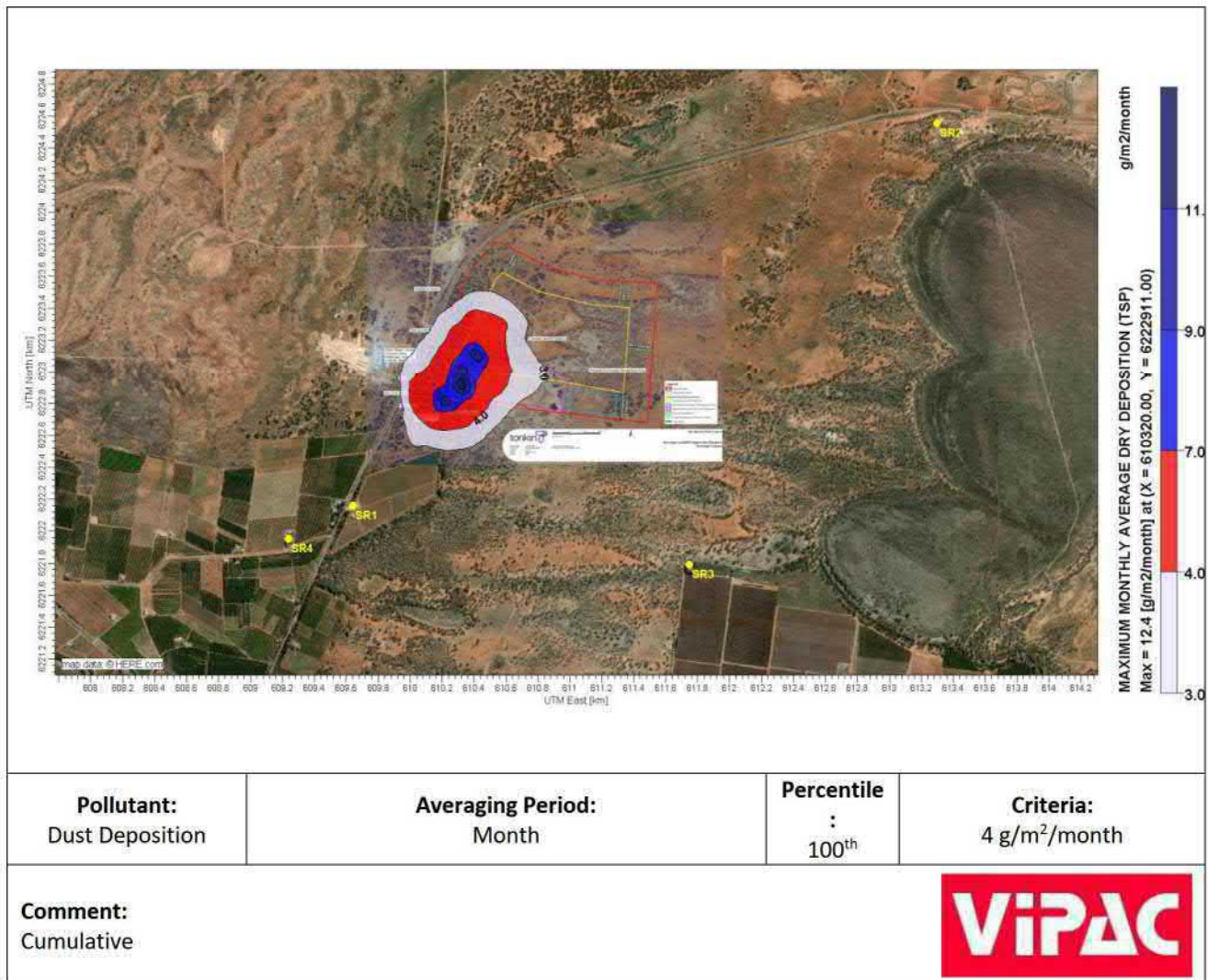
Table A-3: Parameters applied in emissions estimation

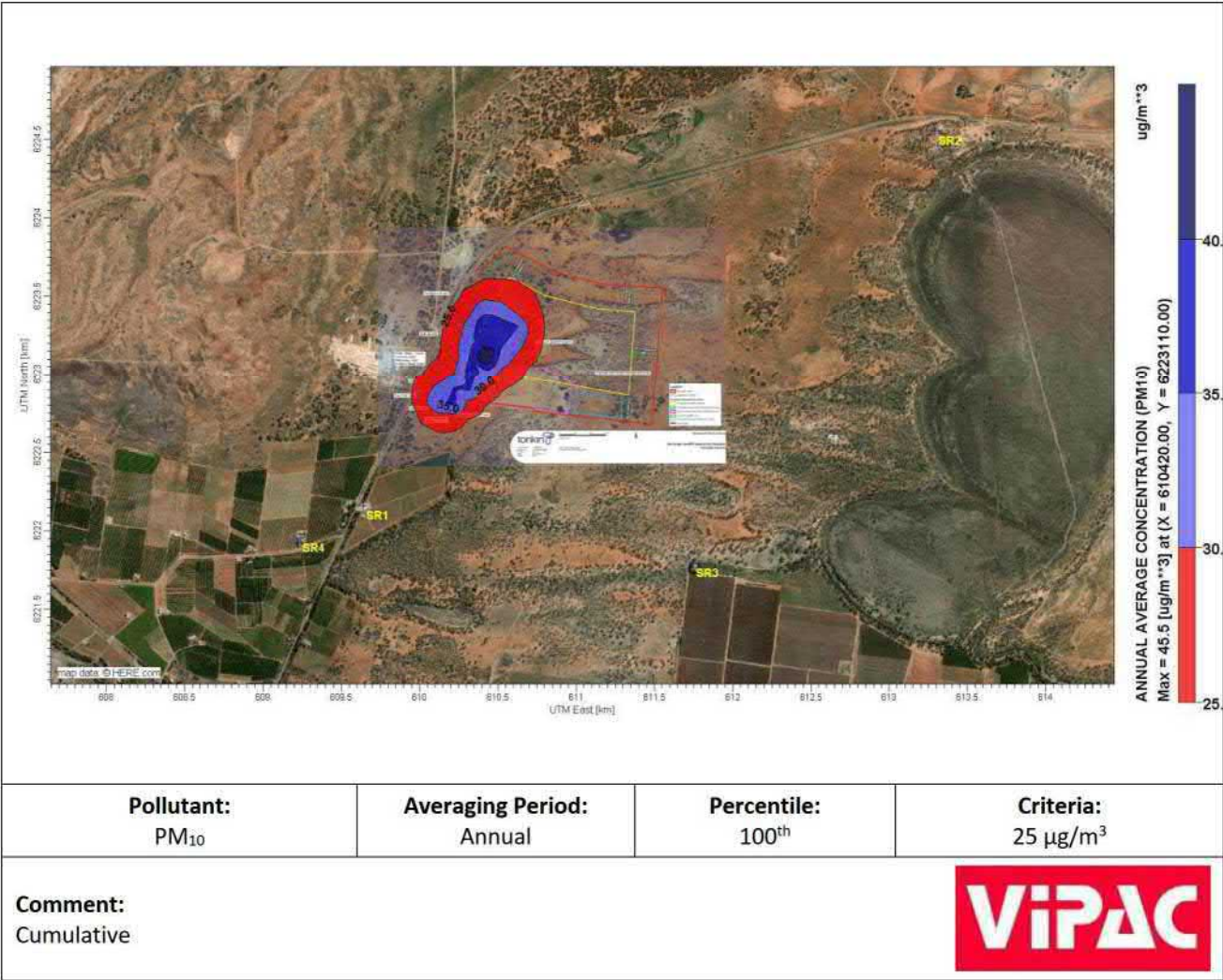
Parameter ID	Value	Units	Description	Data source
Hours	87	hours/week	Hours of operation	client supplied
Days	365	Days/year	Hours of operation	client supplied
W	46	t	Truck capacity	client supplied
Waste received	100,000	t/y	Waste received	client supplied
Maximum waste received/handled	910	t/day	Waste received/handled	estimated
Haul	10	VKT/hr	HDV Hauling	estimated
Haul	5	VKT/hr	LDV Hauling	estimated

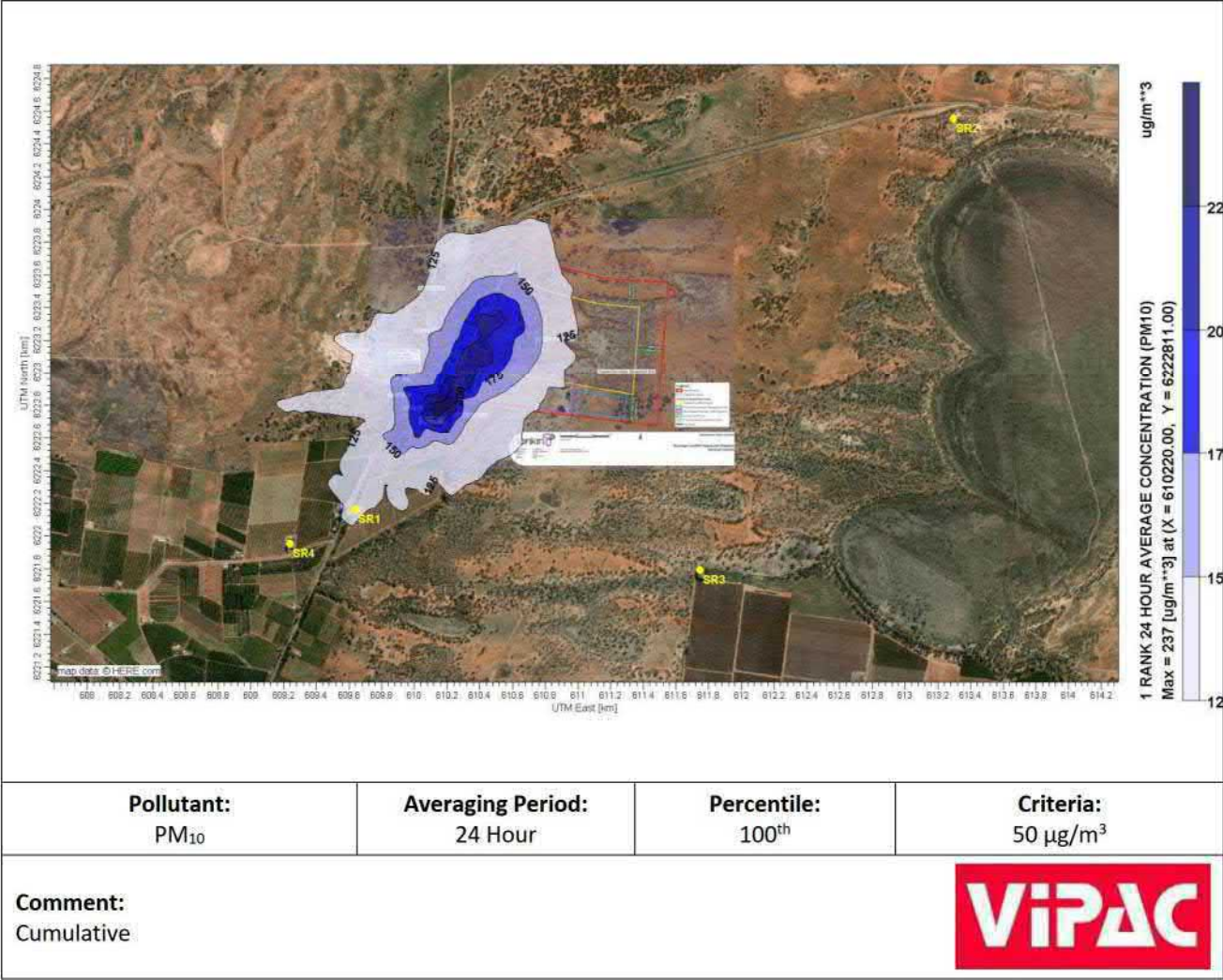
Appendix B CONTOUR PLOTS

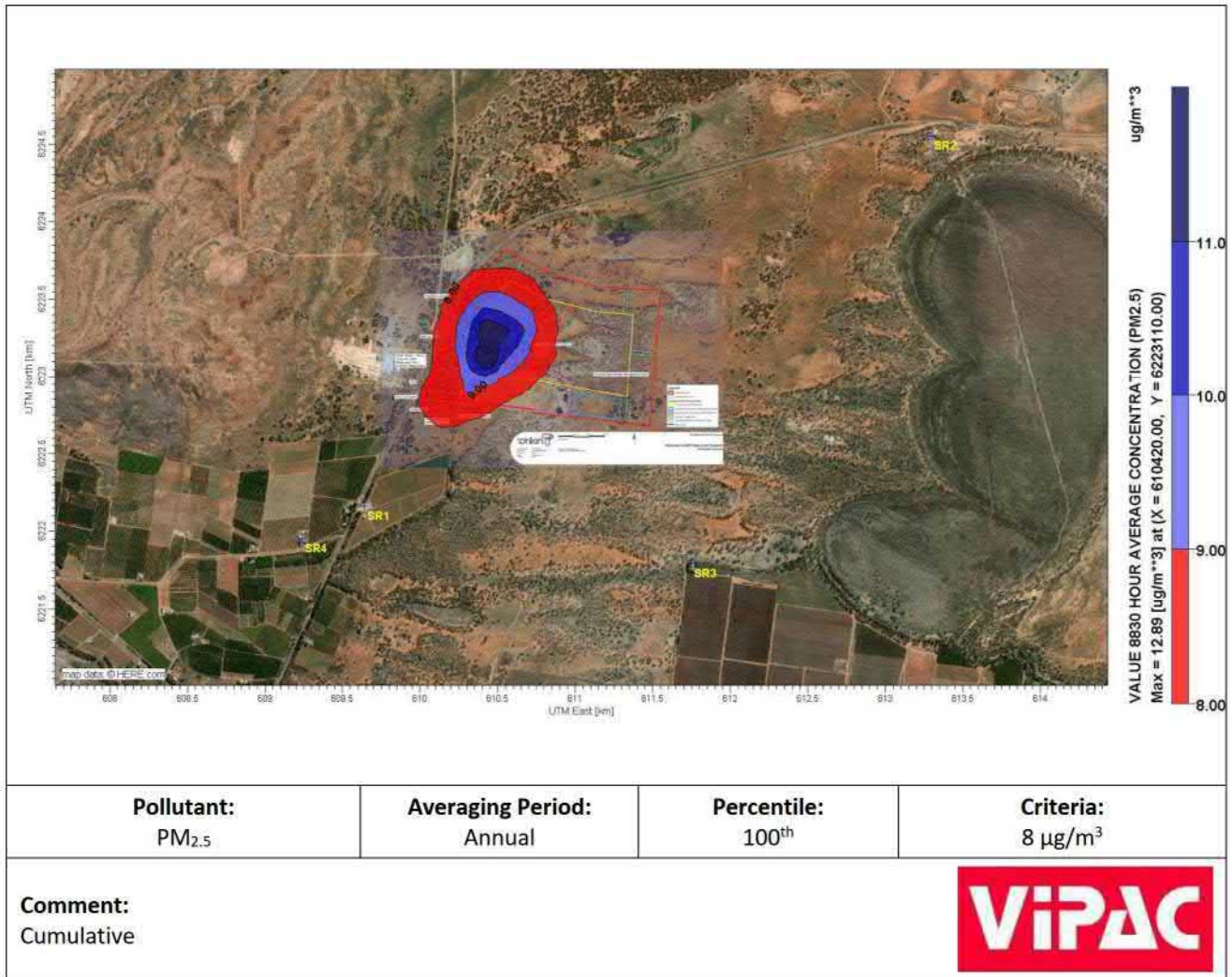
The contour plots are created from the predicted ground-level concentrations at the network of gridded receptors within the modelling domain at frequent intervals. These gridded values are converted into contours using triangulation interpolation in the CALPOST post-processing software within the CALPUFF View software (Version 7.2 - June 2014).

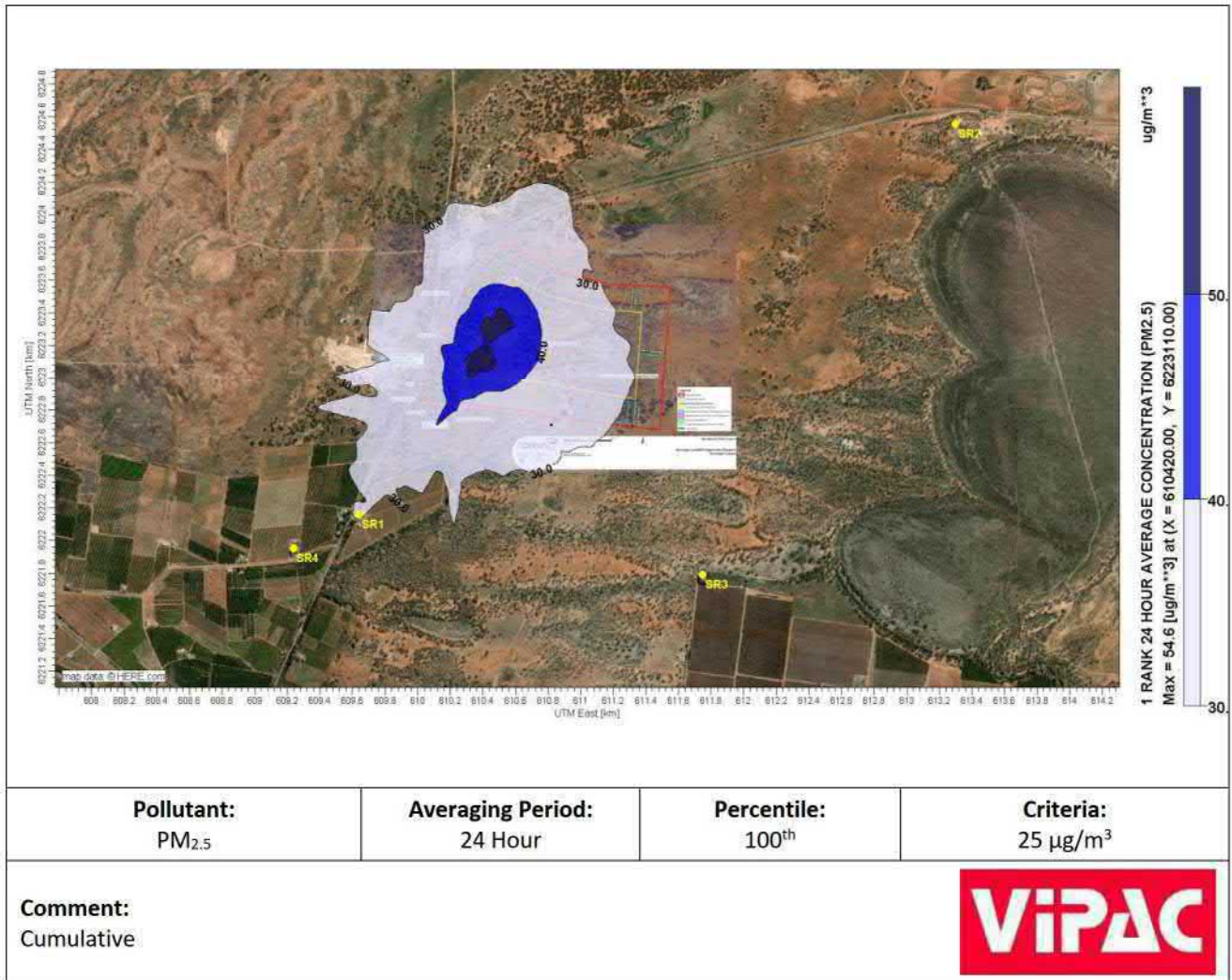
Contour plots illustrate the spatial distribution of ground-level concentrations across the modelling domain for each time period of concern. However, this process of interpolation causes a smoothing of the base data that can lead to minor differences between the contours and discrete model predictions.

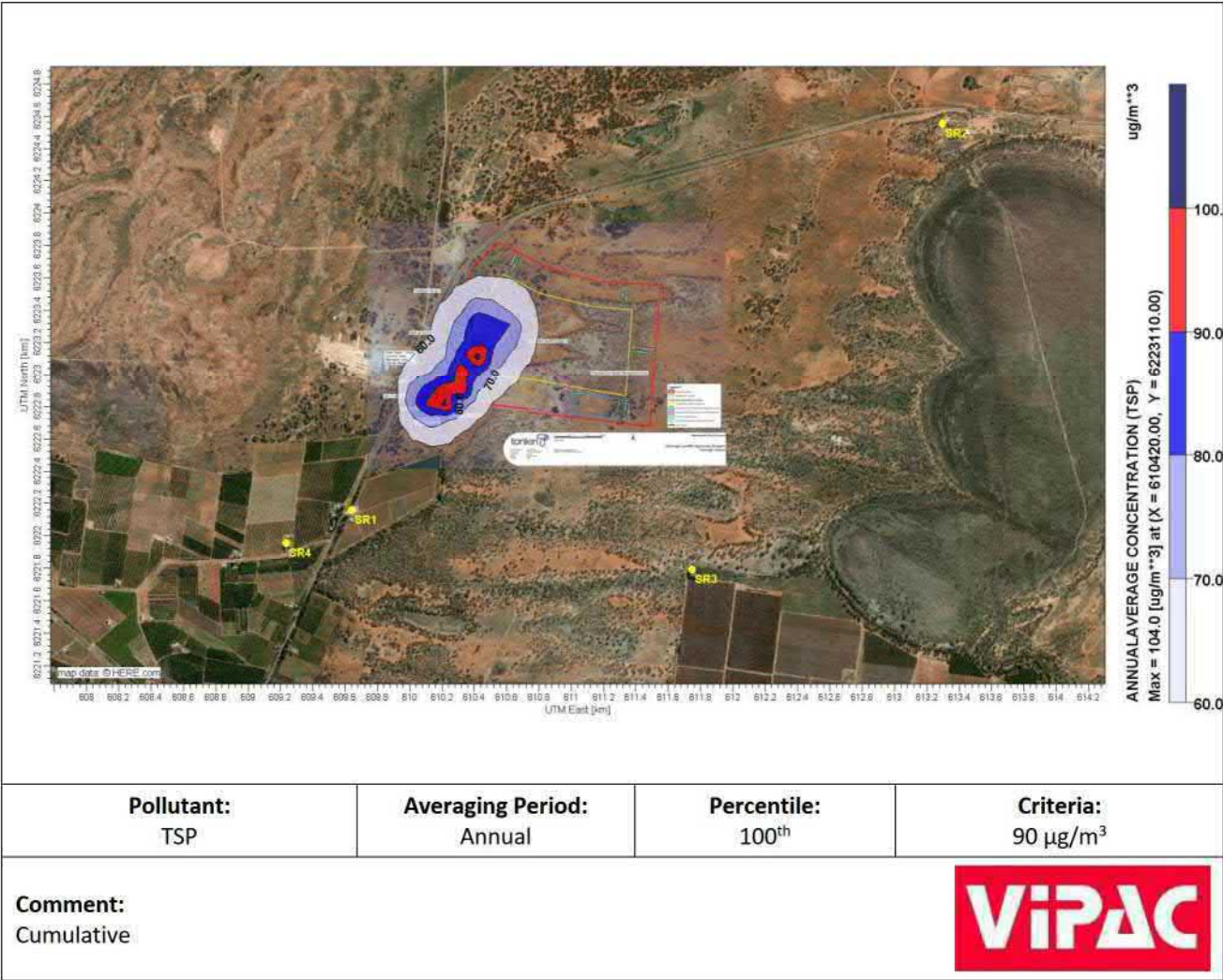


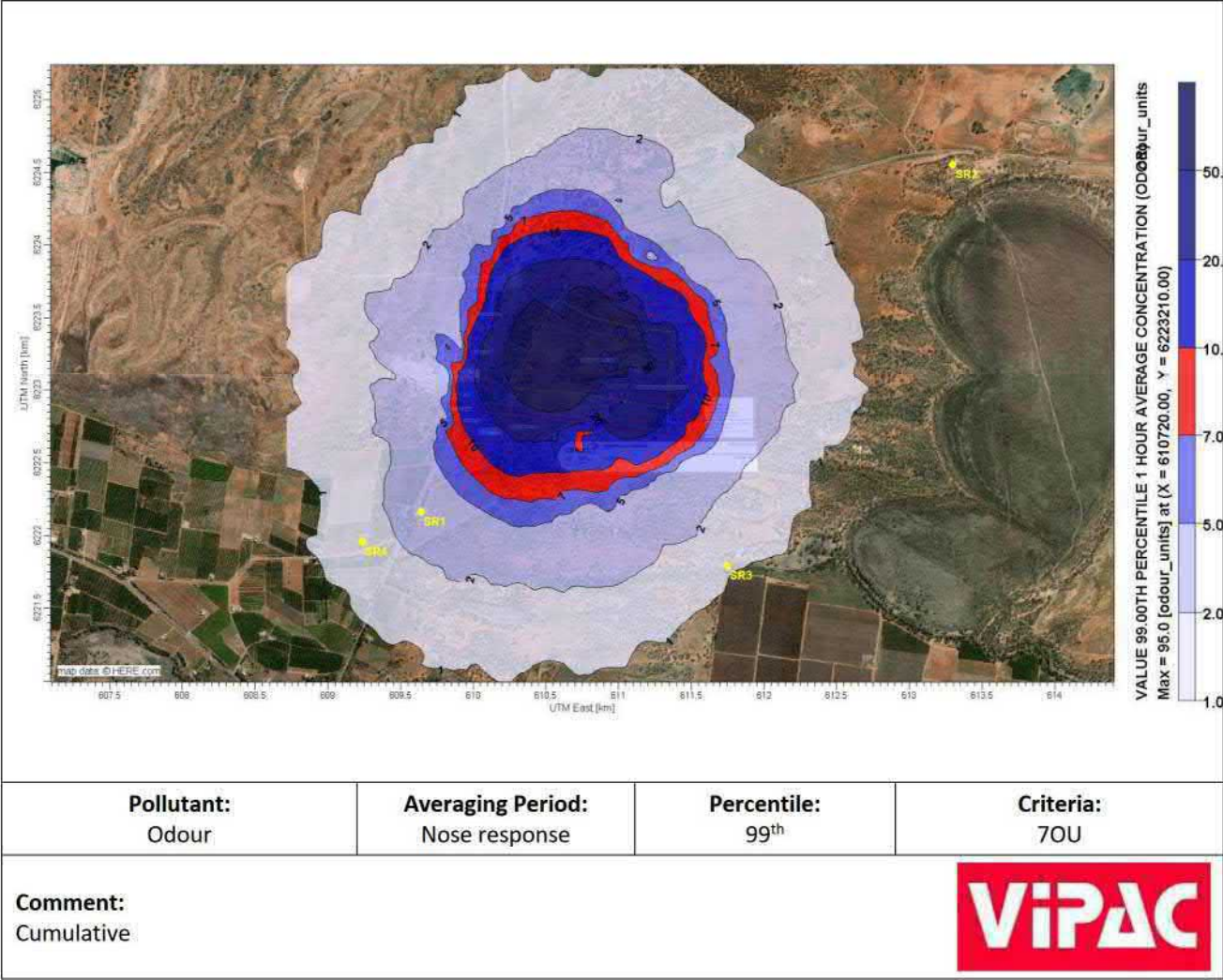














Appendix G. Stage 3 - Traffic Assessment (Tonkin, 2021)

Buronga Landfill Extension Project

Traffic Assessment: Environmental Impact Assessment

Prepared for Wentworth Shire Council

27 September 2021

Ref: 202597



Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft for Client Comment	BD	RB/NF		
C	Issued to Council				15/06/2021
D	Revised report following client review and community consultation	NF	NF	MS	7/09/2021
0	Issued for use	NF	NF	MS	27/09/2021



Contents

Project: Buronga Landfill Extension Project | Traffic Assessment: Environmental Impact Assessment
Client: Prepared for Wentworth Shire Council
Ref: 202597

1	Introduction	5
2	Methodology and Data Sources	7
3	Consultation with Stakeholders	8
4	SEARS	9
5	Existing Road Network	10
5.1	Silver City Highway	10
5.2	Arumpo Road	11
5.3	Other Local Roads	13
5.4	Silver City Highway/Arumpo Road Junction	13
5.5	Arumpo Road/Buronga Landfill Junction	14
5.6	Landfill Traffic Volumes	14
5.7	Warrants for Current Intersection Improvements	14
6	Traffic and Parking Demands for the Proposal	16
6.1	Construction Generating Activities	16
6.2	Site Access and Parking	16
6.3	Traffic Generation	16
6.4	Traffic Distribution	18
7	Impact Assessment	19
7.1	Traffic Volumes on the Road Network	19
7.2	Traffic Impact at Intersections	21
7.3	Traffic and Transport Management	23
8	Summary and Conclusions	24

Tables

Table 1	Historic and projected traffic volumes for Silver City Highway	10
Table 2	Traffic volumes for Arumpo Road	12
Table 3	Daily traffic generated by the upgraded landfill	17
Table 4	Daily Traffic Generation per Area	18
Table 5	Future daily traffic assessment for average operational traffic	19



Table 6 Future daily traffic assessment for a combination of average construction and operational traffic	20
Table 7 Future daily traffic assessment for a combination of average construction and operational traffic	20
Table 8 Future Intersection Volumes (Daily)	21

Figures

Figure 1 Site Locality for the Project	6
Figure 2 Silver City Highway intersection with Arumpo Road facing south (left) and north (right).....	11
Figure 3 Arumpo Road – Travelling Away from to Silver City Highway (Left) and Between Silver City Highway and Buronga Landfill	12
Figure 4 Truck rest area opposite Arumpo Road and Silver City Highway intersection	13
Figure 5 Entrance to Buronga Landfill Looking South	14
Figure 6 Warrants for additional turn lanes at intersections on major roads	15
Figure 7 Updates to the warrants for additional turn lanes at intersections with future volumes.....	21
Figure 8 Widened shoulder on Arumpo Road, directly in front of Buronga landfill entrance	22

Appendices

Appendix A – Proposed Intersection Upgrades



1 Introduction

Wentworth Shire Council has engaged Tonkin to prepare an Environmental Impact Statement for the Buronga Landfill Expansion Project in the far south west Riverine region of New South Wales (Figure 1). The Traffic Impact Assessment forms one component of the overall review of environmental factors for the proposed development. Wentworth Shire Council proposes to develop the project on a site within the Wentworth local government area (LGA), approximately 7 kilometres (km) north of the border between Victoria and New South Wales.

An increase in volume of waste from the current 30,000 tonnes per annum limit to 100,000 tonnes per annum is proposed for the current Buronga Landfill site, which triggers the need for an Environmental Impact Assessment (EIA) and referral of the Environmental Impact Statement (EIS). As the expansion requires a Development Application (DA) and will include waste from areas outside the council area, the Project is classified as a State Significant Development (SDD).

An Environmental Impact Statement (EIS) is a requirement of the approval process. This Traffic Impact Assessment (TIA) forms part of the EIS. It documents the traffic impact assessment methods and results, and the methods proposed to avoid and minimise associated traffic impacts, and the additional mitigation and management measures proposed to address any outstanding impacts not able to be avoided.

The three stages of the assessment have included;

1. Review of existing Environment and constraints;
2. Road Transport and Infrastructure Design, and
3. Environmental Impact Assessment.

The key tasks undertaken for the assessment has included but not limited to:

- Collation and review of data including traffic volumes and crash statistics
- Confirmation of vehicle types to be used to service the upgraded facility
- Detailed site inspection of the existing access on Arumpo Road and connections to Silver City Highway to understand:
 - the configuration of the existing roads and intersections
 - sight distances available at the intersections
 - existing signage
 - the condition of the existing roads, pavement and road structures
 - any constraints that may exist related to proposed changes to the road transport network
- Review the operation of the road network.
- Consultation with the road authorities to understand any particular concerns with the proposal that need to be addressed within the assessment.
- Preparation of concepts to address identified deficiencies and any upgrades required on the local road network.
- Assessment of impacts on the proposed transport route during both the construction and operational stages including
 - Existing and proposed traffic volumes
 - Level of service and road network performance
 - Safety of all road users
- Assessment of adequacy of the recommended upgrades, where operation mitigation measures to alleviate impacts are included.
- Recommendations for ongoing monitoring of road conditions.

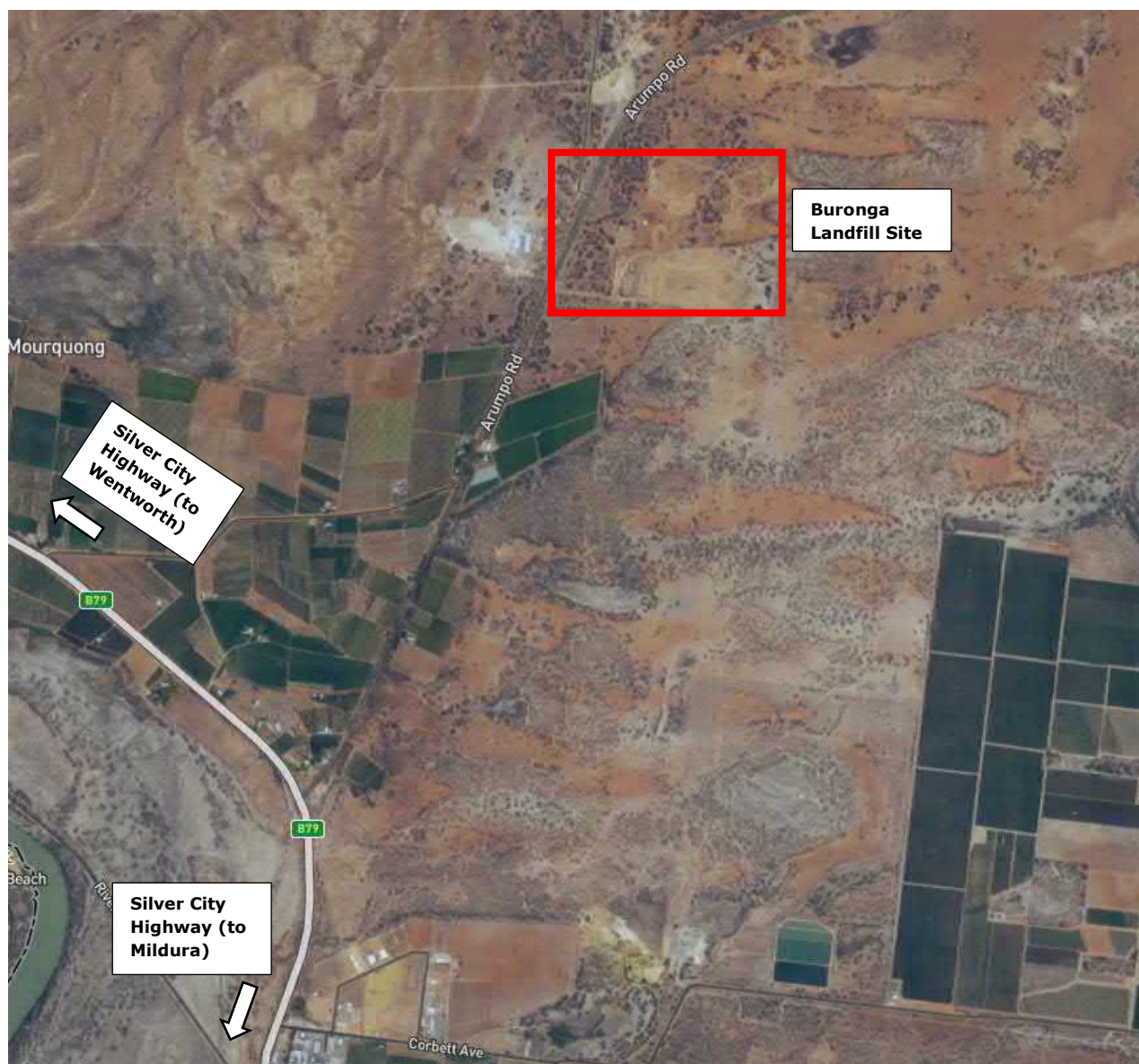


Figure 1 Site Locality for the Project



2 Methodology and Data Sources

The assessment has been undertaken with the relevant governmental assessment requirements, guidelines and policies, and in consultation with the relevant government agencies.

The assessment is based on the following general scope for matters to consider in a TIA which is defined by the NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (RTA 2002).

- the existing locality and surrounding land uses;
- the existing road network and intersections;
- traffic generation characteristics of the project;
- traffic impacts of the project, and
- a summary of the assessed traffic impacts and any traffic management or mitigation measures.

In addition to the above, the following Austroads Guidelines have been referred to in preparation of this report including the relevant TfNSW Supplements to Austroads guides:

- Austroads Guide to Road Design Part 3 – Geometric Design
- Austroads Guide to Road Design Part 4 – Intersections and Crossings - General
- Austroads Guide to Road Design Part 4A – Unsignalised intersections and signalised intersections
- Austroads Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings
- Austroads Guide to Pavement Technology Part 5 – Evaluation Treatment Design

The National Heavy Vehicle Regulator (NHVR) Performance Based Scheme (PBS) - Network Classification Guidelines have also been referred to in the preparation of the assessment.

This TIA will also address the requirements of the Secretary's Environmental Assessment Requirements.

A site inspection of the entrance to the current landfill on Arumpo Road indicated in Figure 1 together with the junction of Arumpo Road and the Silver City Highway was undertaken on 24 March 2021 to establish the existing road arrangements, geometry, sight distances and pavement conditions so as to identify any constraints to the development of the Project and develop measures to address any identified constraints.



3 Consultation with Stakeholders

Consultation with key stakeholders has involved discussions with Wentworth Shire Council and Transport for NSW (TfNSW) with the key points identified below.

Wentworth Shire Council (Roads and Engineering Department)

- Indicated that the access with the landfill should be upgraded to suit the largest vehicle required to access the landfill.
- No other comments

Transport for NSW (TfNSW)

- TIA needs to address where the additional landfill is expected to come from and how the landfill is expected to be processed on site, and in particular if it arrives from Victoria, the impact on George Chaffey Bridge needs to be addressed.
- Impacts on the state road network regionally to be addressed.



4 SEARS

The Secretary's Environmental Assessment Requirements as they relate to the traffic impact assessment are outlined below:

Transport for NSW

- TIA is to address the existing and anticipated additional traffic generation on the surrounding road network, vehicle types and volumes including peak traffic volumes, travel routes for vehicles accessing the development site.
- Consideration of the cumulative impacts of the potential traffic generation when added to existing traffic volumes on upon the surrounding road network.
- Address and provide recommendations for any mitigation measures necessary to address traffic related impacts generated by this development upon the surrounding road network during the lifetime of the project.
- Traffic related issues should be addressed in two distinct stages as follows:
 - Establishment phase i.e. transport of material and equipment/components for the construction of the development, including movement and parking of construction related vehicles.
 - Operational phase – ongoing traffic generation due to the operation, maintenance and serving of the project.
- Need to appropriately consider and minimise the impacts of the total traffic generation due to the development on the existing road infrastructure and maintain the safety, efficiency and standard of maintenance along the existing road network through the design, construction and operation of the development and any road works required to support the operation of the development.



5 Existing Road Network

Access to the Project Site is proposed to occur from Arumpo Road. Arumpo Road is in turn accessed by Silver City Highway, which links many of the towns that are likely to use the landfill.

5.1 Silver City Highway

5.1.1 Function and Geometry

The Silver City Highway is a two lane two-way road under the care and control of TfNSW. This section of the road is currently posted as a 100km/hr speed limit from approximately 1.5km from the intersection with Sturt Highway and is the primary route for transport linking Mildura in the south to Broken Hill in the north. The road extends from Buronga at the Sturt Highway in the south, to the Queensland/NSW border in the north and intersects other major highways including Sturt Highway, Calder Highway and Barrier Highway. Silver City Highway is used by light vehicles in Southern NSW as a means of linking nearby towns such as Buronga, Dareton and Wentworth. The Highway has approval for travel by B-double, Type (1) A-double, Modular B-triple, B-triple and AB-triple vehicles.

Silver City Highway is sealed, and edge lined, with sealed shoulders throughout the area between Buronga and Arumpo Road. Predominantly, Silver City Highway is a two-lane two-way road, with marked lane widths of 3.5m and sealed shoulder widths of 1.0m. Unsealed shoulders are approximately 1.5m. The Highway does not have any noticeable vertical alignment changes. There are a range of large horizontal curves that exist in the area of Arumpo Road and Buronga.

5.1.2 Road Condition

The condition of the Highway appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.

5.1.3 Traffic and Safety

Daily traffic volumes were obtained from Austraffic traffic surveys, in March 2021. Traffic volumes are presented in Table 1 below. Traffic counts were taken over a two-week period.

Table 1 Historic and projected traffic volumes for Silver City Highway

Direction		Traffic Volume (veh/day)	Average Volume at Peak Hour (Peak Time)	Heavy Vehicle Percentage	85 th Percentile Speed (km/h)
South of Arumpo Road Intersecti	Two-Way	2,999	274 (2pm)	22.7%	95
	Northbound	1,488	122 (6am)	21.4%	95
	Southbound	1,475	156 (2pm)	23.9%	93
North of Arumpo Road Intersecti	Two-Way	2,501	233 (2pm)	19.7%	103
	Northbound	1,256	103 (2pm)	19.3%	102
	Southbound	1,244	130 (2pm)	20.1%	104

Road width design standards for single carriageway rural roads are defined by the Austroads Guide to Road Design Part 3 (2021) and are based on daily traffic volumes. Based on Table 4.5 in the Guide, the minimum traffic lane width required is 3.5m, with a total shoulder of 2m, with minimum 1m sealed. The Silver City Highway within the vicinity of Arumpo Road currently meets the minimum cross-sectional requirements of the Guide based on existing traffic volumes.



The NHVR PBS - Network Classification Guidelines also detail minimum carriageway widths for heavy vehicle routes. Given Silver City Highway is gazetted for Level 3 vehicles (Type 1 Road Trains), the minimum lane and total shoulder widths required by the Guidelines are 3.3m and 1.5m respectively for the current traffic volumes. Silver City Highway currently exceeds this requirement.

A review of published crash data by the Centre for Road Safety Illustrates that there were 5 crashes within 2.5km of the intersection with Arumpo Road along Silver City Highway between 2015 and 2019. 3 of these crashes occurred between approximately 1.0km and 2.5km North of the Arumpo Road intersection. The three crashes included a cross-traffic collision at an intersection, a rear-end collision turning off the highway into a T-junction, and a vehicle that ran off the road. The final 2 crashes were at the intersection between Sturt Highway and Silver City Highway, approximately 2.5km south of the Arumpo Road intersection. These crashes included a rear end collision and a left-turn sideswipe. All crashes resulted only in minor injuries.



Figure 2 Silver City Highway intersection with Arumpo Road facing south (left) and north (right)

5.2 Arumpo Road

5.2.1 Function and Geometry

Arumpo Road is a sealed road under the care and control of the Wentworth Shire Council. The road has an 80km/h posted speed zone from the Silver City Highway and continues for approximately 2km and then increases to a 100km/h posted speed zone. Arumpo Road provides a link between Buronga and Mungo, extending north-east from the Silver City Highway. Arumpo Road has the approval for travel by B-double, Type (1) A-double and Modular B-triple vehicles.

On the approach to Silver City Highway, Arumpo Road has lane widths of 3.6m with an unsealed shoulder width of 1.0m. On the approach to the Buronga Landfill, Arumpo Road has lane widths of approximately 3.25m, with an unsealed shoulder width of 1.5m. There is localised seal widening at the junction with Mourquong Road, with the total sealed width increasing from 6.5m to 10m on the approaches to the junction. At the intersection to Buronga Landfill, there exists a wide sealed shoulder, likely designed to allow vehicles travelling straight to pass vehicles turning left into the landfill.

The road alignment is straight, with the exception of a large radius curve approximately 200m from the Silver City Highway, in the 80km/h section of road. There also exists a vertical crest curve south of the speed limit change 2km from the Silver City Highway.

5.2.2 Road Condition

The condition of Arumpo Road appears satisfactory with minimal rutting or surface defects suggesting the underlying pavement is in good condition.

5.2.3 Traffic and Safety

Daily traffic volumes were obtained from Austraffic traffic surveys, in March 2021. Traffic volumes are presented in Table 2 below. Traffic counts were taken over a two-week period.

Table 2 Traffic volumes for Arumpo Road

Direction	Traffic Volume (veh/day)	Average Volume at Peak Hour (Peak Time)	Heavy Vehicle Percentage	85 th Percentile Speed (km/h)
Two-Way	478	47 (1pm)	24.6%	69
Eastbound	237	24 (6am)	23.25%	64
Westbound	241	28 (2pm)	26%	71

Based on Table 4.5 in the Austroads Guide, the minimum traffic lane width required is 3.1m, with a total shoulder of 1.5m, with minimum 0.5m sealed. In addition, the Guide outlines that a minimum 7.0m seal should be provided on designated heavy vehicle routes (or where the AADT contains more than 15% heavy vehicles). Based on the above, the majority (approximately 2.2km out of 2.6km) of Arumpo Road between the Silver City Highway and the Landfill access does not currently meet the minimum cross-sectional requirements of the Guide based on existing traffic volumes, with a total minimum seal width of 7.2m required consisting of 2x 3.1m lanes and 0.5m sealed shoulder. It is noted that current traffic volumes are close to the current Design AADT threshold.

Assessed against the NHVR PBS - Network Classification Guidelines the minimum lane and total shoulder widths required are 2.9m and 1.2m respectively for the current traffic volumes and Level 3 vehicles gazettal status. Arumpo Road currently exceeds this requirement.

A review of published crash data by the Centre for Road Safety Illustrates that there were no crashes along Arumpo Road within 15km of the Arumpo Road and Buronga Landfill intersection. Approximately 16 km north-east from the intersection, a single moderate injury crash from 2018 exists. This crash was caused by a vehicle losing control on a T-junction turn.



Figure 3 Arumpo Road – Travelling Away from to Silver City Highway (Left) and Between Silver City Highway and Buronga Landfill



5.3 Other Local Roads

5.3.1 Mourquong Road

The only other local road within the vicinity of the subject site is Mourquong Road. Mourquong Road is a local road primarily providing access to adjacent horticulture land including a small number of dwellings. It extends between Silver City Highway and Arumpo Road. Being primarily for local access, it is of lower standard and width than Arumpo Road, with a sealed width of approximately 4.8-5m. Mourquong Road is not gazetted for vehicles greater than semi-trailers. The current posted speed limit is 80km/hr.

Due to the current cross section standard, it is not expected that Mourquong Road will be utilised by development traffic, in particular heavy vehicles and would only be utilised by incidental light vehicles.

5.4 Silver City Highway/Arumpo Road Junction

At the intersection between Silver City Highway and Arumpo Road, there exists a deceleration and acceleration on Silver City Highway for left turns onto and from Arumpo Road respectively. There also exists an auxiliary right-turn treatment on Silver City Highway, with two lanes, allowing vehicles to pass a right-turning vehicle on a short left lane. These intersection treatments mean that Silver City Highway contains four lanes around the Arumpo Road intersection. The two central lanes remain with a width of 3.5m. The east-most deceleration lane and the west-most lane have widths of 3.0m at their largest. Shoulder widths are 0.5m, meaning that at Silver City Highway's widest point in the vicinity of Arumpo Road, the seal width is 14.0m.

The sight distance at the Silver City Highway / Arumpo Road intersection was assessed using Austroads Guide to Road Design Part 4A the Safe Intersection Sight Distance (SISD). For a posted speed limit of 100km/hr (assumed to be the operating speed) and based on the guidance presented in Austroads and the RMS Supplement to Austroads. The minimum required SISD is 262m based on a 2.5 second driver reaction time. Based on a site visit, sight distances were deemed to be acceptable, with sight distance deemed to be 300+ metres, despite horizontal curves existing on either side of the intersection.

Due to the location of the traffic counter on Arumpo Road, it can be determined that 24 vehicles enter the intersection from Silver City Highway and 28 vehicles exit the intersection onto Silver City Highway during the peak hours.

There exists a truck rest area directly opposite the intersection, as seen in Figure 4 below.



Figure 4 Truck rest area opposite Arumpo Road and Silver City Highway intersection



5.5 Arumpo Road/Buronga Landfill Junction

Road conditions upon entrance to Buronga Landfill are poor. There are a range of deformed areas and small potholes. There is widespread evidence of stripping, with some areas of the base exposed.



Figure 5 Entrance to Buronga Landfill Looking South

The sight distance has been checked at the Buronga Landfill junction with the Arumpo Road using Austroads Guide for SISD. The operating speed of the road is likely to be 100km/hr, and this equates to a SISD of 262m based on a reaction time of 2.5 seconds. Arumpo Road continues with negligible changes to horizontal alignment in the vicinity of the Buronga Landfill entrance. Sight distances appear to be in excess of 700m, and thus sight distances are met.

5.6 Landfill Traffic Volumes

The volumes of vehicles using the intersection can be determined using the volumes of traffic using the landfill weighbridge, as well as the volume of employee vehicles. Six employee vehicles are expected to access the landfill daily, assumed to be in light vehicles. There are an additional 24 light vehicles such as cars, utes and trailers carrying household waste that pass through the weighbridge. 4 light rigid trucks, 21 heavy rigid trucks, and a single articulated truck pass through the landfill weighbridge daily on average. This means that an average of 56 vehicles enter into the landfill each day equating to a total of 112 movements in and out of the landfill.

5.7 Warrants for Current Intersection Improvements

Rural intersection upgrade warrants are assessed from the combination of the peak hourly through and turning traffic movements which occur at the intersection. This will determine the need for turning lanes in accordance with current Austroads Guide to Traffic Management Part 6 and is shown in Figure 6 below.

There are separate design charts for roads with either 100 km/hr or higher design speeds or design speeds for lower than 100km/hr. As the speed limit on the major road at both the Silver City Highway/Arumpo Road junction and Arumpo Road/Landfill access junction is 100km/hr, the design chart for design speeds 100km/hr or greater is to be adopted. Additional left or right turn traffic lanes are only required where the combination of the major road peak hourly traffic volume and the minor road traffic exceeds the curve 1 as shown in the chart in Figure 6 below.



Silver City Highway contains 122 veh/hour travelling north towards the Arumpo Road intersection (according to the traffic count south of the intersection) and 130 veh/hour travelling south towards the intersection (according to the traffic count north of the intersection). Note that these vehicle volumes are based on the worst-case scenario, which in this case happens to be the peak hours of 6am and 2pm. Based on the Arumpo Road traffic count, it is assumed that at a maximum, 24 vehicles will turn onto Arumpo Road during the peak hour.

Figure 6 is used, with a design speed of larger than 100km/h, turn volumes of 24 veh/h, and major road volumes of 252 veh/h for the right-turn and 130 veh/h for the left-turn. Based on the figure, a basic left turn is adequate and a short channelised right turn lane is required. Currently, only auxiliary lanes exist for right turns.

The peak hour volume of vehicles along Arumpo Road is only 47 vehicles/hour. Only 56 vehicles enter the facility daily, and by taking an assumed 10% of the daily peak to inform the hourly peak, it is assumed 6 vehicles enter the intersection at peak time. Based on Figure 6, with the low volumes of traffic on Arumpo Road, it means that basic left and right turns are adequate upon the entrance to the landfill facilities.

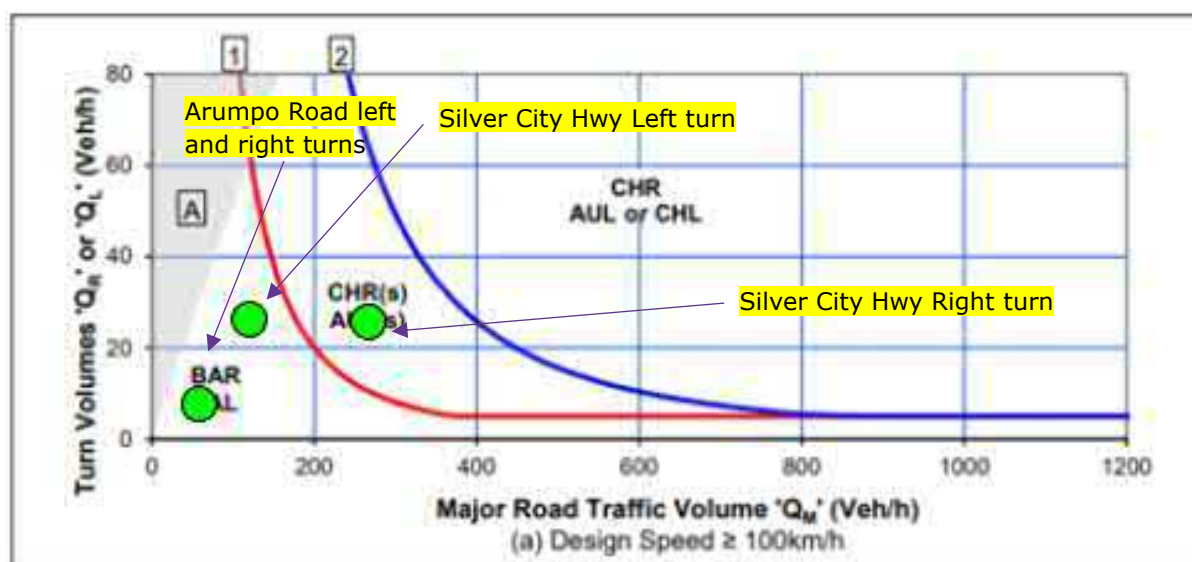


Figure 6 Warrants for additional turn lanes at intersections on major roads



6 Traffic and Parking Demands for the Proposal

6.1 Construction Generating Activities

Construction of the Project is expected to be prevalent and staged throughout the entire life span of the landfill facilities. Construction is expected to occur alongside operation of the current facilities. Whilst it depends on landfill cell capacity, it is projected that new cells will be required to be built approximately every 3-5 years. It is expected that there will be an average of 15 extra employees undertaking the construction of each cell.

Construction activities that are expected to occur include both the construction of additional landfill cells, as well as any intersection upgrades that may be necessary.

6.2 Site Access and Parking

Site access to the upgraded landfill is shown to occur at the entrance to the current landfill on Arumpo Road. The majority of waste at the landfill is from household waste, and all towns that would be expected to use the landfill facilities will require the use of the Silver City Highway. Approximately two thirds of the waste comes from Mildura, via commercial vehicles and rigid trucks. The remaining third of waste comes from the Wentworth, Buronga and Gol Gol areas, including via cars and trailers.

Limited parking facilities are present in front of the landfill offices, out of the way of landfill user traffic. Local users of the landfill would be expected to drop off their rubbish at designated points around the site and leave, thus there is no particular need for any upgrade to parking facilities. The same is applicable for commercial waste trucks. Currently only 6 staff are employed at the landfill facilities, however this is expected to increase to 10. This should not affect parking on site.

6.3 Traffic Generation

Traffic generation can be grouped into four separate scenarios, due to the need for construction and operation at the same time.

- Scenario 1 - Current Operation
- Scenario 2 - Current Operation and Initial Construction
- Scenario 3 - Future Operation
- Scenario 4 - Future Operation and Top-Up Construction

The first scenario is simply from the current landfill operation levels. Construction will begin simultaneously to the operation of the current landfill, creating an increase in volume. Once construction has been completed, it is expected that traffic volumes into the larger operating landfill will increase, as the facilities take on more waste from surrounding areas, including Mildura (once the current Mildura landfill reaches the end of its life). Finally, construction of new cells approximately every three years means there will be a combined volume of construction traffic as well as the increased operating traffic from the initial development.

A range of vehicles are expected to access the site, as outlined by Wentworth Shire Council. Light vehicles are the predominant vehicle type, closely followed by heavy rigid trucks. Light rigid trucks and articulated trucks occur daily but are in much lower volumes. The largest expected vehicle is a B-Double.

The current operation volumes are taken from weighbridge movements, combined with employee volumes. Wentworth Shire Council has provided a daily average of vehicles travelling through the landfill weighbridge, and the breakdown of this can be seen in Table 3. This equates to a total of 50 vehicles. Given there are 6 employees travelling daily, this takes the current operation total to 56 vehicles.



A range of assumptions are made in calculating the updated vehicle volumes:

- The majority of material during construction can be sourced from the landfill site itself. Geosynthetics, pipes and fittings, concrete, steel, pumps, etc for construction of resource recovery areas and landfill cells will be sourced externally. These materials will be predominantly transferred using heavy articulated trucks.
- Light vehicle traffic will not change much in future operations, as most light traffic from Mildura will drop off waste at existing local transfer stations.
- Current average daily volumes from commercial type vehicles are 7t/day, large high volume vehicles are 35t/day, and cars and trailers are 2t/day. Given these averages, on average there is 16,060 tonnes of waste delivered each year. This is approximately 3/5 of the total tonnage of the landfill. Given this information, it is expected that once the landfill is upgraded to 100,000 tonnes annual capacity, an average day would see it reaching 60,000 tonnes of waste annually. However, it is understood the landfill actually currently operates near capacity, therefore an additional peak profile has been developed based on 29,000t per year.
- Light vehicles predominantly come in from the NSW side of the river, and these are not expected to change.
- Heavy vehicles are expected to increase in volume from Mildura and will make up most of the difference in volume from 16,000 tonnes to 60,000 tonnes.
- Peak traffic is equal to 1.6x the average traffic (rounded). This means that at its peak, the landfill will experience 96,000 tonnes delivered in a year to the expanded site.
- As light and rigid vehicles are both expected to increase in volume, their predicted future operation volume will increase by the same factor. This increase is deemed to be approximately 3.8x to reach a volume of 60,000 tonnes.
- Employees increase from 6 to 10 with the increase in capacity of the landfill.

Table 3 Daily traffic generated by the upgraded landfill

Vehicle Type	Current Operation		Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Light Vehicles	30	48	45	72	46	74	61	98
Light Rigid Trucks	4	6	5	8	15	24	16	26
Heavy Rigid Trucks	21	34	22	35	81	130	82	131
Articulated Trucks	1	2	3	5	2	3	4	6
TOTAL	56	90	75	120	144	230	163	261

It can be seen from the table above that daily traffic will be at its peak during periods where usual operation of the upgraded facilities is combined with construction of new cells.



6.4 Traffic Distribution

During periods where construction is taking place, it is expected that:

- 90% of construction vehicles will travel to and from the site from Victoria (Mildura)
- 5% of construction vehicles will travel to and from the site from Buronga
- 5% of construction vehicles will travel to and from the site from Wentworth

These percentages are likely due to the fact that most materials required for the landfill will be produced in Mildura. 5% of constructions vehicles in Buronga and Wentworth allow for employee vehicles, and also any materials that may be sourced from alternate sources in NSW.

During operating periods, it is expected that:

- 75% of vehicles will travel to and from the site from Victoria (Mildura)
- 15% of vehicles will travel to and from the site from Buronga/Gol Gol
- 10% of vehicles will travel to and from the site from Wentworth

The majority of light vehicles are from households in Wentworth Shire Council. The only increase expected from these areas are due to population increases. Household waste from Mildura is expected to increase, however this will travel to Buronga Landfill via waste processing facilities and rigid trucks. Note that these percentages are based on the closing of the Mildura Landfill, as it reaches the end of its life.

Using these assumptions, the following table is produced.

Table 4 Daily Traffic Generation per Area

Vehicle Type	Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak
<i>Mildura</i>	17	27	66	106	83	133
<i>Buronga</i>	1	2	13	21	14	23
<i>Wentworth</i>	1	2	9	14	10	16
TOTAL	19	30	88	141	107	171



7 Impact Assessment

7.1 Traffic Volumes on the Road Network

The impact of additional traffic on the road network is expected to affect Silver City Highway and Arumpo Road. The existing daily traffic volumes (estimated baseline daily traffic volumes for the year 2021) for the Silver City Highway and Arumpo Road and the existing adequacy of the road design standards for these routes is discussed in Section 5.

The roadway Design Annual Average Daily Traffic (AADT) for single carriageway roads can be measured against the existing traffic lane and carriageway widths as indicated in the Austroads Guide to Road Design Part 3. Based on the existing cross sections of the road, the Design AADT for each road is below:

- Silver City Highway North - >3000 vehicles per day
- Silver City Highway South - >3000 vehicles per day
- Arumpo Road - 150-500 vehicles per day

The additional daily traffic volumes generated during the construction and operation stages are summarised for the affected travel routes (Silver City Highway & Arumpo Road) in the following sections.

7.1.1 Future Operational Traffic

The below table highlights the expected changes to AADT on key roads near the Buronga Landfill, following the upgrade of the facilities.

Table 5 Future daily traffic assessment for average operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	9	0.35%	2,510
Silver City Highway (South of Arumpo Road)	2,999	79	2.64%	3,078
Arumpo Road	478	88	18.41%	566
George Chaffey Bridge	18,000	66	0.37%	18,066

The current AADT volumes sit below the expected design AADT based on road cross sections, however it is noted that Arumpo Road has deficient total seal width for the current AADT. These traffic volumes show a very little increase in traffic volume on Silver City Highway and Arumpo Road, however the increase on Arumpo Road will put it into the next Design AADT category (500-1000 vehicles per day), therefore it is recommended that the seal width is increased to 7.2m minimum as recommended by Austroads regardless of the development proceeding or not. No changes are proposed or recommended for Silver City Highway.



7.1.2 Construction Traffic

The below table highlights the expected effect of having more vehicles on the road due to construction work to the landfill.

Table 6 Future daily traffic assessment for a combination of average construction and operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	1	0.04%	2,502
Silver City Highway (South of Arumpo Road)	2,999	18	0.60%	3,017
Arumpo Road	478	19	3.97%	497
George Chaffey Bridge	18,000	17	0.10%	18,017

The majority of vehicles come from Mildura and must cross the George Chaffey Bridge and Silver City Highway south of Arumpo Road. These volumes are low enough in comparison to the current AADT.

7.1.3 Construction and Future Operational Traffic

Construction will occur at regular intervals throughout the life of the facility, and simultaneously during the operation of the facilities. Thus, the construction and operation traffic is likely to have the greatest impact on the surrounding road network. The below table highlights the expected effect of having both construction and additional operation traffic on surrounding roads.

Table 7 Future daily traffic assessment for a combination of average construction and operational traffic

Road Name	Current AADT	Additional Vehicles	Traffic Increase Percentage	New AADT
Silver City Highway (North of Arumpo Road)	2,501	10	0.39%	2,511
Silver City Highway (South of Arumpo Road)	2,999	97	3.24%	3,096
Arumpo Road	478	107	22.38%	585
George Chaffey Bridge	18,000	83	0.46%	18,083

As identified under the existing conditions in Section 5 it was found that the Arumpo Road does not have sufficient seal width for the existing AADT based on the Austroads Guide to Road Design Part 3. With a combination of operational and construction traffic, the road AADT will move into the next design AADT category. While this does not increase the minimum seal width required, it does highlight that the seal width should be widened regardless of the development proceeding.

The AADT of Silver City Highway and George Chaffey Bridge is not largely altered enough to warrant any recommended upgrades due to the expanded Landfill.



7.2 Traffic Impact at Intersections

Given an increase in traffic in much of the surrounding road network, the ability of the intersection to handle the new influx of traffic is to be investigated. From [Section 5](#) of this report, it was found that a maximum of 24 veh/h turn onto Arumpo Road. It was also found that a total of 56 vehicles turn into the landfill on any given day, with an assumption that 10% of these make the peak hour, taking the peak hourly rate to 6 veh/h.

Vehicles predicted to use the Silver City Highway and Arumpo Road, as well as the Arumpo Road and Landfill Entrance intersections are assessed again with reference to AGTM Part 6, but with additional vehicles at the intersection. As traffic during simultaneous operation and construction is largest, the peak volumes from those periods is used to analyse the intersection.

The peak additional daily traffic was calculated for each area surrounding the landfill facilities in Table 4. It is assumed that the 10% of expected peak traffic occurs during the peak hour. These peak hourly volumes are used to predict the increased major road and turning volumes. Additional vehicles entering the intersection are summarised in the table below.

Table 8 Future Intersection Volumes (Daily)

	Current Major Road Volume	Current Turn Volume	Peak Additional AADT	New Major Road Volume	New Turn Volume
Silver City Highway (North of Arumpo Road)	130	24	16	132	26
Silver City Highway (South of Arumpo Road)	252	24	156	268	40
Arumpo Road	47	6	171	64	22

The increase in traffic at each intersection does not change the required intersection treatment from what was outlined in Section 5.6, according to the Austroads Guide to Traffic Management Part 6. This is demonstrated in Figure 7 below.

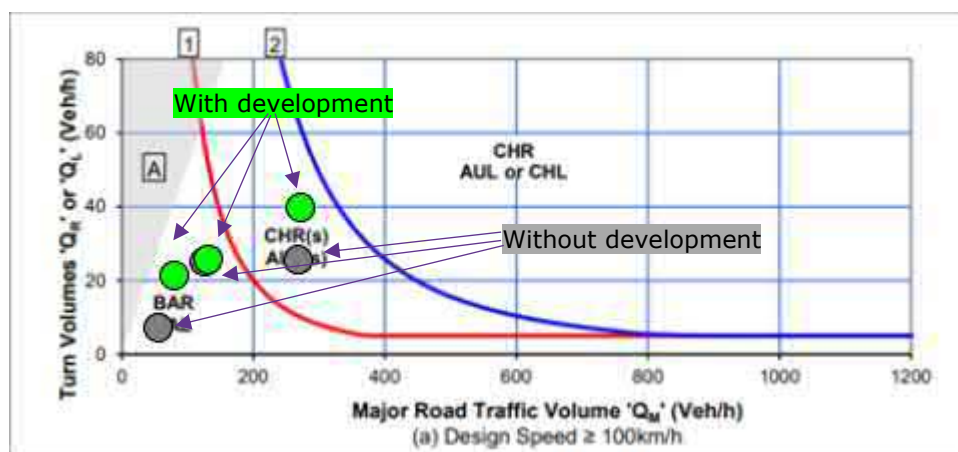


Figure 7 Updates to the warrants for additional turn lanes at intersections with future volumes

Note that this assumes a worst case scenario that the peak traffic of the road network coincides with the peak hour traffic of the landfill.

Based on the above assessment the recommended infrastructure improvements to facilitate vehicle access to the Project Site are discussed in the sections below.

7.2.1 Arumpo Road

As previously identified, Arumpo Road currently has deficient seal width to meet the requirements of Austroads. The minimum seal width required to meet the current and forecast AADT for the development is 7.2m, including minimum 3.1m lanes, 1.5m total shoulder with minimum 0.5m sealed. The current seal width is as narrow as 6.5m. It is estimated that approximately 2.2km of Arumpo Road between Silver City Highway and the Landfill access is narrower than the minimum. While the minimum lane widths are currently met, the seal width is not wide enough. Regardless of whether the development proceeds or not, the Arumpo Road should be widened to meet the minimum widths as required by Austroads. This is expected to involve reworking of the existing unsealed shoulders and sealing to meet the minimum total seal width. It is recognised that this work will need to be funded and should be undertaken prior to the landfill reaching its expanded capacity.

7.2.2 Arumpo Road/Buronga Landfill Intersection

According to the Austroads Guide to Road Design Part 4A, a minimum 7.0m width between the edge of a widened shoulder at the centreline must be implemented to allow for vehicles to pass turning vehicles. Currently this width does not exist.



Figure 8 Widened shoulder on Arumpo Road, directly in front of Buronga landfill entrance

The design of BAL and BAR turns on Arumpo Road can be seen in Appendix B. This includes approximate total areas of pavement that are required to be widened to allow for B-Double and AB-Triple vehicles. The landfill is expected to only require the entrance of B-Doubles; however, the road is gazetted for AB-Triples. A BAR and BAL turning movement for AB-Triples is undertaken in case the landfill requires the entrance of AB-Triple vehicles in the future.



7.2.3 Silver City Highway/Arumpo Road Intersection

Currently an AUR turn exists on Silver City Highway, when a CHR(s) turn in theory is preferable. However, the length of the additional auxiliary lane, plus the addition of a truck parking area, means that the current auxiliary lane is considered appropriate. Currently, the additional lane near Arumpo Road runs for approximately 500m. This length not only allows for vehicles to avoid right-turning vehicles onto Arumpo Road, but also allows room for trucks to enter and exit the parking area to the east of Silver City Highway. The truck parking area may also be a limitation on a potential CHR intersection, because the design of a CHR may limit the ability of heavy vehicles to turn into and out of the parking area.

Given the length of the current auxiliary lane, it is recommended to maintain the current intersection layout.

7.3 Traffic and Transport Management

The proposed intersection treatments would be incorporated into a Construction Traffic Management Plan, which will utilise Austroads and TfNSW guidelines for the major road intersection operations and worksite traffic control throughout the project construction period.

Temporary traffic control arrangements will be required during construction of public road improvements. During construction period, the largest vehicles which are anticipated to be visiting the site are B-Doubles. Additional traffic management will not be required during the solely operational phases.

A Transport Management Plan would be required for any oversize and/or overmass vehicles travelling to the site. It is a comprehensive document describing how an oversize and/or overmass movement will be safely carried out in NSW and is required to be submitted to TfNSW prior to obtaining a permit for these movements.



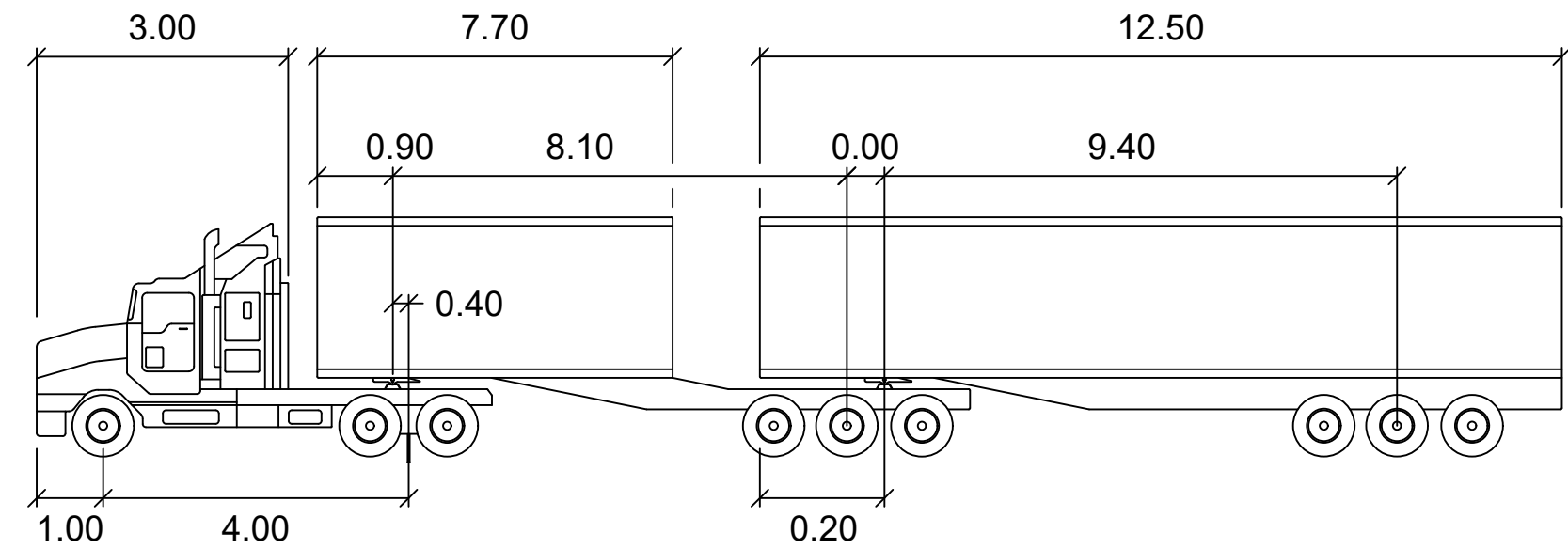
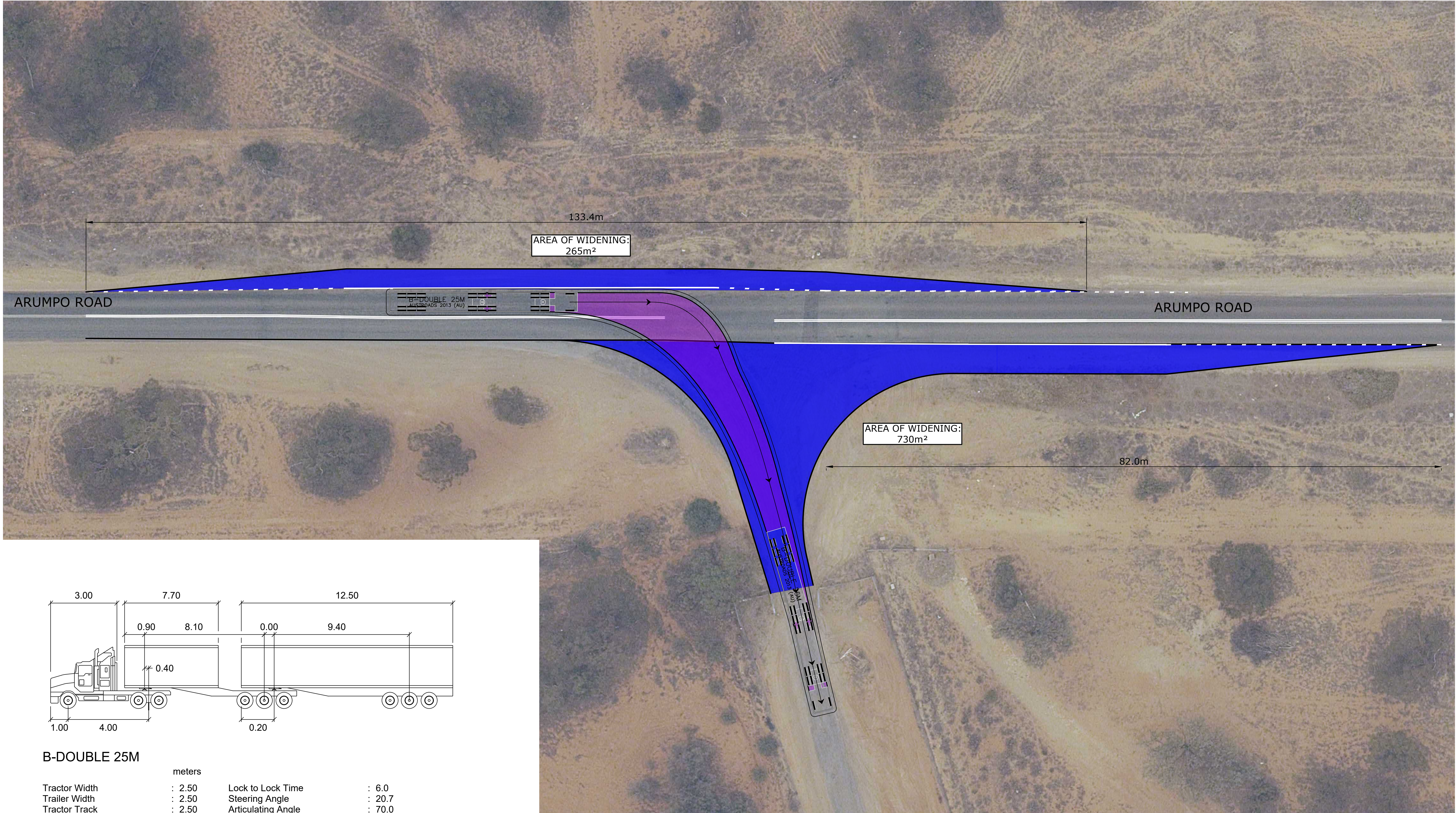
8 Summary and Conclusions

The traffic impacts from the proposed Buronga Landfill extension have been assessed and the key findings are as follows:

- The BAR intersection at the junction of Arumpo Road and Buronga Landfill currently is not to the standards outlined by Austroads and will need to be upgraded.
- Silver City Highway have an appropriate cross section and geometry to meet Austroads standards despite the influx of future volumes due to the landfill.
- Arumpo Road currently has deficient seal width to meet Austroads standards, regardless of whether the development proceeds. It is recommended that Arumpo Road is widened to meet the minimum seal width of 7.2m as required by Austroads.
- There will be no adverse effects from the Buronga Landfill on the George Chaffey Bridge, due to the low increase in traffic volumes from Mildura, in comparison to the volumes that the bridge is exposed to.
- The intersections of Silver City Highway and Arumpo Road, and Arumpo Road and the Buronga Landfill have appropriate sight distance.
- Future traffic volumes were based on assumptions of the usage of surrounding areas, as well as Traffic Engineering experience.
- The junction between Silver City Highway and Arumpo Road may require a CHR treatment, however due to the length of the current auxiliary lane and constraints of a nearby heavy vehicle pullover point, the current AUR treatment may be deemed to be retained.
- The largest volumes of traffic caused by the Buronga Landfill development are in periods when construction upgrades of the landfill coincides with future operation volumes. This increase is equal to 10 vehicles on Silver City Highway (North of Arumpo Road), 97 vehicles on Silver City Highway (South of Arumpo Road), 107 vehicles on Arumpo Road, and 83 vehicles on George Chaffey Bridge.
- Intersection upgrades are not required due to the increased volumes caused by the landfill upgrades.

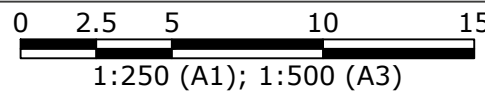


Appendix A – Proposed Intersection Upgrades



B-DOUBLE 25M

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	Trailer Width	: 2.50	Steering Angle	: 20.7
	Tractor Track	: 2.50	Articulating Angle	: 70.0
	Trailer Track	: 2.50		



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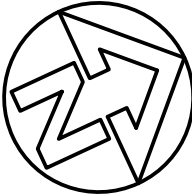
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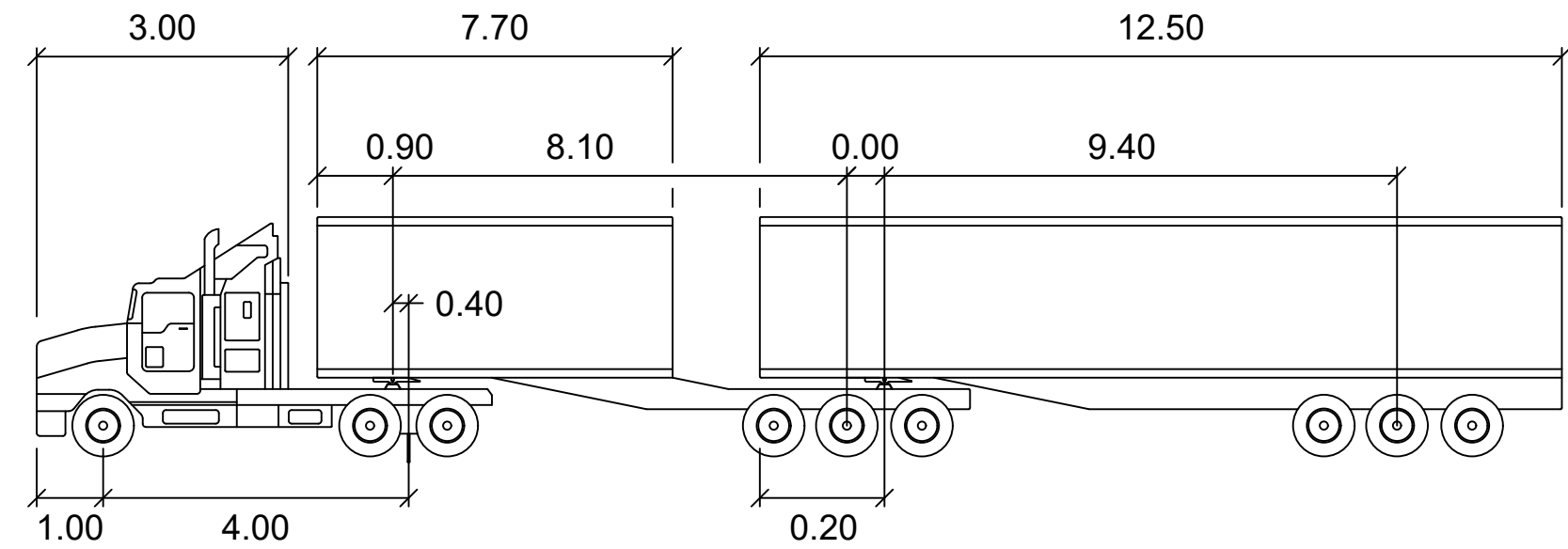
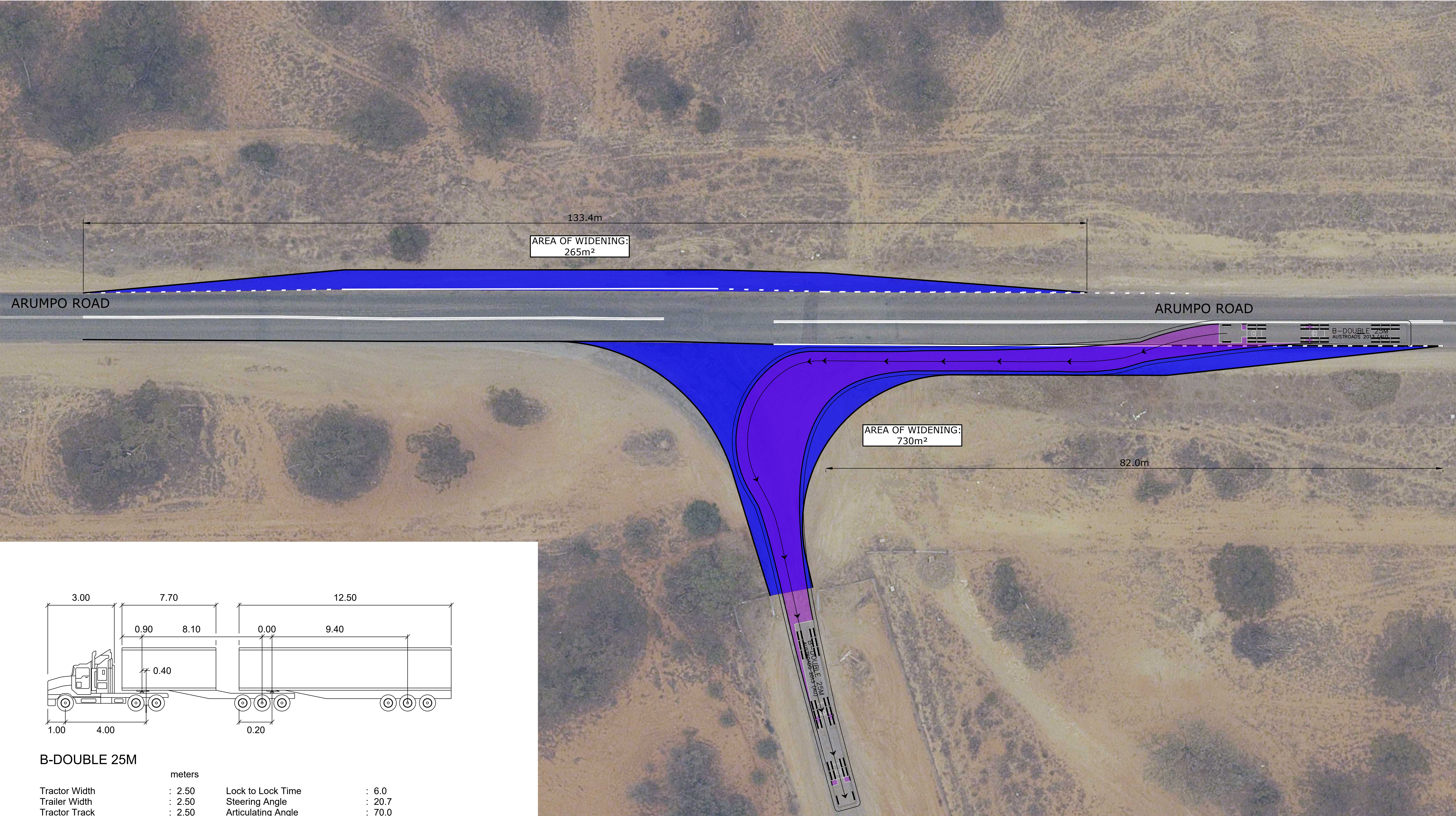


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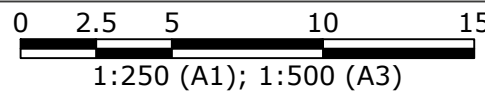
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B-DOUBLE 25M

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	Trailer Width	: 2.50	Steering Angle	: 20.7
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	Trailer Track	: 2.50		

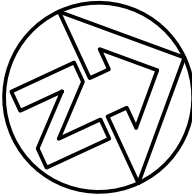


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Appendix H. Geotechnical Investigation (Tonkin, 2021)

Geotechnical Investigation Report

Buronga Landfill Expansion

Wentworth Shire Council

11 June 2021

Ref: 202597R02A



Building exceptional
outcomes together



Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft for client comment	MA/ERT			11 June 2021



Contents

Project: Geotechnical Investigation Report | Buronga Landfill Expansion
Client: Wentworth Shire Council
Ref: 202597R02A

1	Introduction	4
2	Field Investigation	5
2.1	Fieldwork	5
2.2	Borehole Methodology	5
2.3	Laboratory Testing	7
3	Results.....	8
3.1	Site Description	8
3.2	Geological Information	8
3.3	Subsurface Conditions	8
3.4	Environmental Testing	12
4	Assessment	13
4.1	Excavatability	13
4.2	Stability	13
4.3	Material Reuse	13
5	Limitations.....	15

Appendices

Appendix A – Borehole Logs

Appendix B – Photographs

Appendix C – Geotechnical Lab Test Certificates

Appendix D – Environmental Results Tables and Lab Test Certificates



1 Introduction

Wentworth Shire Council (Council) has identified that the predicted volume of waste requiring disposal at their Buronga Landfill is likely to increase in the future beyond the current approved limit. Therefore, Council is seeking regulatory approval to increase the waste disposal limit and expand the landfill to areas north of the existing footprint.

Tonkin has been engaged to undertake a soil/geotechnical investigation prior to commencing the landfill conceptual site design as the information from these investigations will inform the landfill design scope.

This report presents the results of the geotechnical investigation undertaken including:

- Summary of the subsurface conditions encountered;
- Borehole logs for each investigation location;
- Results from selected geotechnical and environmental laboratory testing; and
- Discussion and recommendations on geotechnical properties for design of project elements.



2 Field Investigation

2.1 Fieldwork

The field investigation undertaken on 16 to 18 February 2021 was directed by a senior geotechnical engineer from Tonkin and included the following:

- Work Health and Safety Hazzard Assessment;
- Undertaking dial before you dig search to assess potential underground service conflicts;
- Drilling twelve boreholes (H1 to H12) to a maximum depth of 10 m below the existing surface level or drilling refusal across the proposed landfill expansion area;
- Logging and classifying soils and materials encountered using visual tactile techniques;
- Recording groundwater and soil moisture observations;
- Obtaining selected soil samples for potential laboratory environmental and geotechnical testing.

Logs of the boreholes are presented in Appendix A.

Photographs of each borehole and selected sites were taken. A selection of these is provided in Appendix B.

2.2 Borehole Methodology

The boreholes were drilled using a Rockmaster drill rig on a Toyota Landcruiser 4WD, provided and operated by In Depth Drilling Pty Ltd, using a combination of push tube and solid auger (including rock tip) techniques. Bulk samples were retrieved from auger flights.

Boreholes were located to provide a broad coverage of potential soil conditions across the site, whilst also being directed by access restrictions.

Borehole locations are presented on Figure 1.1 below.





2.3 Laboratory Testing

2.3.1 Geotechnical Testing

Bulk samples were retrieved at random locations and depths from the boreholes and sent to CivilTest for geotechnical laboratory analysis. CivilTest is a NATA-accredited laboratory for the analyses requested. The scope of testing was intended to provide classification of representative samples and to target samples that will potentially be included in capping or base liners, or other potential on reuses on site. The laboratory testing requested included the following:

- Particle Size Distribution (PSD) x 18
- Atterberg Limits (AL) x 18
- Emerson Class x 18

The geotechnical laboratory test reports reference number 3210195-1 issue 1 dated 8/4/21 are presented in Appendix C.

2.3.2 Environmental Testing

Representative samples, mostly targeting surface soils, were retrieved at random depths from the boreholes and sent to Australian Laboratory Services (ALS) for environmental laboratory analysis. ALS is a NATA-accredited laboratory for the analyses requested. The scope of testing was intended to provide a broad classification of the potential contamination status of the soils on site. The laboratory testing requested included the following:

- Heavy metals x 18
- Organochlorine Pesticides (OCPs)/ Organophosphorus Pesticides (OPPs) x 10
- National Environment Protection Measure (NEPM) Screen x 13

The environmental laboratory test report reference EM2102930 and associated QA/QC reports are presented in Appendix D.



3 Results

3.1 Site Description

The general topography of the site is undulating, with overall grade towards the west. The River Murray Valley is south west of the site.

The southern area of the site has been disturbed as it abuts the current landfill operations. The south western portion has been disturbed significantly with material being removed in various locations for landfill cover or construction. Borehole H5 was drilled in this area. The central area is also highly disturbed through likely material sourcing for various Council operations. The eastern area is relatively undisturbed and well vegetated.

3.2 Geological Information

Based on the 1:250,000 scale Geological Map Series Sheet SI 54-11 entitled Mildura, Edition 2 dated May 1997, the geology within the site is likely to consist of:

- Woorinen Formation including aeolian red brown sand with carbonaceous silt; and
- Coonambidgal Formation which contains fluvial and lacustrine sand, sandy clay, and clay likely associated with Lake Gol Gol located east of the site.

3.3 Subsurface Conditions

The subsurface conditions observed were in general accordance with those expected from the geological maps.

Fill was only encountered in borehole H3 to a depth of 0.2m below the surface.

Topsoil was mostly non-existent apart from a sandy surface layer observed in most boreholes.

Generally, sand and clayey sand materials were observed in the upper layer, underlain by clays and sandy clays of low to medium plasticity, further underlain by silty clayey sand and sand often containing groundwater. The upper sands and clayey sand layers were more predominant in the western boreholes (H1 to H6, H11 and H12), with the eastern boreholes (H7 to H9) encountering clays near the surface.

Rock or rock strength materials were not encountered in the boreholes, although some materials provided high resistance to drilling due to being hard and dry.

Groundwater was observed in all boreholes apart from H1 and H5. Groundwater was observed at between 6.8 m (H7) and 9.7m (H11) below the surface with standing water level measured in eth open boreholes after approximately one day stabilisation at between 5.9m (H7) and 9.5m (H2) below the surface in the boreholes that did not collapse.

A summary of the soils encountered is provided below in Table 4.1.



Table 4.1 – Soil Profile Summary (depth intervals are m below surface)

Soil Description	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
FILL, Clayey Sand (FILL)			0 - 0.2									
SAND, fine to coarse grained, red brown and pale brown (UNIT 1)	0 - 1.2	0 - 0.8	0.2 - 1.7	0 - 0.4		0 - 0.6				0 - 0.4	0 - 0.5	0 - 1.2
Clayey Gravelly SAND/Clayey SAND, fine to coarse grained, pale orange/brown, pale brown and white, fine to coarse gravel, low plasticity fines (UNIT 2A)	1.2-6.4	0.8 - 2.0	1.7 - 2.6	0.4 - 2.4	0 - 2.0	0.6 - 3.0				0.4 - 1.8	0.5 - 2.2	1.2 - 3.0
SAND/Clayey SAND, fine to coarse grained, pale brown, orange/brown and orange, low plasticity fines (UNIT 2B)	6.4 - 10.0	2.0 - 5.2	2.6 - 5.2		2.0 - 4.0	3.0 - 7.1					2.2 - 6.4	3.0 - 4.2
Clayey SAND, fine to coarse grained, grey/brown, low plasticity fines (UNIT 3A)				2.4 - 3.5	4.0 - 4.6				0 - 0.05			
Sandy CLAY/CLAY, medium plasticity, grey, grey/brown, yellow brown, red, fine to coarse sand (UNIT 3B)		5.2 - 10.0	5.2 - 9.0	3.5 - 8.0	4.6 - 7.5	7.1 - 8.1	0 - 6.8	0 - 9.3	0.05 - 6.5	1.8 - 8.1	6.4 - 8.2	4.2 - 8.2
Clayey SAND/Silty SAND, fine to coarse grained, yellow brown, grey, low plasticity fines (UNIT 4A)			9.0 - 10.0	8.0 - 10.0	7.5 - 10.0		6.8 - 10.0		6.5 - 8.0	8.1 - 10.0	8.2 - 10.0	8.2 - 10.0
SAND, fine to coarse grained, grey (UNIT 4B)								9.3 - 10.0	8.0 - 10.0			



Table 4.2 - Laboratory Result Summary

Sample Location	Depth (mbsl)	Soil Description	Particle Size Distribution (% passing)					Atterberg Limits (%)			Emerson Class
			19mm	2.36mm	0.6mm	0.3mm	75um	LL	PI	LS	
UNIT 1											
BS2/1	0 – 0.5	Clayey SAND (SC)	100	100	98	77	22	NO	NP	NO	4
UNIT 2A											
BS1/2	1.2 – 1.7	Clayey SAND (SC)	100	99	98	78	27	NO	NP	NO	4
BS3/1	2.0 – 2.5	Clayey SAND (SC)	100	99	97	81	23	18	4	0.5	5
BS5/1	0 – 0.5	Clayey SAND (SC)	100	74	71	63	24	NO	NP	NO	4
BS6/1	2.0 – 2.5	Clayey SAND (SC)	100	99	98	88	45	26	15	2.5	2
BS11/1	1.5 – 2.0	Clayey SAND (SC)	100	90	86	64	27	21	6	2.0	4
UNIT 3B											
BS2/3	6.0 – 6.5	Sandy CLAY (CI)	100	100	98	90	70	38	26	8.0	2
BS4/2	3.5 – 4.0	Sandy CLAY (CI)	100	100	99	94	61	36	25	8.5	5
BS5/2	5.0 – 5.5	CLAY, with sand (CI)	100	100	99	94	74	37	25	9.0	5
BS7/1	3.0 – 3.5	Sandy CLAY (CI)	100	99	89	80	57	42	29	11.0	4
BS8/1	0.5 – 1.0	Sandy CLAY (CI)	100	100	94	87	61	39	24	10.0	6
BS8/3	5.0 – 5.5	CLAY (CI) with sand	100	99	96	92	74	45	30	12.0	5
BS9/2	4.0 – 4.5	Sandy CLAY (CL)	100	100	95	87	50	29	17	6.5	4



BS10/1	2.5 – 3.0	Sandy CLAY (CI)	100	98	96	89	59	35	22	10.0	4
BS10/2	5.5 – 6.0	Sandy CLAY (CI)	100	100	93	84	65	36	24	11.0	5
BS12/2	4.2 – 4.7	Sandy CLAY (CL)	100	100	98	87	56	30	17	4.0	4
UNIT 4A											
BS4/4	8.5 – 9.0	Clayey SAND (SC)	100	93	29	17	14	22	11	4.0	5
BS7/3	7.0 – 7.5	Clayey SAND (SC)	100	97	64	37	22	27	13	6.0	2
<hr/>											
LL – Liquid Limit	PI – Plasticity Index		LS – Linear Shrinkage								



3.4 Environmental Testing

3.4.1 Assessment Criteria

Based on NSW EPA definitions, the samples material can be classified as Virgin Excavated Natural Material (VENM) as it is natural material which is not contaminated. However, to confirm that the material is free of contaminants a qualitative review of the results was undertaken against the NSW EPA Excavated Natural Material (ENM) criteria:

- NSW 2014 Excavated Natural Material (Absolute Max)
- NSW 2014 Excavated Natural Material (Max Average)

In addition, the samples were also assessed with reference to the ASC NEPM commercial/ industrial investigation levels to account for the soils remaining or being re-used on site:

- Health Investigation Level (HIL) Level D – Commercial/ Industrial
- Ecological Screening Level (ESL) – Commercial/ Industrial
- Ecological Investigation Level (EIL) – Commercial/ Industrial
- Management Levels for TPH Fractions – Commercial/ Industrial

3.4.2 Results

Laboratory report and complete tables of analytical results compared against relevant criteria are provided in Appendix D and summarised below.

Quality Control

Precision of analytical results is measured by the Relative Percentile Difference (RPDs) between the duplicate results. RPDs are generally considered acceptable if they are less than 30% (ASC NEPM). However, when both results are less than 10 times the laboratory limit of report (LOR), where actual difference are minor, higher RPDs are not considered to affect the interpretation of results.

Two inter-laboratory duplicate samples were collected and submitted for laboratory analysis. There were no RPDs observed to be elevated above the acceptable range between the primary samples (H1/1 & H6/1) and the duplicate samples (DUP1 & DUP2).

The laboratory quality control reports (Appendix D) were reviewed and did not report any method blank, duplicate, laboratory control or surrogate recovery outliers. Two matrix spike recovery outliers occurred for organic matter and total organic carbon. The recovery was less than the lower data quality objective. Analysis holding times occurred for pH which only has a holding time of 6 hours which is not achievable due to the delivery time to the laboratory. The laboratory results are considered acceptable for the purposes of this investigation.

NSW EPA ENM

There were no reported exceedances of the ENM criteria.

Assessment of Risk to Human Health & Environment (NEPM)

There were no reported exceedances of the relevant NEPM criteria.

3.4.3 Conclusions

The sampling and analysis undertaken at the proposed Buronga Landfill expansion area has provided an indicative classification of the soil material across the site. The analytical results indicate that the natural material across the site is not contaminated.



4 Assessment

4.1 Excavatability

All soils are expected to be readily excavated with machinery typically used during similar construction projects such as an excavator of notional 20 tonne capacity. Whilst drilling difficulty was experienced in places due to the hard nature and low moisture content of the soils in a bulk excavation this is not considered to be an issue with the expected excavation equipment proposed.

Based on observations of the existing borrow pits the materials appear to be readily excavated with site equipment similar to that mentioned above.

4.2 Stability

The boreholes generally remained open during and after drilling to approximately groundwater level. Based on that and our other observations we generally expect the soils will be self-supporting for short periods after excavation, assuming the weather is dry. It may be possible to work in excavations without support for short periods after excavation, subject to any construction regulations, although it would be prudent to inspect the walls of the excavations prior to accessing them as there may be fissuring or cracking of the soils that will affect their stability but would not have been apparent in our boreholes.

If excavations are required to remain open for more than a couple of days at most, they will require support or battering or stepping back to maintain acceptable stability. The stability of excavations will also be affected by rainfall or runoff, so it will be important to maintain appropriate stormwater management on site.

If there are permanent slopes, for ponds or embankments, we expect these to be acceptably stable at slopes no steeper than 1V to 2.5H in the soils observed.

It is noted that existing borrow areas appear to be performing suitably with benched walls of approximately 2m height and 2m bench width.

It is recommended that excavations remain 2m above the groundwater level to reduce potential softening of subgrade materials that may impact slope stability.

4.3 Material Reuse

Generally, it is expected that the site materials (apart from units 4A and 4B) will be suitable for use as general engineered fill for bulk earthworks, subject to appropriate moisture conditioning. Prior to reuse, site-won materials will need to be significantly moisture conditioned (water added) to achieve a moisture content suitable for construction.

4.3.1 Water Detention Characteristics

The soils encountered within unit 3B are considered suitable for use in water retaining structures if placed and compacted at a suitable standard, due to their fine-grained nature and low to medium plasticity. However, no permeability testing was undertaken as part of this scope.

Emerson Classification values varied across the samples from 2, 4, 5 and 6. Generally samples with an Emerson class of 2 would show signs of dispersion, as identified in sample BS2/3. However, based on the majority of results within Unit 3B we would expect that these soils would not be dispersive.

4.3.2 Pipe Bedding

Based on the results the sand and clayey sand materials observed would not be suitable for reuse as pipe embedment material.



4.3.3 Pavement Materials

Whilst gravel sized particles were observed in some Unit 2A materials, based on the results these soils are unlikely to be suitable for reuse as pavement materials for sheeting internal roads.



5 Limitations

The contents of the report are for the sole use of the client and no responsibility or liability to any third party will be accepted. Data or opinions contained within the report may not be used in other contexts or for any other purposes without Tonkin's prior review and agreement.

The recommendations in this report are based on data collected at specific locations and by using suitable investigation techniques. Only a finite amount of information has been collected to meet the specific financial and technical requirements of our Proposal and the Brief, and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it must be appreciated that actual conditions could vary from the assumed model.

Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

It is strongly recommended that any plans and specifications prepared by others and relating to the content of this report, or amendments to the original plans and specifications, are reviewed by Tonkin Consulting to verify that the intent of our recommendations is properly reflected in the design.

During construction Tonkin requests the opportunity to review our interpretations if the exposed site conditions are significantly different from those inferred in this report.

Subsurface conditions, such as groundwater levels, can change over time. This should be borne in mind, particularly if the report is used after a protracted delay.

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Appendix A – Borehole Logs



Appendix B – Photographs



Photo 1 – H1 Location



Photo 2 – H1 0 – 6m bsl



Photo 3 – H1 6m – 10m bsl



Photo 4 – H2 Location



Photo 5 – H2 0 – 6m bsl



Photo 6 – H2 6m – 10m bsl



Photo 7 – H3 Location



Photo 8 – H3 0 – 6m bsl



Photo 9 – H3 6m – 10m bsl



Photo 10 – H4 location



Photo 11 – H4 0 – 6m bsl



Photo 12 – H4 6m – 10m bsl



Photo 13 – H5 Location



Photo 14 – H5 0 – 6m bsl



Photo 15 – H5 6m – 10m bsl



Photo 16 – H6 location



Photo 17 – H6 0 – 6m bsl



Photo 18 – H6 6m – 10m bsl



Photo 19 – H7 Location



Photo 20 – H7 0 – 6m bsl



Photo 21 – H7 6m – 8m bsl



Photo 22 – H8 location



Photo 23 – H8 0 – 6m bsl



Photo 24 – H8 6m – 10m bsl



Photo 25 – H9 Location



Photo 26 – H9 0 – 6m bsl



Photo 27 – H9 6m – 10m bsl



Photo 28 – H10 location



Photo 29 – H10 0 – 6m bsl



Photo 30 – H10 6m – 10m bsl



Photo 31 – H11 Location



Photo 32 – H11 0 – 6m bsl



Photo 33 – H11 0 – 6m bsl



Photo 34 – H12 location



Photo 35 – H12 0 – 6m bsl



Photo 36 – H12 6m – 10m bsl



Appendix C – Geotechnical Lab Test Certificates



Appendix D – Environmental Results Tables and Lab Test Certificates



Appendix I. Groundwater Impact Assessment (Tonkin, 2021)

Groundwater Impact Assessment

Buronga Landfill Expansion

Wentworth Shire Council

19 September 2021

Ref: 202597R03



Building exceptional
outcomes together



Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	DRAFT for Client comment	DAN (CEnvP SC)	MRS	MRS	22/04/2021
0	For Issue	DAN (CEnvP SC)	MRS	MRS	19/09/2021



Contents

Project: Groundwater Impact Assessment | Buronga Landfill Expansion
Client: Wentworth Shire Council
Ref: 202597R03

1	Introduction	1
1.1	Site History and Operation	2
1.2	Objectives.....	2
2	Scope of Works	3
3	Regulatory Context.....	4
3.1	Commonwealth.....	4
3.2	State Based Legislation.....	4
4	Project Site Setting.....	7
4.1	Climate.....	7
4.2	Soil Profiles and Landscape	8
4.3	Regional Hydrogeological and Geological Setting	10
4.4	Salt Interception Schemes.....	12
4.5	Groundwater Dependant Ecosystems.....	14
4.6	Regional Beneficial Use Assessment.....	14
5	Conceptual Hydrogeological Model	16
5.1	Soil Investigation	16
6	Conclusions and Recommendations	19

Tables

Table 4.1	Site Identification Details.....	7
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Figures

Figure 1	Site Location Plan.....	1
Figure 2	Map of the Western Porous Rock © Commonwealth of Australia (Murray–Darling Basin Authority).....	8
Figure 3	Map of Western NSW Soils (from SEED Map).....	9
Figure 4	Map of Western NSW Landforms (from SEED Map)	10
Figure 5	Map of the Western Porous Rock © Commonwealth of Australia (Murray–Darling Basin Authority).....	11
Figure 6	Cross Section of the Western Porous Rock © Commonwealth of Australia (Murray–Darling Basin Authority).....	12



Figure 7 Buronga Salt Intersection Scheme (from Murray Darling Basin Authority)	13
Figure 8 Borehole Location Plan.....	18



1 Introduction

Tonkin was commissioned by the Wentworth Shire Council (Council) to undertake a Groundwater Impact Assessment (GIA) to provide information for inclusion into an Environmental Impact Statement (EIS), which is required as part of the Development Application for the expansion of the Buronga Landfill. The location of the landfill site is presented following on Figure 1.

Wentworth Shire Council (Council) has identified that the predicted volume of waste requiring disposal at the Buronga Landfill is likely to increase beyond the current approved limit of 30,000 tonnes per annum. Council is therefore seeking approval to increase the waste disposal limit to 100,000 tonnes per annum to provide regulatory confidence in anticipation of future throughput and expand the landfill to areas north of the exiting footprint.

This assessment pertains to the potential groundwater impacts of the use of the site as a waste landfill consistent with the siting restrictions as outlined in Environmental Guidelines: *Solid Waste Landfills* (NSW EPA, 2016) and to address the NSW Planning & Environment Planning SEARs.

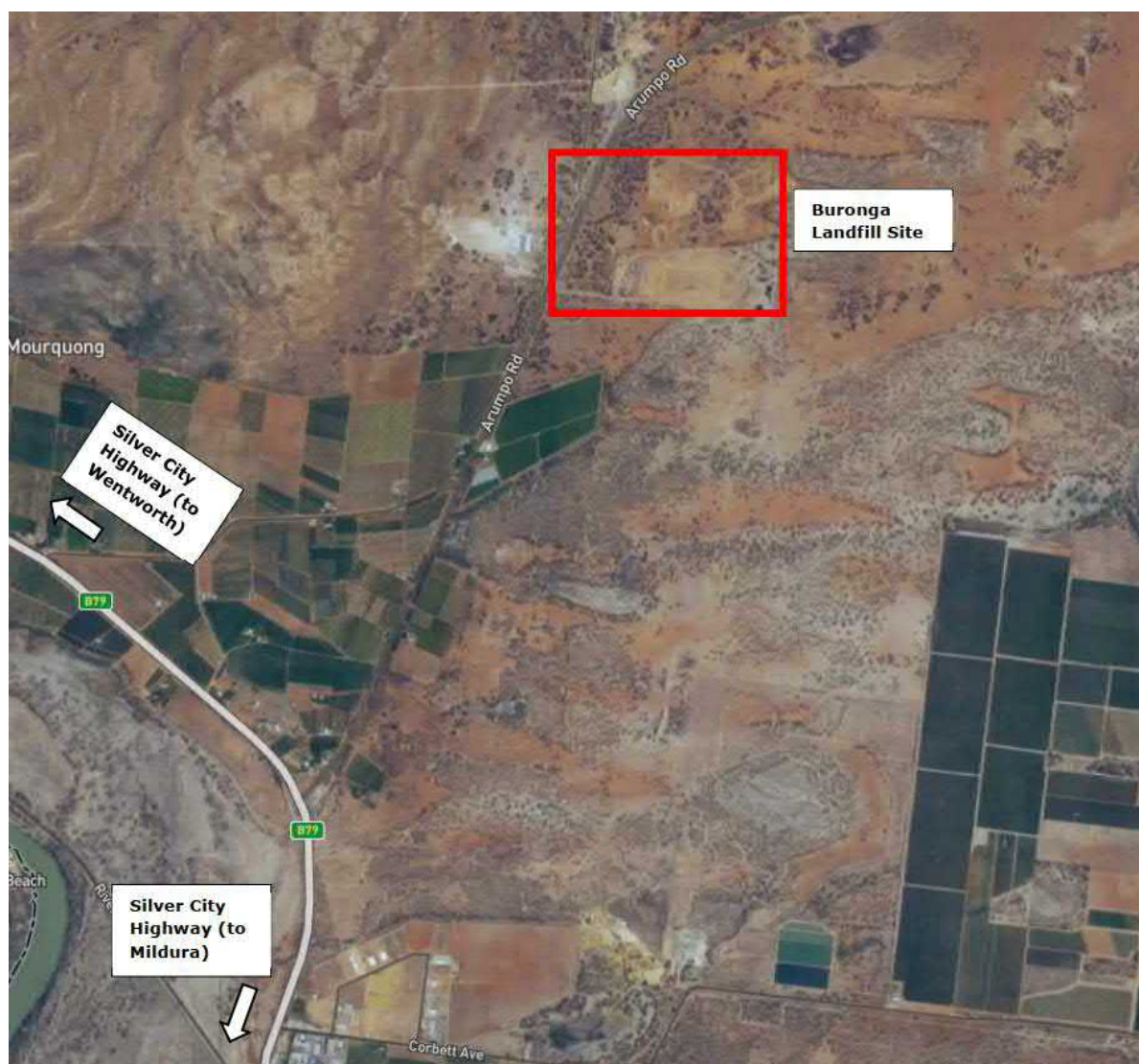


Figure 1 Site Location Plan



1.1 Site History and Operation

The site was first used for waste disposal in 1934. In 1967, the Local Government Gazettal notes Reserve No. 86496 (which contains the site) was trusted to the Wentworth Shire Council under the Public Trusts Act 1897 (NSW) for use in landfilling. Since 2015 the facility has been operated by the Wentworth Shire Council, from 2011-2015 the waste facility was operated by a private contractor. The site was operational for many years before the private contractor took over management of the site. The site is licenced by the NSW EPA under the Protection of the Environment Operations Act 1997, with Wentworth Shire Council holding Licence number 20209. The current licence was issued 5 April 2013 and was most recently varied on 24 November 2017. The site is operated under the conditions required by this licence, as well as by the Landfill Environmental Management Plan (LEMP) (WSC, 2015). The LEMP sets out operational procedures protecting human health and the environment from impact by the operations at the Buronga Landfill.

The first lined landfill cell was completed in 2017 and designed and constructed in accordance with the NSW EPA Environmental Guidelines for Solid Waste Landfills (NSW EPA, 2016) hereafter referred to as the NSW Landfill Guidelines. EPA approval of this cell was received in November 2017, following this approval landfilling commenced in the new lined cell. A community recycling centre (CRC) operates at the site, constructed in accordance with the NSW Environmental Trust Community Recycling Centre Grants Program.

1.2 Objectives

The primary objective of this report is to provide background information in support of the EIS. The focus of this document is to provide information on the existing environment and constraints for the proposed landfill expansion and provide an assessment of the likely impacts involved.

This report has been specifically prepared to provide a description of the existing groundwater environment, including:

- Bores within and surrounding the landfill Site;
- Springs and outflow zones;
- Groundwater dependent ecosystems;
- Aquifers underlying and in the vicinity of the project site; and
- Water quality in identified aquifers.

The objectives of the groundwater impact assessment include an assessment of the likely short term and long-term impacts of the proposed development on groundwater resources in the vicinity of the project site.



2 Scope of Works

The scope of works for this groundwater impact assessment includes the following:

- Summary of relevant legislation
- Detailed review of the site setting
- Review of offsite and onsite registered bores and construction details,
- Insight into groundwater availability and licensing within the investigation area
- Description of the existing subsurface and groundwater environment within the investigation area
- Identification of groundwater related environmental values (registered bore users and groundwater dependent ecosystems) with a two-kilometre buffer around the investigation area (hereafter, referred to as the 'investigation buffer') through a review of the following:
 - geological maps, Bureau of Meteorology's (BoM) Groundwater Dependent Ecosystem (GDE) Atlas and National Groundwater Information System (NGIS) database search for registered bores
 - groundwater level and groundwater quality related to the investigation area and project buffer
 - climatic data (rainfall and evapotranspiration) from the nearest available source to the investigation area
- Identification of possible groundwater systems to be utilised as future resources



3 Regulatory Context

The following sections outline the Commonwealth and State legislation are relevant to the management of groundwater and water resources within the investigation area.

3.1 Commonwealth

Commonwealth guidelines relevant to the management of groundwater include:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC/ARMCANZ, 2000).
- Australian Drinking Water Guidelines (NHMRC, 2011).
- The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

3.2 State Based Legislation

There are two key parts of legislation for the management of groundwater in NSW:

- Water Act (1912); and
- Water Management Act 2000 (WMA 2000).

In addition to the above Acts, the relevant plans, policies and regulation are considered the main tools which assist in implementing and defining the provisions of the WMA:

- The Water Management (General) Regulation (2011);
- Water Sharing Plans (WSPs):
 - Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources (2012);
 - Water Sharing Plan for the Macquarie-Bogan Unregulated and Alluvial Water Sources (2012);
- The NSW State Groundwater Dependent Ecosystem Policy (2002);
- The NSW Aquifer Interference Policy 2012 (September 2012);
- The NSW Groundwater Policy Framework Document – General (1997);
- The NSW Groundwater Quality Protection Policy (1998);
- The NSW State Rivers and Estuaries Policy (1993); and
- The NSW Wetlands Policy (2010)

3.2.1 Water Management Act (2000)

Water resources are administered under the Water Act (1912) and the Water Management Act (2000) by the NSW Department of Industries – Water (DoI-W). The Water Management Act (2000) governs the issue of water access licences and approvals for those water sources (rivers, lakes, estuaries and groundwater) in New South Wales where Water Sharing Plans have commenced. Water sharing plans establish rules for sharing water between the environmental needs of the river or aquifer and water users, and also between different types of water use such as town supply, rural domestic supply, stock watering, industry and irrigation. The Water Act (1912) governs the issue of water licences for water sources in other areas. There are Water Sharing Plans for regulated and unregulated river catchments and groundwater sources in water management areas.

The Water Management Act 2000 requires approvals for activities that impact the aquifer(s). The approval is for activities that intersect groundwater other than water supply bores and may be issued for up to ten years. Part 2 of the Water Management Act 2000 establishes access licences for the taking of water within a particular water management area.



Part 3 of the Water Management Act 2000 establishes three types of approvals that a proponent may be required to obtain. These are:

- water use approvals.
- water management work approvals (including water supply work approvals).
- activity approvals (including controlled activity approvals and aquifer interference approvals).

To construct a test or monitoring bore a 'Water Supply Work Approval' form, which can be downloaded from the DoI – W website, is required to be completed and submitted to the nearest DoI – W office. To construct a production bore the same form must be filled out together with a 'Water Use Approval' form.

3.2.2 Water Sharing Plans

Water Sharing Plans (WSPs) have been developed for rivers and groundwater systems across NSW following the introduction of the WMA. Water Sharing Plans made under the WMA are being prepared as Minister's plans under Section 50 of the Act. These plans protect the health of NSW rivers and groundwater while also providing water users with perpetual access licences, equitable conditions, and increased opportunities to trade water through separation of land and water.

WSPs provide a legislative basis for sharing water between the environment and consumptive purposes. Under the WMA, a plan for the sharing of water must protect each water source and its dependent ecosystems and must protect basic landholder rights.

The site sits within the Western Porous Rock water sharing plan which covers groundwater located within the sedimentary basins in the NSW portion of the Murray-Darling Basin. The plans also includes alluvial sediments that overly these basins that have not been separately mapped and incorporated into other WSPs as individual SDL resource units.

Whilst groundwater from these basins tends to be obtained from their porous rock layers, they also include sediment layers that do not have significant porosity. The SDL resource units include all groundwater from the entire geological basin sequence, including groundwater within these interbedded fractured rock sediments.

Twenty eight percent of these groundwater resource units are buried under other alluvial or fractured basalt groundwater WRP resources.

3.2.3 NSW State Groundwater Dependant Ecosystems Policy (2002)

The NSW Groundwater Dependent Ecosystems Policy is specifically designed to protect valuable ecosystems which rely on groundwater for survival so that, wherever possible, the ecological processes and biodiversity of these dependent ecosystems are maintained or restored for the benefit of present and future generations. The policy defines GDEs as "communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater".

Five management principles establish a framework by which groundwater is managed in ways that ensure, whenever possible, that ecological processes in dependent ecosystems are maintained or restored. The principles are:

- GDEs can have important values. Threats should be identified, and action taken to protect them;
- Groundwater extractions should be managed within the sustainable yield of aquifers;



- Priority should be given to GDEs, such that sufficient groundwater is available at all times to meet their needs;
- Where scientific knowledge is lacking, the precautionary principle should be applied to protect GDEs; and
- Planning, approval and management of developments should aim to minimise adverse effects on groundwater by maintaining natural patterns, not polluting or causing changes to groundwater quality and rehabilitating degraded groundwater.

3.2.4 NSW Aquifer Interference Policy (2012)

The Aquifer Interference Policy forms the basis for assessment of aquifer interference activities under the EPA Act. It clarifies the need to hold water access licences or Water licences (as the case may be) under the WM Act and Water Act and establishes consideration in assessing whether 'minimal impact' occurs.

The WM Act defines an aquifer interference activity as that which involves any of the following:

- Penetration of an aquifer;
- Interference with water in an aquifer;
- Obstruction of the flow of water in an aquifer;
- Taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and
- Disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

Examples of aquifer interference activities include mining, coal seam gas extraction, injection of water, and commercial, industrial, agricultural and residential activities that intercept the water table or interfere with aquifers.

3.2.5 Groundwater Quality Protection Policy

The objectives of managing groundwater quantity in NSW are:

- To achieve the efficient, equitable and sustainable use of the State's groundwater;
- To prevent, halt and reverse degradation of the State's groundwater and their dependent ecosystems;
- To provide opportunities for development which generate the most cultural, social and economic benefits to the community, region, state and nation, within the context of environmental sustainability; and
- To involve the community in the management of groundwater resources.



4 Project Site Setting

Buronga Landfill is located on Arumpo Road Buronga approximately 4.5 km north northeast of the township of Buronga, NSW. Access to the Landfill is via Arumpo Road with most landfill operations occurring in an area of approximately 19 ha, with the landfill footprint covering approximately 5 Ha. The Landfill is zoned SP2 (Waste or Resource Management Facility) and is surrounded by agricultural activities and remnant vegetation. A summary of the site details is shown in Figure 3.1 and Table 3.1 following.

Table 4.1 Site Identification Details

Aspect	Detail
Site Name	Buronga Landfill
Site Location	258 Arumpo Road, Wentworth, NSW, 2739
Landfill Area (ha)	Approximately 19 ha operational of a total 124 ha licenced area
Site Owner	Wentworth Shire Council
Site Occupier	Wentworth Shire Council
Certificate of Title	Lot 197 & 212 DP756946 and Lot 1 DP1037845
Current Zoning	Site - SP2 (Waste or Resource Management Facility) Surrounding Areas – RU1 (Primary Production)
Current Use	Solid Waste Landfill / Resource Recovery Centre
EPA Licence	Environmental Protection Licence (EPL) No. 20209
Regional Setting	Rural, Industrial, Agricultural
Surrounding Land Uses	NORTH: Broadscale agriculture (grazing), Arumpo Road EAST: Remnant vegetation, irrigated agriculture to SE, Lake Gol Gol (1.8 km) SOUTH: Remnant vegetation, irrigated agriculture to SW (grapevines, orchards) WEST: Arumpo Road, Industry including bentonite and gypsum suppliers, Mourquong saltwater disposal basin

4.1 Climate

According to Climate Data.org¹ the Buronga area is elevated approximately 43m above sea level and the climate is considered to be a local steppe climate. Rainfall is generally low throughout the year whilst the climate is classified as “Bsh” by the Koppen-Geiger system. The average annual temperature is 18.2 degrees centigrade and the annual rainfall is 274mm. The driest month is March with an average of only 16 mm of rain, whilst in September the precipitation reaches its peak in September with an average rainfall of 28 mm.

¹ <https://en.climate-data.org/oceania/australia/new-south-wales/buronga-764924/#climate-graph>

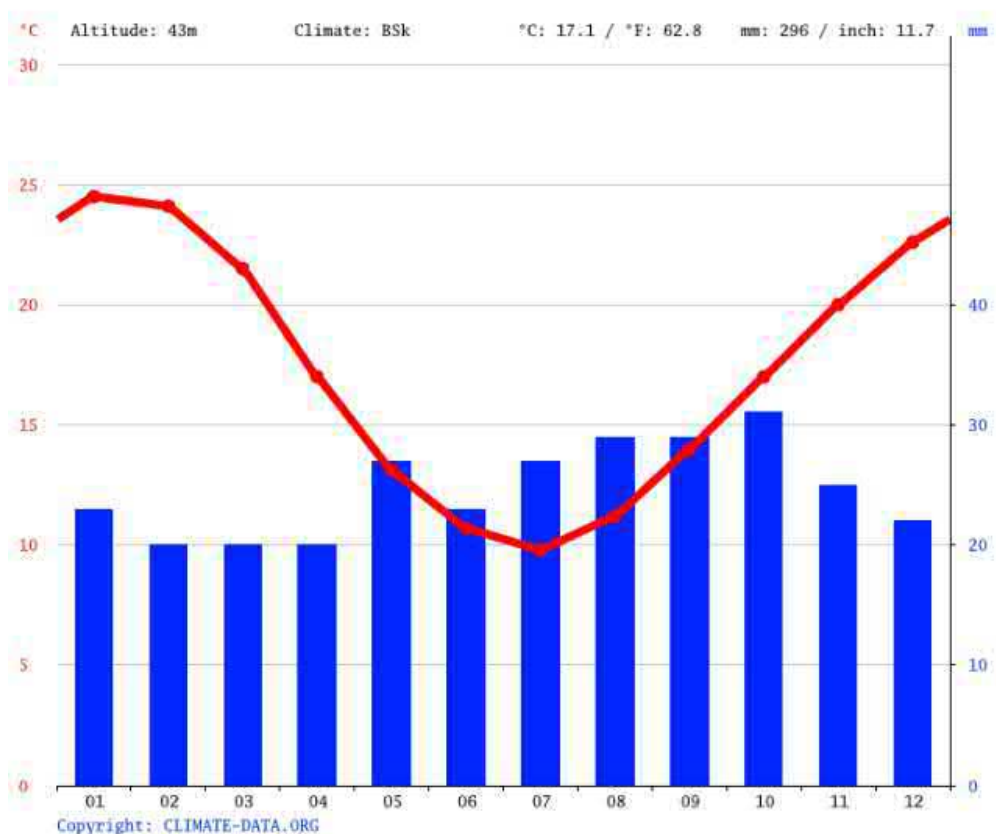


Figure 2 **Map of the Western Porous Rock © Commonwealth of Australia (Murray–Darling Basin Authority)**

4.2 Soil Profiles and Landscape

The site area lies on Tertiary and Quaternary sediments. These are subsequently overlain with the Woorinen Formation which are formed from windblown sands, silts, and calcareous clays from Quaternary deposits, and the Coonambidgal Formation which is comprised of alluvial deposits, and channel sands from the Holocene.

The soil regolith stability classification of the regional area is logged as “class R3” – relating to high coherence soils with high sediment delivery potential.

The likely soil types within the region range from vertosols (soil type in which there is a high content of expansive clay minerals) to Rudosols (Soils that have negligible pedologic organisation, the component soils vary widely in texture and depth).

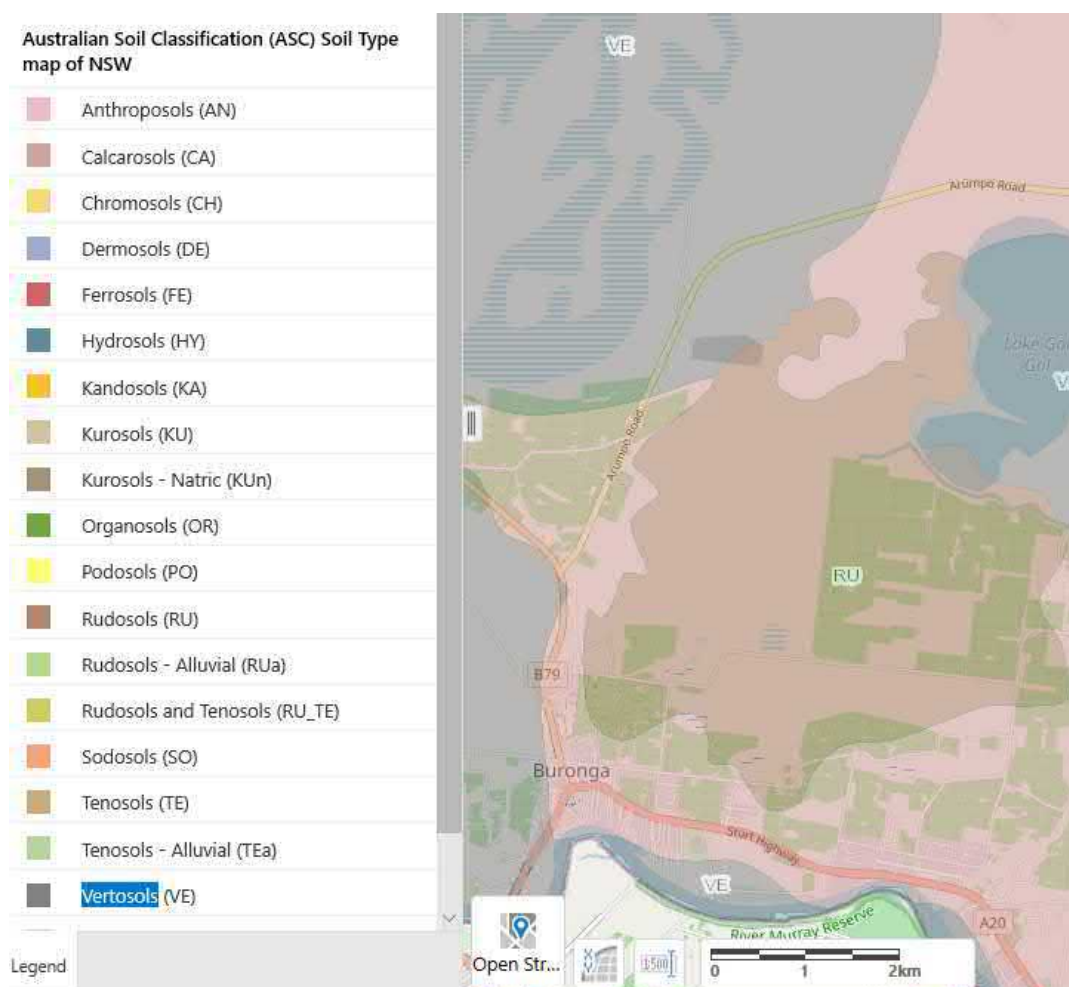


Figure 3 Map of Western NSW Soils (from SEED Map²)

The site is situated within the Huntingfield land system which predominantly consists of sandplains and dune fields sustaining predominant Belah and Bluebush vegetation. Geomorphologically the regional landform consists of a series of playas and basins.

² Walker P.J, 1991, Land System of Western NSW, Technical Report No. 25, Soil Conservation Service of NSW, Sydney

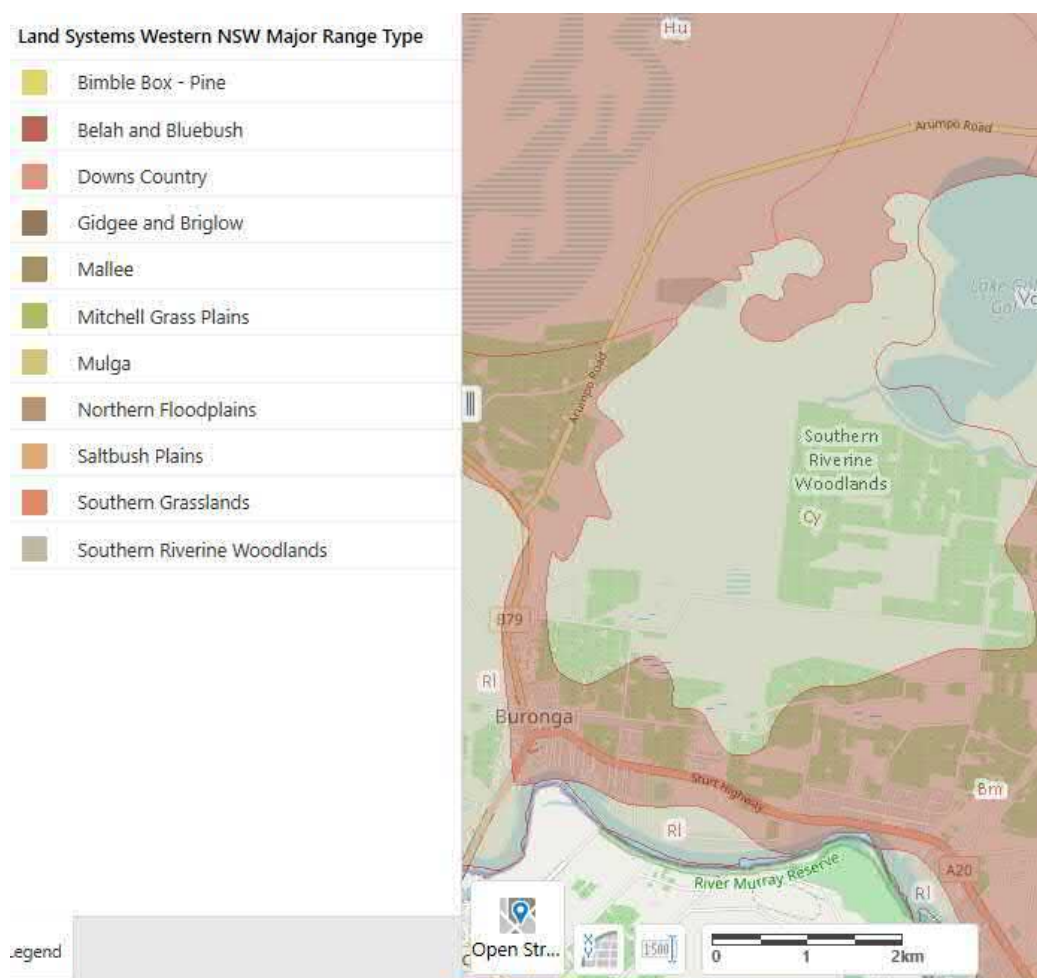


Figure 4 Map of Western NSW Landforms (from SEED Map)

4.3 Regional Hydrogeological and Geological Setting

The site is situated within the southern part of the Western Porous Rock resource unit. The Western Porous Rock SDL resource unit is located in the semi-arid zone of south-western NSW. It extends approximately between the South Australian border in the west, the River Murray in the south, Wilcannia and Broken Hill in the north and Balranald in the east, covering a total area of approximately 73,000 km². The location and extent of the Western Porous Rock SDL resource unit is shown following in Figure 5, whilst a cross sectional view is presented following in Figure 6.

The resource unit incorporates all groundwater within sediments of Tertiary and Quaternary age and all alluvial sediments within the outcropped area. The two major aquifers of the resource unit are the Renmark Group Aquifer and the Pliocene Sands Aquifer, the sands of which are weakly cemented and thus defined as porous rock (NSW Office of Water 2013)³.

The Renmark Group Aquifer forms the major confined aquifer covering most of the water source. It is an accumulation of riverine sediments deposited approximately 30 to 50 million years ago (NSW Office of Water 2013). It is comprised of intercalations of lignite, peat, carbonaceous clay and medium to coarse grained quartz sand (NSW Office of Water 2013). Salinity in the Renmark Group ranges from

³ NSW Office of Water (2013) Western Murray Porous Rock and Lower Darling Alluvium Groundwater Sources, Groundwater Status Report 2011, January 2013



2,000 to 36,000 mg/L TDS with the freshest water located in the northern margins and salinity increasing down the hydraulic gradient. Vertical stratification is commonly observed in the areas to the north and east.

The Pliocene Sands Aquifer forms the major shallow unconfined/semiconfined aquifer covering most of the water source. It is comprised of layers of sand and gravel deposited approximately 2 to 6 million years ago. The aquifer is predominantly sands of marine origin comprised of the Loxton-Parilla Sand, while to the east lies a small area of sands of riverine origin comprised of the Calivil Formation (NSW Office of Water 2013). The Loxton-Parilla Sands contain significant deposits of heavy mineral sands (rutile, zircon and ilmenite), whilst overlying younger deposits contain bentonite and gypsum. The Pliocene Sands Aquifer contains highly saline groundwater ranging from 1,000 to 82,000 mg/L TDS and very locally up to 160,000 mg/L TDS near salt lakes.

Areas of Murray Group Limestone are also located in the south-west of the groundwater source overlying the Renmark Group. The Murray Group Limestone is comprised of marine sediments of calcarenite, limestone and marl about 12 to 32 million years old (NSW Office of Water 2013). This unit is not a target of groundwater extraction due to its higher salinity and lower hydraulic conductivity, and hence has not been included in any groundwater resource planning.

Management of the Western Porous Rock SDL resource unit is governed by the *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources* (NSW Office of Water 2011).

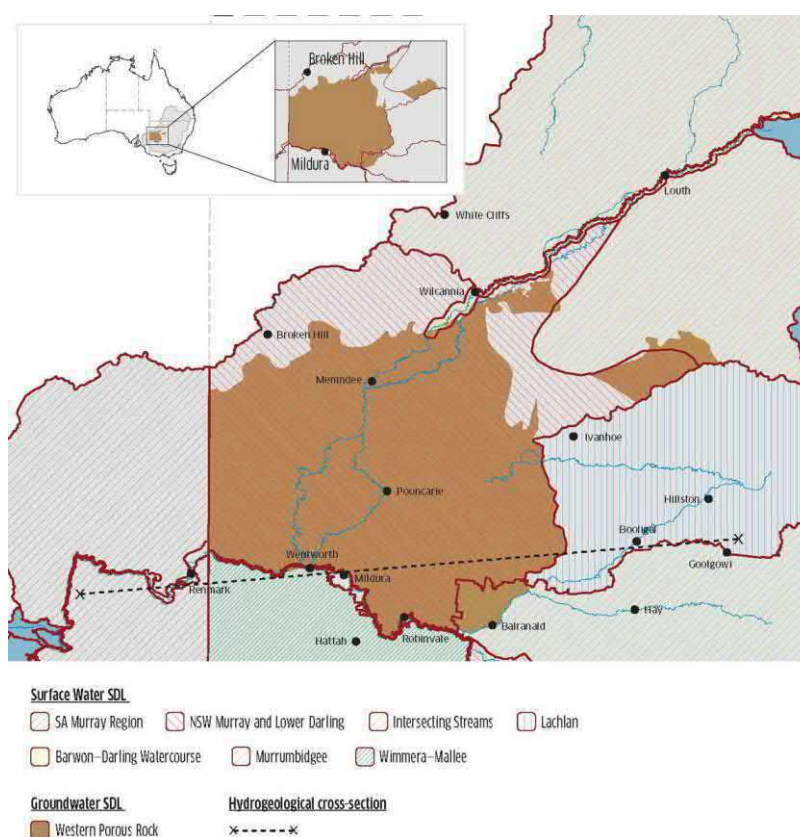


Figure 5 Map of the Western Porous Rock © Commonwealth of Australia (Murray-Darling Basin Authority)



WESTERN POROUS ROCK

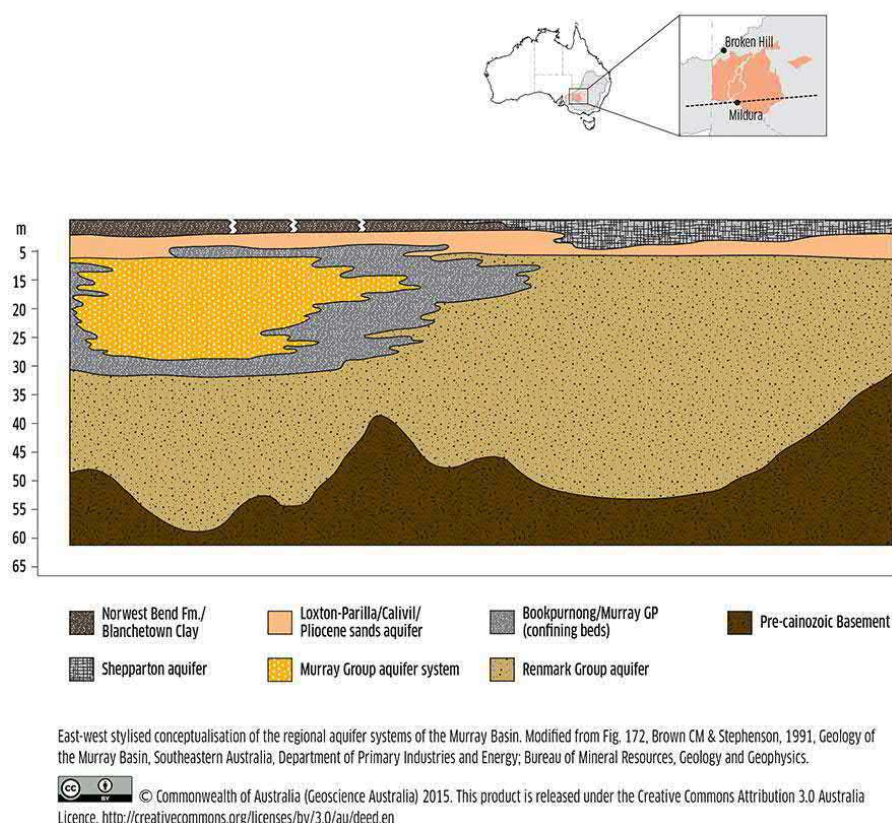


Figure 6 Cross Section of the Western Porous Rock © Commonwealth of Australia (Murray-Darling Basin Authority)

According to GHD (2012)⁴, the NSW Government online groundwater data base has indicated that there are 20 bores situated within a 2km radius of the proposed construction site. Of the 20 bores five are situated within 1km of the site, of which a total of nine purpose constructed groundwater monitoring boreholes were considered. The boreholes vary in depth from between 10.5 to 61m depth, with measured groundwater levels between 1.5 to 7.37 mgl.

4.4 Salt Interception Schemes

Although the township of Buronga was only declared in 1937, settlement in the area commenced in the 1920s. Early settlement focussed on cropping and horticultural activities and thus irrigation has been undertaken in the area for many years.

The salinity problem observed today are caused by the construction of the Mildura Weir and Lock and the groundwater mounding under the nearby irrigation areas (Mildura-Merbein, Buronga and Coomealla). These activities have increased the pressures in the Parilla Sands aquifer system, resulting in the displacement of saline groundwater from that aquifer to the Murray River on the downstream side of the weir, over a reach of approximately 3.5km.

⁴ GHD (2012) Buronga Landfill Geotechnical Investigation Report, Wentworth Shire Council (21/21400/181848)



A series of eight groundwater bores with submersible pumps have been installed along the banks of the River Murray between Mildura west (Lock 11) and Mourquong where the saline water is believed to be entering the river. The submersible pumps are located in the deeper Parilla Sands aquifer. Saline water is pumped from this aquifer to lower the pressure that is driving the saline water into the river. By lowering the pressure in the aquifer, the gradient is reversed away from the river. The intercepted saline water is pumped approximately 7km to the Mourquong disposal complex.

The Buronga scheme is part of the Murray-Darling Basin Authority's Basin Salinity Management Strategy developed to manage the problems of river salinity, waterlogging and land salinisation in the Basin.

The Buronga scheme will intercept the deeper Parrilla Sands aquifer and prevent approximately 17,500 tonnes of salt from entering the Murray River annually. This scheme together with the companion Mildura-Merbein scheme located in Victoria, contribute approximately 14 EC benefit to the river at Morgan, South Australia. The scheme has been designed as an efficient and effective component of a regional 'no borders' approach to salinity management in the Sunraysia Region⁵.

The scheme also provides a major socio-economic benefit to the region, by providing the raw material (saline groundwater) necessary for the successful salt harvesting operation located at the Morquong basin. The location of the salt interception scheme and evaporation basin are presented following on Figure 7.

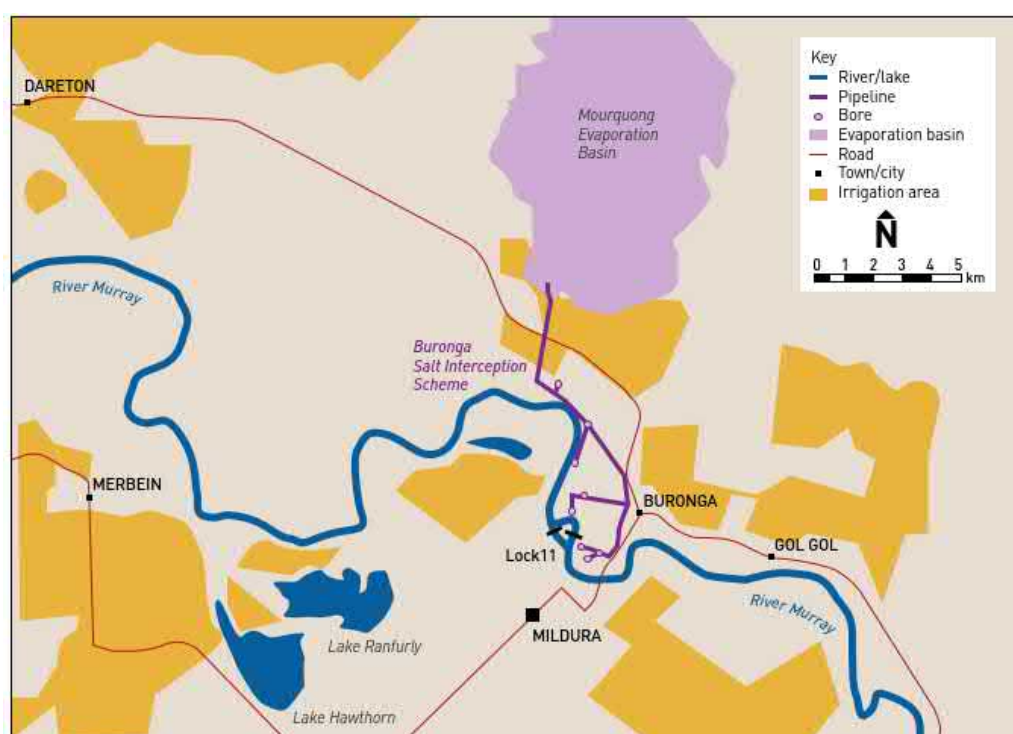


Figure 7 Buronga Salt Intersection Scheme (from Murray Darling Basin Authority⁶)

⁵ <https://www.industry.nsw.gov.au/water/science/groundwater/interception-schemes/buronga>

⁶ NSW Government Office of Water, Murray Darling Basin Authority Buronga Salt Interception Scheme www.mdba.gov.au



4.5 Groundwater Dependant Ecosystems

DPI Water defines ecosystems that depend on groundwater as those 'ecosystems that require access to groundwater to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services' (Richardson et al. 2011⁷).

Groundwater dependent ecosystems (GDEs) require groundwater to maintain their composition and functioning. The removal or change in groundwater availability or quality will influence the composition, structure and function of these ecosystems (Eamus et al. 2006⁸). Groundwater dependent vegetation does not rely on the surface expression of water to maintain ecosystem function. Instead, the vegetation depends on the sub-surface presence of groundwater, often accessed via the capillary fringe or vadose zone (i.e. the subsurface water just above the water table that is not completely saturated). Plant species within a community may exhibit differing degrees of groundwater dependency (and can range from obligate (total/entire) to facultative (partial and infrequent (i.e. seasonal/episodic)).

Wetlands identified by Eamus et al (2006) as being groundwater dependent can be either ephemeral or permanent systems that have a continuous or seasonal connection with groundwater. Wetlands are considered dependent on groundwater if the presence of groundwater is essential to the biota and ecological processes of that wetland.

4.5.1 Types of Local and Regional GDEs identified – Literature Review

A literature review of DPI (2016)⁹, (Howe et al. 2007)¹⁰ and Eamus et al (2006) and has revealed the following likely GDEs are significant both directly to the project site and within the broader regional area:

- Phreatophytes - terrestrial vegetation that are dependent on the sub-surface presence of groundwater and is often accessed via the capillary fringe or vadose zone. (i.e. the sub-surface water just above the water table that is not completely saturated)
- Wetlands - Wetlands identified as being groundwater dependent can be either ephemeral or permanent systems that have a continuous or seasonal connection with groundwater. Wetlands are considered dependent on groundwater if the presence of groundwater is essential to the biota of that wetland and their ecological processes.
- Terrestrial vegetation - trees mostly take up groundwater from the capillary fringe as oxygen is required for plant respiration. The direct uptake from the water table is difficult for roots to grow and function under saturated conditions. Soil water is an important source of water for plants as less energy is required to draw on water from the vadose zone than from the water table. Trees and shrubs mostly access soil moisture water from the upper unsaturated soil profile.

4.6 Regional Beneficial Use Assessment

4.6.1 Aboriginal values and uses

According to DPI (2016) there is a significant relationship between groundwater and the traditional owners of these lands. Water and specifically groundwater is written into their Lore, their traditional stories and their dreaming. Creation beings live in these stories with cultural knowledge being passed

⁷ Richardson, S, Irvine, E, Froend, R, Boon, P, Barber, S & Bonneville, B 2011, 'Australian groundwater-dependent ecosystem toolbox part 1: assessment framework', Waterlines report, National Water Commission, Canberra.

⁸ Eamus, D, Hatton, T, Cook, P & Colvin, C 2006b, 'Ecohydrology: Vegetation function, water and resource management', CSIRO publishing, Victoria.

⁹ Department of Primary Industries – Water, Methods for the Identification of High Probability Groundwater Dependent Vegetation Ecosystems, 2016

¹⁰ Howe, P, O'Grady, A, Cook, PG, Knapton, A, Duguid, A & Fass, T 2007, 'A framework for assessing the environmental water requirements of groundwater dependent ecosystems', Land and Water Australia, Adelaide.



down through the stories. Song and dance demonstrate the significance of this connection to water, and the people's relationship to land.

Groundwater has provided the life support for generations of traditional owners. Water provided for the trees, the medicinal plants and the animals that sustained the lives of the local communities. Aboriginal people place a high level of value on water as the uses are significant and many, in relation to the survival of Aboriginal people and their culture. DPI Water supports involvement of Aboriginal people in the water resource planning process and supports Aboriginal people to document and share their social, spiritual and cultural information, including identifying specific values and uses associated with water. It is important to better understand Aboriginal values and uses in order to manage risks to them.

Water Dependant Aboriginal cultural asset types and their values are summarised following:

- Waterholes/soaks/ billabongs
- Wetlands
- Lagoons/Wetland bowls
- Transit stops – ephemeral flows
- Occupation sites and campgrounds
- Spiritual sites areas

4.6.2 Irrigated Agriculture

There is only minor development of groundwater resources for irrigated agriculture across the SDL resource units within the WRP areas. This is primarily due to the low groundwater yields and variable salinity levels.

4.6.3 Water for Towns and Essential Human Needs

Groundwater is relied upon within the area for town water supply and stock and domestic purposes, as well as to support local commerce. Town water supply and stock and domestic users have a higher priority for access than other groundwater licences. WSPs recognise this priority by ensuring that a full share of water is allocated for annual town water supplies except where exceptional drought conditions prevent this. The annual water available is specified on the town's licence.

According to the DPI (2017) document, across the WRP areas town water supply (local water utility) access licences have a total share component of 870 ML/year. This is made up of 480 ML/year in the Gunnedah-Oxley Basin (for an SDL of 205,640 ML) and 390 ML/year in the Western Porous Rock (for an SDL of 530,486 ML).

The *Water Management Act* 2000 also requires WSPs to protect water for basic landholder rights, which are made up of domestic and stock rights, harvestable rights and native title rights. Water taken under a domestic and stock right may be used for normal household purposes around the house and garden and/or for drinking water for stock.



5 Conceptual Hydrogeological Model

The local and site-specific geological and hydrogeological settings influence the fate and transport of any potential site contaminants, the movement of groundwater offsite and the fluctuation of groundwater levels in the vicinity of and at the subject site.

The distributions of any contaminants across a site are influenced by the local geology and natural or manmade/altere drainage features in the area or at the site. Their distribution within the sub-surface is influenced by geological structures, variations in the permeability of soil and rock (which may result in perched or 'seasonal' water tables), geochemical, biological and mineralogical variations and the presence of preferential pathways such as loose fill around services.

Certain sites may be located in areas that are naturally enriched with mineral resources and can appear to contain elevated levels of metals and metalloids in soil, surface water or groundwater.

Consequently, it is essential to have an understanding of the background quality of these media and to evaluate potential contamination of this type in terms of the beneficial uses of the groundwater beneath the site.

5.1 Soil Investigation

Drilling works were undertaken by Tonkin across the proposed construction area between 16 and 18 February 2021 and are described in detail in the Geotechnical Investigation Report¹¹. Works undertaken included the advancement of 12 boreholes to depths of between 8.1 and 11.0m below ground level (bgl). The borehole locations are identified following on Figure 8 following.

5.1.1 Site Specific Geology

The proposed construction area is situated predominantly within sediments of the Middle Pleistocene – Holocene age Woorinen Formation¹². The Woorinen Formation is described as being unconsolidated red-brown medium to fine silty sand, red calcareous silty clay, sandy clay, clay pellet aggregates which forms extensive dune fields with subdued crests and flakes separated by swales and sand plains.

The southern and eastern most portion of the site is situated within proximity to the boundaries of the Woorinen Formation and the Late Pleistocene – Holocene aged Yamba Formation. The Yamba Formation consists of friable pale grey gypsite, gypsiferous clay, grey pelletal gypsum-quartz aggregates, black sulphide-rich mud, and ephemeral salt crusts of gypsum, halite, bischofite, thenardite, mirabilite.

The bore logs for the drilling works (refer Appendix A) indicate the observed geology onsite is generally consistent with the published information, however some localised variance in sand content within clays was observed.

Fill was only encountered in borehole H3 to a depth of 0.2m below the surface. Topsoil was mostly non-existent apart from a sandy surface layer observed in most boreholes. Generally, sand and clayey sand materials were observed in the upper layer, underlain by clays and sandy clays of low to medium plasticity, further underlain by silty clayey sand and sand often containing groundwater. The upper sands and clayey sand layers were more predominant in the western boreholes (H1 to H6, H11 and H12), with the eastern boreholes (H7 to H9) encountering clays near the surface.

¹¹ Tonkin. 2021. *Geotechnical Investigation Report Buronga Landfill Expansion*. Ref 202597R02 Rev0 Dated 28/09/21

¹² Raymond, O.L., Liu, S., Gallagher, R., Zhang, W., Highet, L.M., 2012, *Surface Geology of Australia 1:1 million scale dataset 2012 edition*: Commonwealth of Australia (Geoscience Australia). 5 / 697310



A generalised summary of the encountered geology is included following, whilst a borehole location plan is presented following as Figure 8:

- FILL: Clayey Sand, identified at surface
- Unit 1: SAND, fine to coarse grained, red brown and pale brown
- Unit 2A: Clayey Gravelly SAND/Clayey SAND, fine to coarse grained, pale orange/brown, pale brown and white, fine to coarse gravel, low plasticity fines
- Unit 2B: SAND/Clayey SAND, fine to coarse grained, pale brown, orange/brown and orange, low plasticity fines.
- Unit 3A: Clayey SAND, fine to coarse grained, grey/brown, low plasticity fines.
- Unit 3B: Sandy CLAY/CLAY, medium to high plasticity, grey, grey/brown, yellow brown, red, fine to coarse sand
- Unit 4A: Clayey SAND/Silty SAND, fine to coarse grained, yellow brown, grey, low plasticity fines
- Unit 4B: SAND, fine to coarse grained, grey

A review of the data shows that the groundwater intersections during push tube drilling occurred predominantly within the sandy CLAY and clayey SAND/ clayey silty SAND materials. Given piezometers were not installed as a part of the works, actual groundwater standing water levels (SWLs) are not able to be calculated and hence actual groundwater levels are likely to differ from the water intersection levels reported herein.

Where boreholes were left open overnight, groundwater levels were found to rise approximately 1m above the original intersected level. This was observed within two boreholes, H7 and H9. At both these locations groundwater intersection was measured as being within, or on the boundary of the high plasticity clays. This may be indicative of the both the lower aquifer transmissivity within the high plasticity clay material and or that the clay layers partially confine the groundwater onsite. Given hole collapse in several boreholes it is currently unknown however if the same water level rises would be observed within the other observed materials.

Based on the obtained groundwater intersection data:

- The northern W-E sections provided groundwater levels varying from 8.1 m (H12) to 7.8 m (H9), the predominant groundwater bearing unit was clayey SAND
- The central W-E sections provided groundwater levels varying from 9 m (H5) to 7.2 m (H8), the predominant groundwater bearing unit was clayey SAND
- The southern W-E sections provided groundwater levels varying from 9.5 m (H2) to 8 m (H4), the groundwater bearing unit included clayey SAND, CLAY and Sandy CLAY

Given the potential partially confined nature of the aquifer, it is probable that true groundwater levels beneath the site are within the order of 5.9 and 7.5 mbgl, conforming with groundwater depths obtained from surrounding water bores within a 2km radius of the site. It is likely that water levels ultimately are controlled by regional and local recharge and prolonged heavy rainfall periods could see further groundwater level rises.

Calculation of an accurate groundwater flow direction, groundwater gradient and hydraulic conductivities are unable to be determined given the absence of established piezometers onsite. However, based on the obtained information and published information, it is estimated that:

- Groundwater flow is potentially towards the east, in the direction of Lake Gol Gol and the associated wetlands.
- Groundwater gradients are likely to be quite flat given the topography, with hydraulic conductivities variable, ranging from 0.01 to 0.21 m/day.



ARUMPO ROAD

- H01
- H02
- H03
- H04
- H05
- H06
- H07
- H08
- H09
- H10
- H11
- H12

Legend
Borehole Locations



Job Number: 202597
Filename: 202597GQ00
Revision: Rev 0
Date: 2021-03-31
Drawn: WG

0 100 200 300 400 m

Data Acknowledgement:
Primary Imagery from ESRI, 2021



Wentworth Shire Council

**Buronga Landfill Expansion
Hydrogeological Investigations
Borehole Location Plan**

Figure 2



6 Conclusions and Recommendations

Tonkin was commissioned by the Wentworth Shire Council (Council) to undertake a Groundwater Impact Assessment (GIA) to provide information for inclusion into an Environmental Impact Statement (EIS), which is required as part of the Development Application for the expansion of the Buronga Landfill.

The investigation has included a desk top study of regional and site specific information pertaining to groundwater occurrence and usage within the region and also within immediate proximity to the proposed construction area.

The investigation has determined that:

- The site is situated within the Huntingfield land system which predominantly consists of sandplains and dune fields. Geomorphologically the regional landform consists of a series of playas and basins. The climate is described as steppe (semi-arid), so rainfall occurrence is low, and vegetation is restricted to smaller shallow rooted species such as Belah and Bluebush vegetation. Given the low rainfall, regional groundwater recharge is low.
- The presence of surrounding groundwater bores within a 2km radius of the site suggests shallow groundwater of variable salinity and quality, typically with salinity increasing further south.
- The geology encountered onsite is indicative of the regional setting and consists of a succession of sands and clays. Clays range from highly plastic with low transmissivity to low plastic sandy clays with moderate transmissivity. Water occurrence beneath the site appears to be predominantly within the clayey SAND and Sandy CLAY materials which are partially confined in places by higher plasticity clays.
- Literature research shows that there are definite GDEs within proximity to the site, particularly wetlands and terrestrial vegetation. There are also potential beneficial uses of the groundwater including irrigation and potential (non-potable) domestic use.

The study has shown that although groundwater movement from site is likely to be relatively slow, groundwater levels are shallow and variable between unconfined and partially confined, based on the interbedded sequences of clay (partial confining layer) and the sandy clay/ clayey sand materials. Therefore in theory groundwater levels are able to rise exponentially, if recharge permits.

However, given the semi-arid climate and the review of regional and site-specific data it is perceived that level rises above 5.9m below ground level are unlikely and the variance between high and low groundwater points lower. Additionally, with groundwater essentially within the clay bearing units which are of a lower conductivity than sand, groundwater flow rates are likely to be lower should the water table be intersected through excavation works.

It is therefore concluded that overall risk to groundwater onsite of the construction is low, however it is recommended that groundwater monitoring wells are installed up and down hydraulic gradient of the site to enable temporal groundwater data and water quality data to be monitored prior to construction and during operation of the site. These monitoring wells should additionally be located as such to provide sufficient coverage for the upgradient and down gradient monitoring of potential groundwater contamination emanating from the landfill activities on-site.



Appendix J. Hazard Assessment

RISK ASSESSMENT RECORD

			Inherent Risk			Residual Risk				
Item	Hazard	Unwanted event	Consequence	Probability	Rating	Existing Description and Controls	Consequence	Probability	Rating	Further Actions Required to Maintain or Reduce Rating
1	Inhalation of dust during waste deposition, sorting or from vehicle movements	Impacts to staff health	Major	Almost Certain	E - 3	Ventilation in sheds Use of water to wet down dust generating material and haul roads if required Machinery operators to keep cabin doors closed Dust control procedure implemented Workers on site to avoid standing close to dust generating activities and wear respiratory protection if required. Housekeeping of FERF	Minor	Unlikely	L - 21	Dust masks readily available Dust control procedure
2	Vehicle/machinery collisions	Personal injury or fatality	Catastrophic	Possible	E - 4	Traffic management plan including standard traffic rules, signage etc. to be implemented Site speed limits to be imposed and monitored Site layout to minimise vehicle reversing Designated pedestrian areas provided Training/evidence of driver competency required for staff Safe Work Method Statements (SWMS) for high-risk work on site Machine inductions/licencing Reverse alarms and fixed mirrors fitted to vehicles All persons to wear high visibility clothing when outside of vehicles, with the exception of general public.	Minor	Unlikely	L - 21	Traffic Management Plan SWMS for high-risk work
3	Waste - release of bio-aerosols when moving or turning waste	Impacts to staff health	Major	Likely	E - 5	Machinery operators to keep cabin doors closed, air conditioned cabin Workers on site to avoid standing near active tip face. Respiratory protection to be worn where longer term exposure to exposed waste may be required.	Minor	Unlikely	L - 21	Appropriate respiratory protection available
4	Waste - contact with unknown hazardous waste material `	Impacts to staff health Contamination of other recyclable materials	Moderate	Possible	H - 12	Waste drop off areas well ventilated Staff to wear PPE including overalls, boots, disposable and puncture resistant gloves, eye and respiratory protection as required Staff to wash hands frequently throughout the day Waste acceptance and monitoring procedures to be implemented Dedicated drop-off for hazardous household items provided Resource Recovery Area	Insignificant	Rare	L - 25	Waste Acceptance Procedure
5	Waste fire at FERF or RRA	Asset damage or personal injury	Major	Possible	E - 7	All fuel on site stored in purpose designed and appropriate facilities Fire protection systems installed Good housekeeping maintained Fire break surrounding site and cleared areas around buildings as far as practical Inspection and maintenance regime Emergency response and evacuation procedures implemented	Insignificant	Possible	L - 22	Emergency Response and Evacuation Procedure
6	Green waste fire from spontaneous combustion	Asset damage Personal injury	Moderate	Likely	H - 9	Control of size of processed green waste stockpiles Location of water tank near green waste stockpiles Firefighting equipment on site	Insignificant	Unlikely	L - 24	
7	Landfill Fire from incorrect disposal of batteries in MSW or spontaneous combustion	Asset damage Personal injury Environmental impact	Major	Almost Certain	E - 3	Soil stockpile maintained near tipping face for extinguishing fires Water truck available on site Emergency response procedure implemented Regular maintenance of gas extraction system Covering and compacting waste to minimise oxygen ingress	Insignificant	Possible	L - 22	

RISK ASSESSMENT RECORD

			Inherent Risk			Residual Risk				
Item	Hazard	Unwanted event	Consequence	Probability	Rating	Existing Description and Controls	Consequence	Probability	Rating	Further Actions Required to Maintain or Reduce Rating
8	Landfill Gas	Failure in gas management system leading to explosion	Catastrophic	Unlikely	E - 6	Compacting waste in thin lifts Minimising open tip face Daily, interim and final capping constructed and maintained to minimise fugitive gas emissions Gas management system to be installed Waste storage areas well ventilated	Moderate	Rare	L - 20	
9	Landfill Gas	Failure in gas management system leading to personal injury, e.g. asphyxiation from accumulation of methane	Catastrophic	Unlikely	E - 6	Staff training Landfill gas management plan to be prepared including regular gas monitoring conducted including inside buildings, across the landfill surface and in subsurface monitoring wells Lined landfill cells to prevent gas migration	Insignificant	Rare	L - 25	
10	Contact with leachate	Injury to personnel or fauna	Moderate	Likely	H - 9	Maintain leachate and stormwater collection systems to prevent ponding Fenced leachate pond with egress ladders for emergencies Staff training	Insignificant	Unlikely	L - 24	
11	Leachate outbreak	Contamination of soil or groundwater	Major	Likely	E - 5	Maintain leachate and stormwater collection systems Use markers to ensure adequate freeboard maintained in leachate ponds Use of tehcnical specification and construction quality control plans to ensure liner integrity Use of a suitably qualified and experience landfill design engineer to design cell Rehabilitate finished cells promptly and maintain cover and capping materials to reduce leachate generation Monitor and minimise leachate head within landfill cells	Insignificant	Unlikely	L - 24	Construction Quality Assurance Plan
12	Fuel storage accidental spill	Contamination of soil	Moderate	Almost Certain	H - 8	All fuel on site stored in purpose designed and appropriate facilities Fuel storages to be bunded and in hardstand area Spill kits available for immediate clean up Regular inspection and maintenance of fuel storage Good housekeeping	Insignificant	Unlikely	L - 24	



Appendix K. Bushfire Assessment (Building Code and Bushfire Hazard Solutions, 2021)

Bushfire Assessment Report

Proposed:
**Buronga Landfill
Expansion**

At:
**258 Arumpo Road,
Buronga, NSW**

Final Report

Reference No: 210933

21st September 2021



Prepared By:
**Building Code & Bushfire
Hazard Solutions Pty Limited**

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Contents

	<u>Page No.</u>
Copyright and Disclaimer	2
List of Abbreviations	3
Executive Summary	4
1.0 Introduction	5
2.0 Purpose of Report	6
3.0 Scope of Report	6
4.0 Compliance Table and Notes	6-9
5.0 Aerial view of the subject landfill site	10
6.0 Site Assessment	11 - 15
7.0 Bushfire Assessment	16 - 23
8.0 Recommendations	24 - 26
9.0 Conclusion	27
10.0 Annexure	28
- List of referenced documents and attachments	
- Attachments	

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Section 4.14 applications (under the Environmental Planning and Assessment Act 1979) and all infill development applications may be referred by Council to the NSW Rural Fire Service for review and concurrence during the DA process. S100B applications under the Rural Fires Act 1997 (subdivisions and Special Fire Protection Purpose Developments), Flame Zone determinations and Alternate Solutions must be referred by Council to the NSW Rural Fire Service for review and receipt of a Bushfire Safety Authority (BSA) or other such recommended conditions from the NSW Rural Fire Service before the consent can be granted.

The onus is on the applicant to cross reference this document with any conditions of consent issued or any requirements supplied by the NSW Rural Fire Service following development approval. BCBHS can review and cross reference these documents however the onus is on the applicant to provide them to us and request this review – Building Code and Bushfire Hazard Solutions Pty. Ltd. is not in a position to track every development approval and we rely upon the applicant to undertake this role as project co-ordinator.

Where any discrepancy between this document and the development approval or the NSW Rural Fire Service requirements is found, the conditions of consent always take precedence until such time as an application to review, amend or vary these conditions is approved.

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Version Control				
Version	Date	Author	Reviewed	Status
1	21/09/2021	David McMonnies BPAD Accreditation No. 2354	Stuart McMonnies BPAD Accreditation No. 9400	Final Report

List of Abbreviations:

APZ	Asset Protection Zone
AS3959	Australian Standard 3959 – 2018 as amended
BAL	Bushfire Attack Level
BLE	Buronga Landfill Expansion
BPMs	Bushfire Protection Measures
BPLM	Bushfire Prone Land Map
Council	Wentworth Shire Council
DA	Development Application
ELVIS	Elevation and Depth Foundation Spatial Data
EP&A Act	<i>Environmental Planning and Assessment Act - 1979</i>
IPA	Inner Protection Area
NASH	National Association of Steel-framed Housing
NCC	National Construction Code
NP	National Park
NSP	Neighbourhood Safer Place
OPA	Outer Protection Area
PBP	<i>Planning for Bush Fire Protection – November 2019</i>
ROW	Right of Way
RF Act	<i>Rural Fires Act - 1997</i>
RFS	NSW Rural Fire Service
SEPP	State Environmental Planning Policy
SFPP	Special Fire Protection Purpose
SSD	State Significant Development
SWS	Static Water Supply

Executive Summary:

Building Code and Bushfire Hazard Solution P/L has been commissioned by Wentworth Shire Council (Council) through Tonkin Consulting to prepare an independent Bushfire Assessment Report for the proposed "Buronga Landfill Expansion" (BLE) located at 258 Arumpo Road, Buronga (the site) and encompasses Lot 1 DP1037845; Lot 212 DP 756946 and Lot 197 DP 756946.

This application is being assessed as a State Significant Development (**SSD**) Application No. 10096818. Specifically, the SSD seeks development consent for the construction and operation of the proposed landfill extension to the north of the existing landfill operational site.

The proposed development is classified as SSD on the basis that it falls within Schedule 1; Cls 23 "Waste and resource management facilities" of the *State Environmental Planning Policy (State and Regional Development) 2011* given the maximum proposed waste to be received each year will be up to 100,000 tonnes.

The Minister for Planning, or their delegate, is the consent authority for the SSD and this application is to be lodged with the NSW Department of Planning, Industry and Environment (**NSW DPIE**) for assessment having regard to Section 4.36 of the Environmental Planning and Assessment Act 1979 and Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011.

In this case the NSW Governments 'ePlanning Spatial Viewer' has been used to identify that the subject property is partially bushfire prone. The bushfire prone area contains Category 2 Vegetation together with its associated 30m buffer zone therefore the subject site is considered 'bushfire prone'. It should be noted that the location of the proposed landfill extension is partially located outside any mapped bushfire zone. Notwithstanding, the whole of the site must be considered under the NSW Rural Fire services document "Planning for Bush Fire Protection - 2019".

This report has been prepared to address the requirements under Section 8.3.10 "Commercial and Industrial Development" of Planning for Bush Fire Protection - 2019 (PBP) in respect to a waste management / landfill site. The subject site and proposal does not contain any residential accommodation and is therefore not captured as Special Fire Protection Purpose (SFPP) or conventional residential development.

The proposal must therefore conform to the aim and objectives as detailed in Chapter 1 'Introduction' and the specific objectives and bushfire protection measures detailed in Chapter 8 'Other Development' of PBP-2019.

The existing Office / Amenities building and Weigh Bridge office were found to be located outside the 30m buffer zone. A minimum Bushfire Attack Level (BAL) of 29kw/m² is required for these existing office buildings und PBP-2019; Cls 8.3.10.

The existing informal APZ's around structures consists of maintained earthen grounds around those structures supported by several access trails within and around the whole of the site.

The proposal will satisfy all relevant specifications and requirements of *Planning for Bush Fire Protection - 2019*.

1.0 Introduction

The development proposal relates to the construction and operation of a substantial extension to the existing landfill site located at 258 Arumpo Road, Buronga, Lot 1 DP1037845; Lot 212 DP 756946 and Lot 197 DP 756946. The subject property has street frontage west, to the Arumpo Road and abuts neighbouring open rural space allotments to the north, east and south.

The NSW Government's 'ePlanning Spatial Viewer' identifies the subject property as partially containing Category 2 Vegetation the associated 30 metre buffer zone therefore the subject site is considered to be 'bushfire prone'. It should be noted that part of the proposed landfill extension is located outside the buffer zone. Notwithstanding, the whole of the property must be assessed as being bushfire prone.

Buildings associated with the site are 'non-habitable' consisting of the Weigh Bridge Office, the Office and Amenities building all being of metal construction and portable in nature. Several 'sheds' are also located around the site.

This report has been prepared to address the relevant specifications and requirements of Planning for Bush Fire Protection - 2019 (PBP).

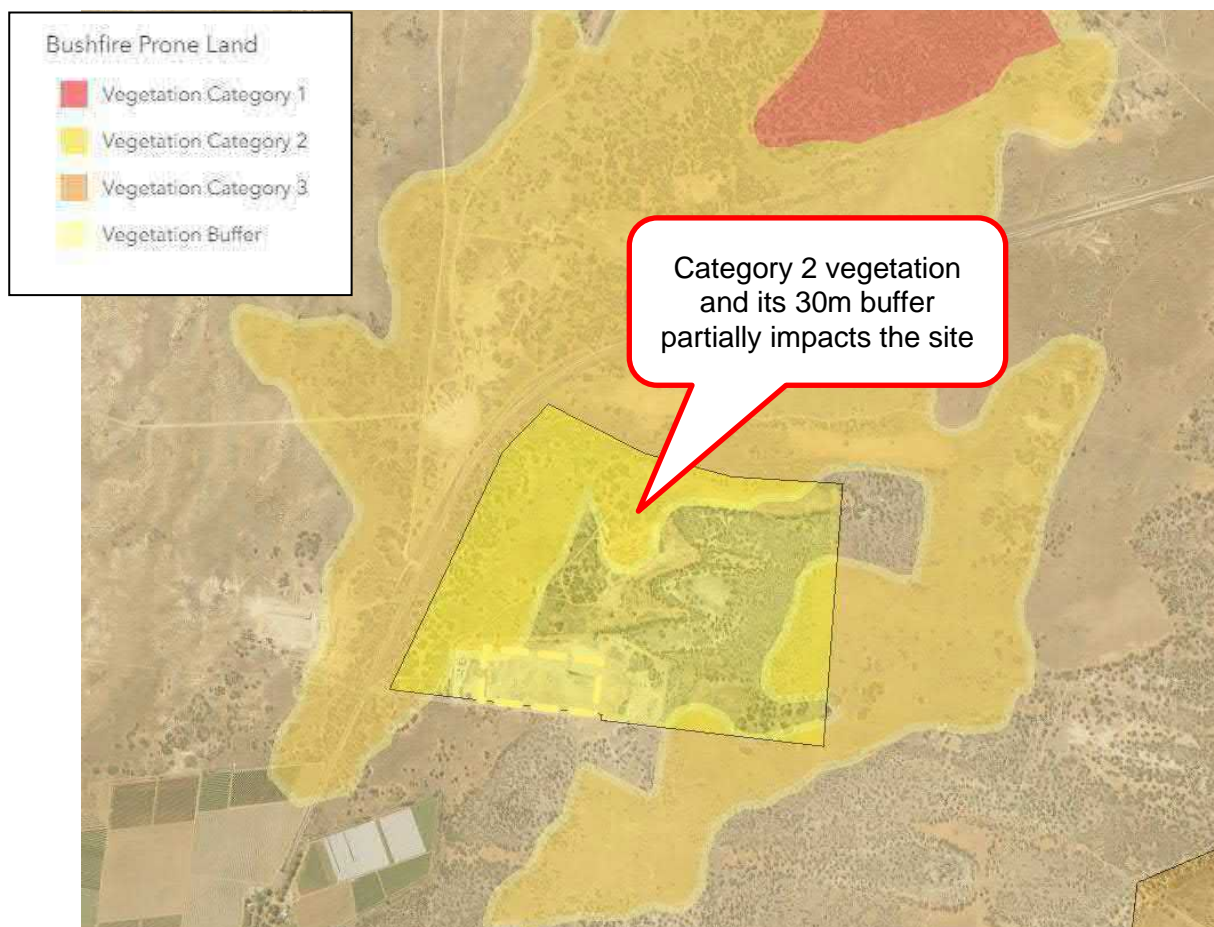


Figure 01: Extract from NSW Governments ePlanning's Bushfire Prone Land Map for the subject land fill area

2.0 Purpose of Report

The purpose of this Bushfire Assessment Report is to provide an independent bushfire assessment determination for the subject land fill site and determine if the SSD Application will comply with the relevant specifications and requirements of Planning for Bush Fire Protection - 2019 as required by the Planning Secretary's Environmental Assessment Requirements (SEARS) approval dated 11/11/2020.

3.0 Scope of this Report

The scope of this report is limited to providing a bushfire assessment and recommendations for the proposed landfill expansion area. Where reference has been made to the surrounding lands, this report does not purport to directly assess those lands; rather it may discuss bushfire impact and/or progression through those lands and possible bushfire impact to the subject property.

The General Office (NCC Class 5) and amenities building and the Weigh Bridge Office (NCC Class 5) are to remain in their current locations as indicated on Tonkin Drawing No 202597 – 010 Rev A dated 14 September 2021. PBP - 2019, Chapter 8.3.10 'Commercial and industrial development' will be applied in this case inclusive of reference to Chapters 1.1 'Aim and Objectives' and Chapter 7 'Residential Infill Development'.

4.0 Compliance Tables & Notes

PBP-2019; Chapter 8.3.10 'Commercial and industrial development' calls for compliance in the following areas of PBP-2019: Chapter 1.1 Aim and Objectives and Chapter 7 'Residential Infill Development'. Chapter 7 is used as a base for a package of bushfire safety measures.

Chapter 7, Table 7.4a 'Asset protection zones' calls for compliance with Table A1.12.2 for the existing buildings. The table provides the minimum distances required to achieve a Bushfire Attack Level (BAL) of 29kW/m² where different vegetation structures apply.

The following summary table sets out the required APZ distances to achieve a BAL of 29kW/m² for the four compass aspects.

	North	East	South	West
Vegetation Structure	Semi-arid woodland	Semi-arid woodland	Semi-arid woodland	Semi-arid woodland
Slope	0° Up	0° Up	0-5° Down	0-5° Down
Required Asset Protection Zone	12 metres	12 meters	16 metres	16 metres
Available Asset Protection Zone	16 metres	16 metres	16 metres	16 metres

Significant Landscape Features	Rural land / trails	Tip site / roads / trails	Roads / Rural land	Arumpo Road
Threatened Species	Not known	Not known	Not known	Not known
Aboriginal Relics	Not known	Not known	Not known	Not known
Bushfire Attack Level	BAL 29	BAL 29	BAL 29	BAL 29
Required Construction Level	BAL 29	BAL 29	BAL 29	BAL 29

Compliance Summary of Bushfire Protection Measures Assessed			
Bushfire Protection Measure	Acceptable Solution	Performance Solution	Report Section
Asset Protection Zones & Landscaping	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
Construction Standard	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
Access	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
Services	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03
Emergency Management Planning	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.03

Table 01 – Compliance Summary

Asset Protection Zones Compliance

Chapter 8.3.10 of PBP calls for the provisions of Chapter 7 to be used as a **base** for the development of Bushfire Safety Measures (BSM's). Chapter 7 is primarily designed for residential infill development. Notwithstanding APZ compliance has been assessed and determined for the existing de-mountable Weigh Bridge Office and the Site Office / Amenities buildings and the remaining Class 10 sheds.

Asset Protection Zones for new 'residential' development are determined from Table A1.12.2 of PBP or bushfire design modelling to achieve a radiant heat impact of no more than 29.0kW/m² at the closest point of the available building footprint back to the hazard. The maximum APZ depth for the

Weigh Bridge Office and Site and Amenities building has been determined to be not less than 16.0 metres in all directions.

Current drawings suggests that none of the existing main buildings will be relocated. This being the case land to the west of the existing buildings is the only area where a new APZ of 16m is to be provided as the other aspects are already clear of vegetation for greater than 16m.

Other Class 10 structures (sheds) do not require a formal APZ. It is recommended however that 10m APZ be provided around these structures where they are located vegetated areas.

Construction Standard Compliance

The highest Bushfire Attack Level for the existing Weigh Bridge Office and Site Office and Amenities buildings was determined from Table A1.12.2 of PBP to be 'BAL 29' (for residential dwellings).

PBP Clause 8.3.1 'Buildings of Class 5 to 8 under the NCC' notes that the National Construction Code (NCC) has no specific performance requirements for bushfire protection for these building classifications, in this case the Weigh Bridge Office and Site Office Amenities building.

It does however state that the objectives of Clause 8.3.1 are to be met in regards to access, water supply and services, and emergency and evacuation planning.

PBP Clause 8.3.2 notes in part that the NCC defines a Class 10 building as being a non-habitable building or structure such as a:

- a) *Class 10a – a non-habitable building being a private garage, carport, **shed** or the like*

For the purposes of this report all other structures can be called sheds. There is no bushfire protection requirements for a Class 10 building (shed) located more than 6.0m from a dwelling under PBP or the requirements of AS3959-2018 "Construction of buildings in bushfire prone areas". Given no dwellings are present there is no specific bushfire constructional requirements under PBP -2019 or AS3959-2018 for any sheds.

The construction of the existing Weigh Bridge Office and Site Office and Amenities building is of non-combustible metal cladding consistent with typical portable or demountable building construction and is therefore satisfactory.

However all openable windows, personnel doors or vents will require treatment to prevent the entry of wind driven embers therefore metal mesh screening and door weather strips will be required to meet the requirements of AS3959-2018.

Where compressed timber is used as a flooring the underside of the building will need protection against the lodgement of possible burning embers. This can be afforded by the application of removable, framed metal meshed screens positioned between the edge of the wall / floor and finished ground level.

Access Compliance

Access for the purposes of public evacuation to a public road system and internal fire service vehicle movement is required under PBP-2019 Cls 8.3.1. In review of the current plans adequate vehicle movement has been provided by the existing graded unsealed road network. All roads are capable of accepting heavy vehicles.

Services Compliance

Adequate fire-fighting water is to be provided to enable the protection of buildings. Fire-fighting water is available from the existing water storage tank.

Gas and electricity supplies are not to be located such that they would contribute to the risk of fire to a building. The existing electrical supply is an underground supply. There is no town main gas supply, all on-site gas is delivered from LPG cylinders.

Emergency Management Compliance

An emergency management and evacuation plan is required for the site. The plan should include a section on bushfire impact.

5.0 Aerial view of the Buronga landfill site

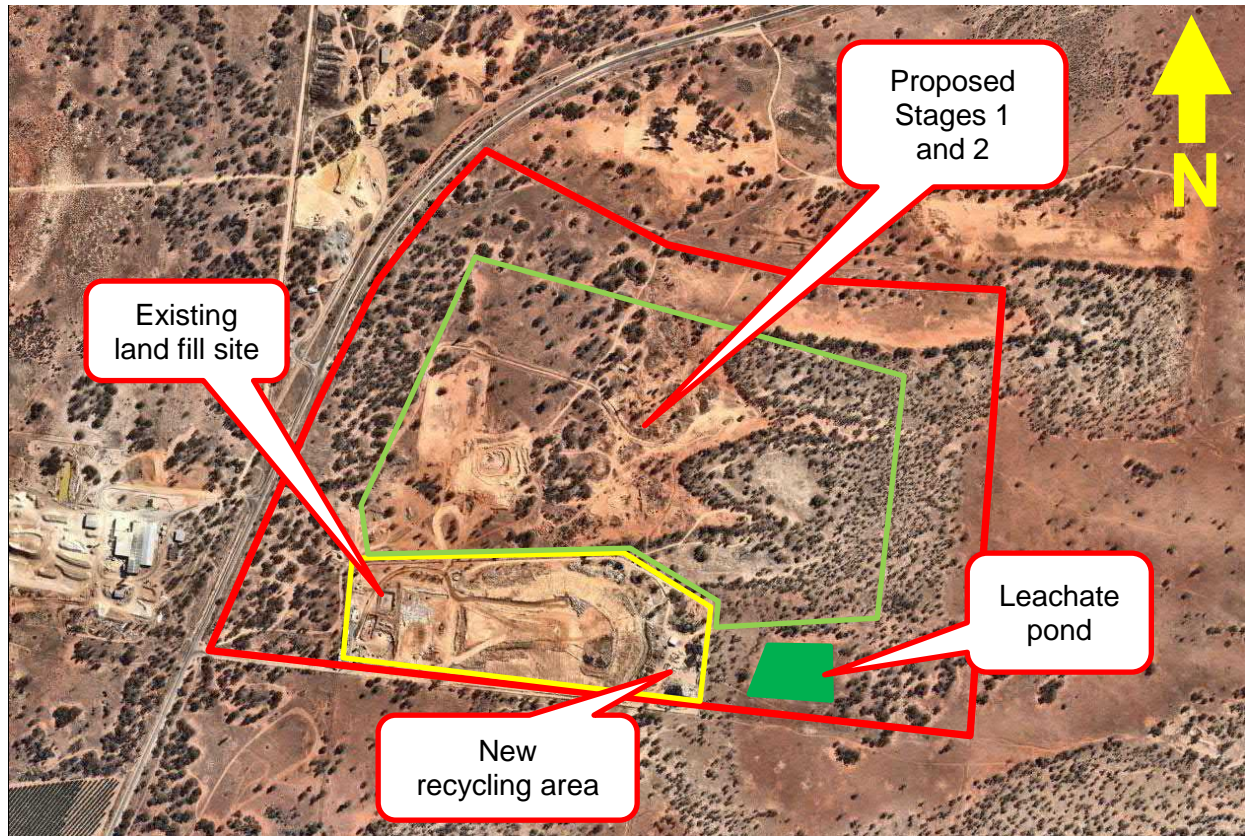


Figure 02: Aerial view of the existing working site (yellow outline), approximate new landfill stages 1 and 2 (green outline) and landfill boundary (red outline)
Courtesy Nearmap – April 2021

6.0 Site Assessment

6.01 Location

The subject site is known as the Buronga Landfill and is located at 258 Arumpo Road, Buronga, encompassing Lot 1 of DP1037845; Lot 212 of DP 756946 and Lot 197 of DP 756946. The site comprises a semi rectangular boundary with an area of approximately 124 hectares (licenced) including the current operational area of approximately 19 hectares.

The subject site is zoned SP2: Infrastructure and is within the Wentworth Shire LGA.

The site has street frontage to the Arumpo Road to the west and abuts open space rural allotments to the north, east and south. Several internal access roads and trails service the site.



Photograph 01: View of main entry exist gate from Arumpo Road.

The proposed site is susceptible to possible bushfire impact from vegetation contained within its own boundaries however it is considered unlikely to occur. (source: Council's Bushfire Risk Management Plan)

The on-site portable weigh bridge office, site office / amenities buildings and fuel store shed the only Council buildings on site.

A private contractor is operating a re-cycling facility in the south east corner of the existing landfill site.

There were no other formal access roads observed servicing the site.

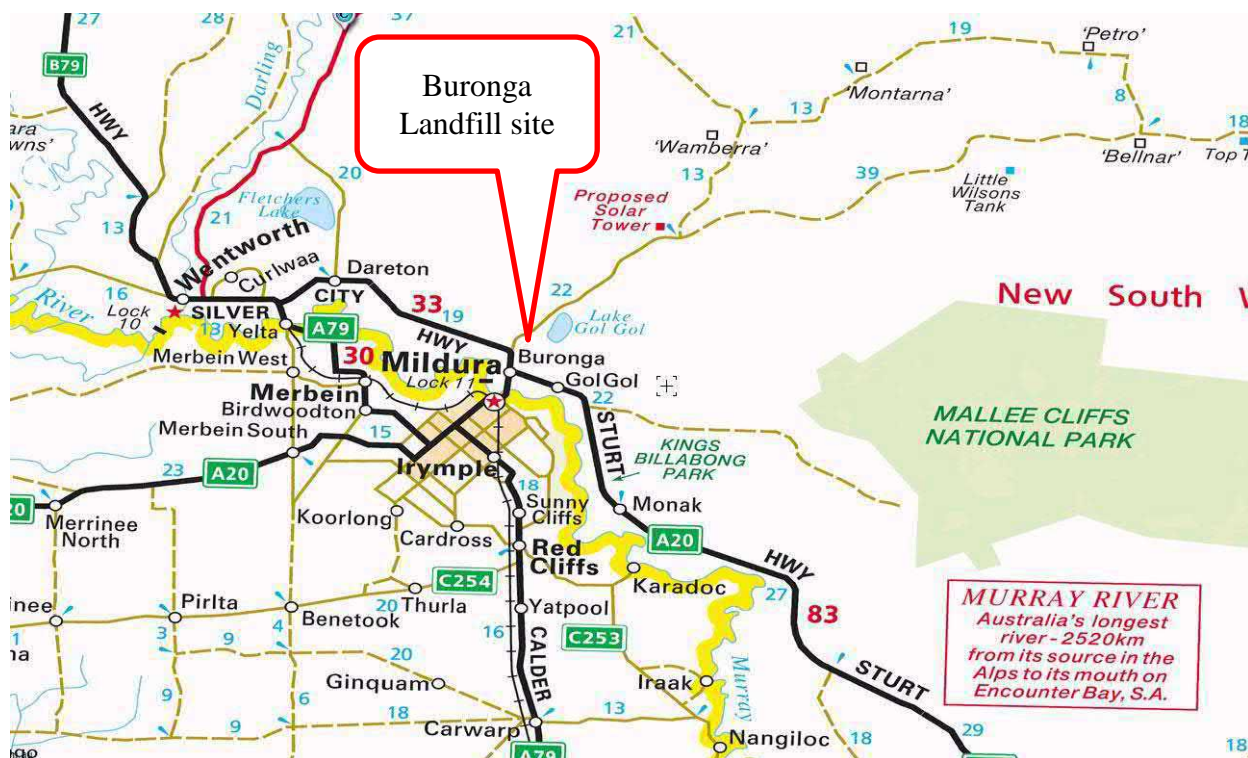


Figure 03: Extract from street-directory.com.au

6.02 Vegetation

In accordance with PBP-2019, Appendix 1 'Site Assessment Methodology' we have undertaken an assessment of all vegetation formations within 140 metres of the proposed expansion site for each aspect as per Keith (2004). That is, to the extents of the outer boundary fences. The predominate vegetation within the subject site and adjacent rural grazing land was found to comprise 'semi-arid woodland'.

We have determined that part of the site to the west clearly has semi-arid woodland (Category 2 vegetation) however the areas to the centre and east within the site are more open and support far less vegetation.

The lack of vegetation has been acknowledged in ePlanning's BPLM where part of the central and eastern portion of the site are not recognised as being bushfire prone. (ref Fig 01)

A review of Council's 'Bushfire Risk Management Plan' for the general area (the landfill site has not been listed as a risk) has suggested that a bushfire occurrence is "Unlikely" and the consequence would be "Moderate" resulting in a "Low" risk of bushfire.

49	Economic	Transgrid Sub Station	Arumpo Road	Wentworth	Wentworth	Unlikely	Moderate	Low	NA	6;18
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Figure 04 – Extract of Council's BRMP for the Transgrid Substation approximately 6.6km northeast on Arumpo Road.

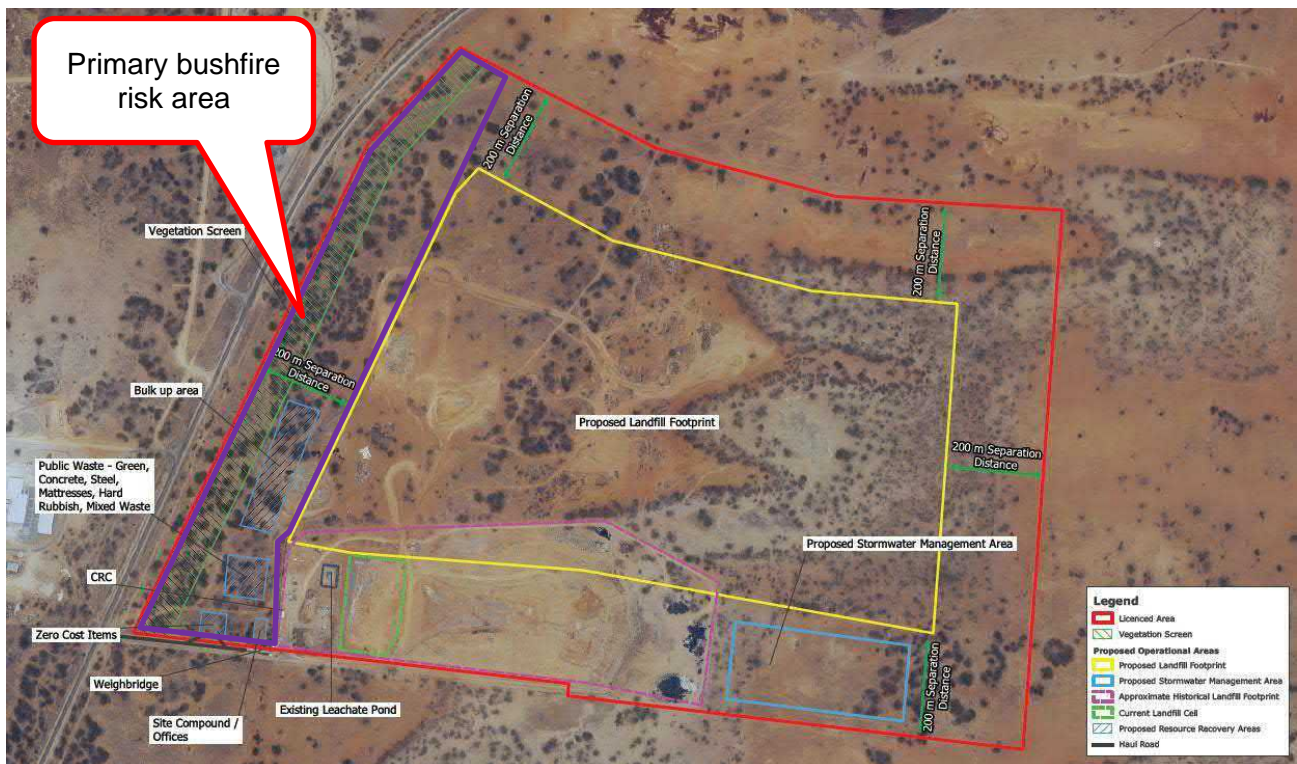


Figure 04: Aerial view of the subject site overlaid with low risk vegetation assessment area (heavy purple line)
(acknowledgements: Tonkin Consulting)

The primary area for possible bushfire progression is within the proposed 200m visual separation zone located to the west of the active site. Part of the southern section of this area will be modified to suit future operational structure needs. This will include the further clearing of vegetation as necessary and the construction of supplementary access trails including a car park area.

The new building operational and construction areas combined with new access road/s will significantly reduce the potential for bushfire impact to the existing Weigh Bridge Office and Site Office / Amenities building.

6.03 Slope and Topography

The slope of the land under the classified vegetation has a direct influence on the forward rate of spread, fire intensity and radiant heat exposure. The effective slope is considered to be the slope under the classified vegetation which will most significantly influence bushfire behaviour toward the development site.

In accordance with A1.4 'Determine slope' of PBP the slope assessment is to be derived from the most detailed contour data available.

In this instance semi-arid woodland was identified in and around the site assessment area and subsequently a slope analysis is required.



Figure 05: Extract from Nearmap and ELVIS showing 1 metre contours

Effective slopes have been determined to be 0-5 degrees down to the south and west and upslope to the north and east to accord with PBP.

6.04 Fire History

There are areas within NSW that have significant fire history and are recognised as known fire paths. While the fire history is more commonly considered as part of strategic planning (to ensure future development is not exposed to an unacceptable risk), it is useful to consider at a Development Application phase to ensure the land is suitable for development in the context of bushfire risk.

In this instance there have been no wildfires recorded within the immediate area (source NPWS Fire History dataset SEED). The closest recorded wildfire was found to be located >7.0 kilometres from the proposed landfill extension.

The subject site is therefore not considered to be within a known fire path. Furthermore in consideration of the previous bushfire history the likelihood of a bushfire occurring within the immediate area is considered unlikely.

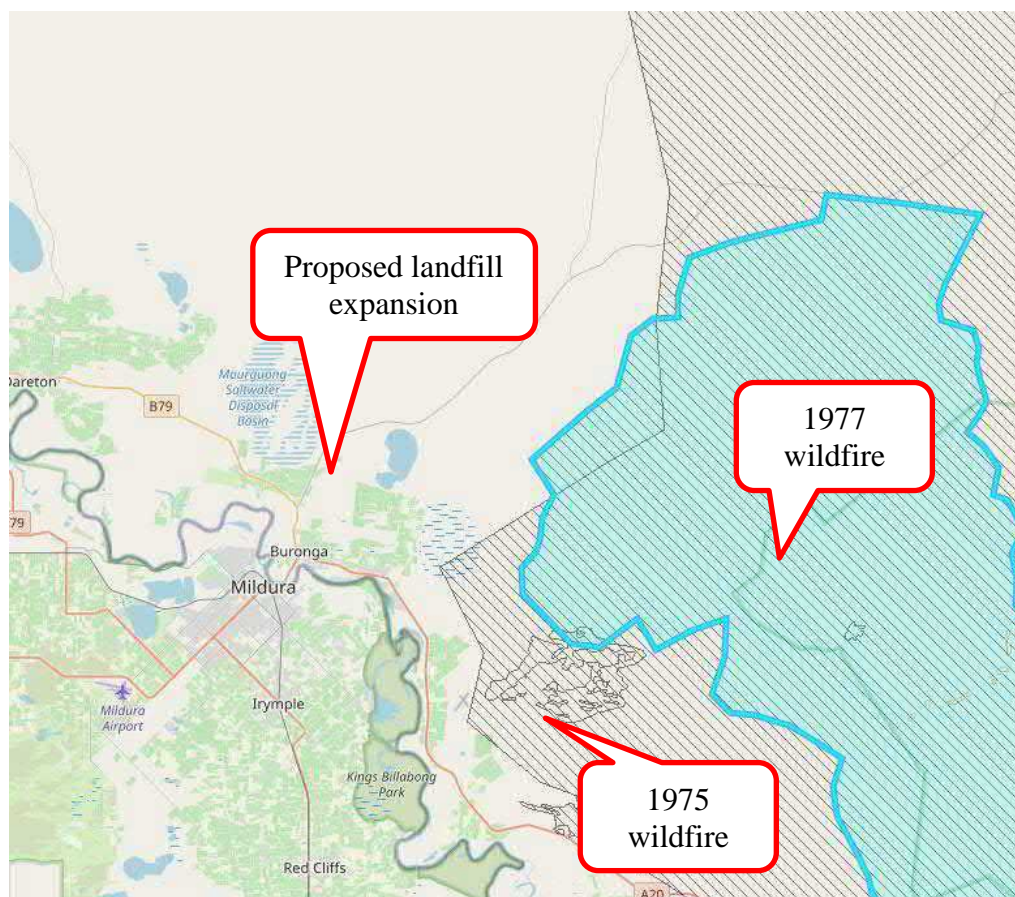


Figure 06 - Areas consumed by 1975 and 1977 wildfires.
Noting no recorded history of wildfire in or about the subject site.
(source: NPWLS / Seed)

Local advice is that several fires have occurred within the landfill site. These fires were not the result of bushfire impact, rather, the short circuiting of discarded batteries. All fires were extinguished by applying soil.

7.0 Bushfire Assessment

7.01 Planning for Bush Fire Protection - 2019

This application is being assessed as a State Significant Development. (SSD-10096818)

Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Land Map as prepared by Council and or the NSW Rural Fire Service.

Reliance has been made on the NSW Rural Fire Service mapping system and the NSW Governments 'ePlanning Spatial Viewer' to identify that the subject site partially contains Category 2 vegetation and its 30m buffer zone. Notwithstanding the partially mapped vegetation area, the whole of the subject site must be considered to be 'bushfire prone'. It should be noted that the location of part of the landfill extension is located outside the buffer zone.

This report has been prepared to address the relevant specifications and requirements of Planning for Bush Fire Protection - 2019 in relation to the proposed extension of the existing landfill site. The subject site and expansion proposal does not contain any staff or caretaker accommodation and is therefore not captured as SFPP development.

Notwithstanding the proposal does involve '*commercial and industrial development*' which is captured under Chapter 8 of PBP.

One of the objectives underpinning PBP is to provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely bushfire spread to buildings.

While there are no minimum required Asset Protection Zones (APZ's) for this type of development it is acknowledged that for commercial and industrial development under PBP 8.3.10, it requires that the provisions within Chapter 7, inclusive of APZ's, are to be used as the **base** for a package of bushfire safety measures.

Chapter 7 requires that APZ's are provided in accordance with table A1.12.2, which details the minimum APZ depth required to achieve <29kW/m² (BAL 29) onto a building, in this case 16m.

The proposal must also conform to the aim and objectives detailed in Chapter 1 'Introduction' and the development of a suitable package of 'bushfire protection measures' as detailed in Section 7.4 'Bushfire Protection Measures' of PBP.

It is noted that Section 7 relates to '*infill residential development*' and as such the suitable package of bushfire protection measures will be tailored to the lesser risk of a landfill proposal in particular the existing buildings.

7.02 Aim and Objectives of PBP (CIs 1.1)

“The aim of PBP is to provide for the protection of human life and minimise the impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.”

The recommendations within this report will satisfy the aim of PBP.

Specific Objectives (Section 7.4)

The following table lists the specific objectives for all residential developments in accordance with section 7.4 of PBP applicable to the proposal together with our comments on compliance or otherwise.

Specific Objective	Comment
<i>APZs are provided commensurate with the construction of the building and a defensible space is provided.</i>	Limited, low risk vegetation found on site. Existing building will remain as having a 16m or greater separation from the Category 2 vegetation. Sufficient defensible space will be provided. Minimum depth APZ's will be maintained.
<i>Firefighting vehicles are provided with safe all-weather access roads to structures and hazard vegetation.</i>	An all-weather access road is existing from Arumpo Road into site. Earthen roads and trails capable of supporting fire fighting vehicles have been provided around the site to facilitate operations and fire-fighting if required. An emergency access gate off Arumpo Road located in the north-western corner of the site will be recommended for emergency service access only. Access for fire-fighting vehicles is considered satisfactory.
There is appropriate access to water supply	Suitable access and hard stand areas have been provided to existing firefighting water draw off points. Hard stand areas for new static water draw off points will be recommended
Adequate water supplies is provided for firefighting purposes.	An existing 45,000ltr static water supply is available complete with hard stand and several separate water draw off points. NSWRFs Storz couplings have been provided at all water draw off points. An additional static water supply has been recommended.
Emergency management Planning exists.	An emergency management plan exists. The plan is to be upgraded with a section on 'Bushfire'.

7.03 Bushfire Protection Measures

Section 7.4 'Bush fire protection measures' (BPM's) of PBP - 2019 outlines the specific BPM applicable to residential infill development including APZ and Landscaping, Construction, Access, Services & Emergency Management Plan. These have been suitably modified to reflect that the proposal does not include any residential accommodation.

The following section addresses each BMP item and the proposals compliance.

Asset Protection Zones & Landscaping

Asset Protection Zones for new infill residential development are determined from Table A1.12.2 of PBP or bushfire design modelling to achieve a radiant heat impact of not more than 29kW/m^2 at the closest point of the available building footprint. A resultant 16m APZ has been determined for the existing Weigh Bridge and Site Office and Amenities buildings to ensure building resilience and occupant safety should the need arise.

The vegetation determination on site was 'semi-arid woodland', in the main being located along the Arumpo Road boundary and part of the northern boundary.

All grounds around the existing Weigh Bridge and Site Office and Amenities buildings not less than 16.0m in depth will be maintained in accordance with an Inner Protection Area as detailed in Appendix 4 of *Planning for Bush Fire Protection - 2019* and the NSW Rural Fire Service publication 'Standards for Asset Protection Zones'.

Isolated trees are permissible as garden features / shading.

There are no formal landscape plans to review at this time.

Notwithstanding, a compliance will exist for the project.

Construction

There is no construction requirements for the existing Class 10 'sheds' under Clause 8.3.2 'Class 10 Structures' of PBP-2019. The existing metal framed portable buildings are satisfactory.

The existing Weigh Bridge and Site Office and Amenities buildings will require compliance with a Bushfire Attack Level (BAL) of 29 as determined from Table A1.12.2 of PBP. This will require a minimum 16m APZ around both buildings for both building resilience and occupant safety / refuge prior to evacuation.

The typical non-combustible metal clad construction of portable or de-mountable buildings will be satisfactory.

Where elevated, all building will require a metal mesh screen to be fixed between the floor and finished ground level to prevent under floor ember entry. Such screens are to be compliant with the screening requirements of AS3959 – 2018.

Access

The subject site has street frontage to Arumpo Road to the west. The access road consists of an all-weather, two lane road capable of accommodating rigid and articulated heavy vehicles. The width of the access road exceeds the requirements of Chapter 7.4 and Appendix 3 of PBP-2019 being in excess of 10m in width.

The existing internal roads which will be utilised to access the existing and proposed landfill site will be graded / compacted earth with a minimum 5.0m width to achieve or exceed the carriageway requirements for access roads as detailed in Table 7.4a 'Access' of PBP. All new access roads are to comply with the same conditions having regard to slope, cross-fall and vegetation clearances.

Persons seeking to egress the landfill site will be able to do so using the main entry / exit road and existing local road infrastructure.

All static water supply points are to incorporate a hard stand area not more than 4.0m away from the water source.

Adequate vehicle passing is available in most areas or at points less than 200m apart. Vehicle turning can be undertaken freely in most areas.

In consideration of the limited hours of operation (8:00am to 4:00pm) access for fire services and opportunities for occupant evacuation are considered adequate.



Photograph 02: View of all-weather entry exit road being in excess of 16m in width.

Given the size of the landfill site overall, It is recommended that an emergency gate be provided in the north western corner of the site to allow an additional access off Arumpo Road. The gate can be locked with keys issued to local fire services. The provision of the gate will allow secondary access for fire services.



Photograph 03: View of northern boundary fence at corner with Arumpo Road.
A rough access trail already exists along the boundary fence.

Services – Water, electricity & gas

The landfill site is not connected to any reticulated town's water main. Existing 'pillar type' fire hydrants and water draw off points are gravity fed or pumped from the existing 45,000 ltr static water supply for both local use and for the replenishment of attending fire services.



Photograph 04 – 45,000ltr static water supply and draw off point.

A water cart truck of approximately 4,000ltrs is also available to be used in case of bush or other fire operations. All static water supply points are to incorporate a hard stand area not more than 4.0m away from the water source.

Given the landfill expansion it will be recommended that the static water supply for firefighting purposes be increased together with suitable additional draw off points. The proposed additional water supply is considered adequate for the replenishment of attending fire services.

There are no reticulated gas services. LPG gas cylinders will be used where necessary and must comply with statutory installation and maintenance regulations.

Electricity supply is underground. Recommendations will be included to ensure compliance with any new electricity services.

Bushfire Emergency Management and Evacuation Plan

The intent of the Bushfire Emergency Management and Evacuation Plan is to provide suitable emergency and evacuation arrangements for occupants of residential, SFPP or commercial / industrial developments. This assessment includes a recommendation (where not already provided) that a Bushfire Emergency Management and Evacuation Plan is prepared.

7.04 PBP Clause 1.1 Aim & Objectives

The following table details the aim and objectives of Planning for Bush Fire Protection - 2019 and the proposals ability to comply.

Aim / Objective	Comment
<i>The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment.</i>	With the inclusion of the recommendations made herein it is of our opinion that the aim of PBP has been satisfied.
<i>(i) afford buildings and their occupants protection from exposure to a bush fire;</i>	<p>A 16m wide APZ is proposed around the existing Weigh Bridge Office and the Site Office and Amenities buildings to provide a defensible space, fire service access and a BAL 29 rating.</p> <p>Class 10 buildings (sheds) do not attract a formal construction level under PBP.</p> <p>Buildings and occupants will be afforded satisfactory protection.</p>
<i>(ii) provide for a defensible space to be located around buildings;</i>	<p>A 16m wide APZ is proposed around the Weigh Bridge Office and the Site Office and Amenities buildings to provide fire service access and a BAL 29 rating.</p> <p>The proposed APZ's will be satisfactory.</p>
<i>(iii) provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;</i>	<p>A 16m wide APZ is proposed around the Weigh Bridge Office and the Site Office and Amenities buildings to provide fire service access and a BAL 29 rating.</p> <p>The provision of numerous internal access roads and trails will reduce or prevent the likely spread of bush fire.</p> <p>The available static fire-fighting water supply will also be increased.</p> <p>The provision of appropriate separation, access and fire service water supplies will be compliant.</p>

Aim / Objective	Comment
<i>(iv) ensure that appropriate operational access and egress for emergency service personnel and occupants is available;</i>	<p>The main entry /exit road off Arumpo Road is sufficient for both day to day operations and for emergency service access.</p> <p>The existing internal road / trail system provides access to almost all of the landfill site. Areas not directly serviced by a road or trail can be freely driven over given the lessor level of vegetation.</p> <p>New internal access roads will be provided to support the expansion of Stage 1 and Stage 2.</p> <p>A new emergency access gate from Arumpo Road will also be recommended.</p> <p>It is considered that satisfactory operational access will be available for fire services and occupant evacuation.</p>
<i>(v) provide for ongoing management and maintenance of bush fire protection measures, (BPMs); and</i>	<p>All APZ's within the site, are to be maintained in accordance with the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 4 of <i>Planning for Bush Fire Protection</i> 2019.</p> <p>Any new landscaping around the proposed / relocated buildings is to comply with the provisions of Appendix 4 of PBP-2019.</p>
<i>(vi) ensure that utility services are adequate to meet the needs of firefighters.</i>	<p>Existing static water is available for the replenishment of attending fire services.</p> <p>The existing pillar hydrant network and water draw off points are freely accessible for fire services.</p> <p>The existing static water supply, pillar fire hydrant network and draw off points will be expanded as part of this proposal to service the landfill expansion area.</p> <p>The proposed firefighting water supply will then be satisfactory.</p>

8.0 Recommendations

The following recommendations are provided as the minimum necessary for compliance with Planning for Bush Fire Protection – 2019. Additional recommendations are provided to supplement these minimum requirements where considered necessary.

Asset Protection Zones

1. That a 16.0m wide APZ is provided around the Weigh Bridge Office and the Site Office and Amenities buildings and shall be maintained as an Inner Protection Area as detailed in the NSW Rural Fire Service's document 'Standards for Asset Protection Zones' and Appendix 4 of Planning for Bush Fire Protection 2019.

Landscaping

2. That any new landscaping around buildings is to comply with Appendix 4 of *Planning for Bush Fire Protection 2019*.

Emergency Management

3. That a Bushfire Emergency Management and Evacuation Plan be prepared (if already not done so) consistent with the NSW Rural Fire Service Guidelines. The plan can be a section of any existing Emergency Management Plan.

Services

Water Supply:

4. That an additional 45,000 ltr static water supply (minimum) is provided to supplement the existing water tank and is to be positioned further north with respect to the proposed new landfill expansion area.
5. A suitable number of new pillar type fire hydrants or fixed water draw off points including suitable RFS 'storz' couplings shall be provided for fire service use.
6. The new static water supply location and water draw off points are to be provided with a hard stand areas in compliance with Table 7.4a of PBP "Water Supplies" to all fire service use.
7. Static water tanks are provided with mechanical water level devices to indicate available water within the tank.

Electricity:

8. Any new electrical services must comply with Table 7.4a of PBP "Electricity Services", specifically:
 - where practicable, electrical transmission lines are underground.
 - where overhead electrical transmission lines are proposed:

- lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and
- no part of a tree is closer to a power line than the distance set out in *ISSC3 Guideline for Management Vegetation Near Power Lines*.

Gas:

- 9 Any new gas services must comply with Table 7.4a of PBP "Gas Services" specifically:
 - reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - *The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used;
 - all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side;
 - connections to and from gas cylinders are metal;
 - if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion;
 - polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used; and
 - above-ground gas service pipes external to the building are metal, including and up to any outlets.

Access

- 10 That any new internal service roads comply with the requirements for Access Roads as detailed in Table 7.4a of PBP, specifically:
 - property access roads are two-wheel drive, all-weather roads;
 - the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating.
 - there is suitable access for Category 1 fire appliances to within 4.0m of a static water draw off point hard stand area.
 - access is provided to all structures;
 - access roads must provide suitable turning areas in accordance with Appendix 3 of PBP; and
 - a minimum 4.0m carriageway width kerb to kerb;
 - Passing bays are provided at 200m intervals that are 20m long by 2m wide making a minimum trafficable width of 6.0m at the passing bay.
 - a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;
 - turning areas are to accord with Appendix 3 of PBP;
 - curves of roads have a minimum inner radius of 6m;

- the crossfall is not more than 10 degrees;
- maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

Further recommendations:

Emergency Access Point:

- To assist with rapid bushfire control or emergency evacuation from the site, consideration should be given to the provision of an emergency vehicle access gate off Arumpo Road at the northwestern corner of the site. The gate/s can normally be kept locked however the fire services (NSWRFS) should be provided with a key.
- A dedicated internal access road should be provided from the proposed north gate to the new static water supply point.

Hazardous Goods Storage:

- All hazardous goods stores are to comply with the requirements of the relevant NSW authority including Safe Work NSW.

Site Emergency Warning:

- Where not already provided, consider installation of a site wide emergency warning siren or other audible system for use by staff to warn or advise the general public of an emergency incident.

9.0 Conclusion

The development proposal relates to the Buronga Landfill Expansion project located at 258 Arumpo Road Buronga in the Wentworth Shire LGA. The proposal allows for an increase in annual waste collection from 30,000 tonnes up to 100,000 tonnes. The landfill footprint will increase from 19ha to 40ha expanding in a northward direction. This application is being assessed as a State Significant Development (Application No. SSD_10096818).

Both the NSWRFs and the NSW government's ePlanning Spatial Viewer identifies the subject property as partially containing Category 2 vegetation (semi-arid woodland) and its associated 30m buffer zone therefore the subject site is considered 'bushfire prone'.

It should be noted that a portion of the proposed works appears to be partially outside the deemed bushfire prone area.

This report has been prepared to address the relevant specifications and requirements of Planning for Bush Fire Protection - 2019 (PBP).

In accordance with the bushfire safety measures contained in this report, and consideration of the site specific bushfire risk assessment it is our opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development.

As the proposal satisfies all relevant specifications and requirements of Planning for Bush Fire Protection 2019, we are in support of the development.

Should you have any enquiries regarding this project please contact our office.

Prepared by
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10.0 Annexure 01

List of Referenced Documents

Tonkin Consulting – Buronga Landfill Proposed Expansion;
Preliminary Scoping Report, dated 08.10.20

Tonkin Consulting – Buronga Landfill Expansion;
Project No 202597 Drawing No's: 010 – 014 dated 14/09/2021

Australian Building Codes Board (2019). *National Construction Code Volume Two - Building Code of Australia*. ABCB

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<http://elevation.fsdf.org.au/>

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<https://www.planningportal.nsw.gov.au/>

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NSW Rural Fire Service NSW (2005). *Standards for Asset Protection Zones*

Standards Australia (2018). *AS3959:2018 Construction of buildings in bushfire-prone areas*.

Standards Australia (2014). *AS/NZS 1596 The storage and handling of LP Gas*

Acknowledgements to:

Geoscience Australia
NSW Department of Lands – SIXMaps
ePlanning Portal, NSW Government
Wentworth Shire Council
Street-directory.com.au
Google maps - Australia

Attachments

Nil



Appendix L. Biodiversity Development Assessment Report (Pinion Advisory, 2021)



Buronga Landfill Expansion

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

SEPTEMBER 2021

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Contents

1	Introduction.....	1
1.1	The Proposal.....	1
1.2	General description	2
1.3	Information sources	4
2	Site Context and Landscape Features	5
2.1	Landscape Features	5
3	Native Vegetation	7
3.1	Native vegetation extent.....	7
3.2	Justification for non-native vegetation	13
3.3	Vegetation integrity assessment	13
3.3.1	Vegetation zones	14
4	Threatened Species	17
4.1	Ecosystem credit species.....	17
4.2	Species credit species.....	18
4.2.1	Justification for exemptions	20
4.2.2	Species requiring further assessment.....	21
4.2.3	Targeted surveys required.....	23
5	Matters of National Environmental Significance.....	24
5.1	Wetlands of international importance (Ramsar).....	24
5.2	Listed threatened ecological communities.....	24
5.3	Listed threatened species.....	24
5.4	Listed migratory species.....	26
5.5	State and Territory Reserves	26
5.6	Nationally Important Wetlands.....	27
6	Avoid and minimise impacts	28
6.1	Assessment of impacts.....	28
6.1.1	Direct impacts.....	28
6.1.2	Indirect impacts	29
6.2	Safeguards and management measures	30
6.3	Location, Construction, and Operation	32
6.3.1	Modes and technologies.....	32
6.3.2	Site selection - Alternative locations	32
6.3.3	Avoid and minimise through proposal design	33
6.3.4	Other site constraints	36
6.4	Prescribed impacts	36
6.4.1	Structures	37
6.4.2	Non-native vegetation	37
6.4.3	Vegetation corridors.....	37
6.4.4	Threatened species movement	37
6.4.5	Vehicles.....	38
6.4.6	Impacted threatened entities	38
6.4.7	Habitat feature importance	38

7	Impact summary	39
7.1	Identification and assessment of entities at risk of SAIL	39
7.1.1	TEC at risk of SAIL	39
7.1.2	Threatened species at risk of SAIL	39
7.1.3	Assumptions	39
7.1.4	Sources	39
7.1.5	Justification.....	39
7.2	Impacts requiring offsets.....	39
7.2.1	Impacts on native vegetation	40
7.2.2	Impacts on credit species	41
7.3	Impacts not requiring offset.....	43
7.4	Areas not requiring assessment	44
8	References	45
9	Appendices	46

Table index

Table 1. Landscape features	5
Table 2. Description of PCT 15 in the Subject land	8
Table 3. Description of PCT 58 in the Subject land	9
Table 4. Description of PCT 170 in the Subject land	10
Table 5. Description of PCT 252 in the Subject land	11
Table 6. Description of regrowth in the Subject land	12
Table 7. Vegetation zones including the existing consent area - Case 00024930	15
Table 8. Vegetation zones outside the existing consent area - Case 00025590	15
Table 9. Current vegetation integrity scores including the existing consent area - Case 00024930	16
Table 10. Current vegetation integrity scores outside the existing consent area - Case 00025590	16
Table 11. Ecosystem credit species.....	17
Table 12. Species credit species.....	19
Table 13. Listed Threatened Species.....	25
Table 14. Listed migratory species.....	26
Table 15. Direct Impacts	28
Table 16. Indirect Impacts	29
Table 17. Safeguards and management measures	30
Table 18. Non-Threatened species observations.....	37
Table 19. Native vegetation impacts requiring offset.....	39
Table 20. Threatened species impacts requiring offset	40
Table 21. Ecosystem credits for plant community types - Case 00024930	40
Table 22. Ecosystem credits for plant community types - Case 00025590	40
Table 23. Species credit requirements - Case 00024930	42
Table 24. Species credit requirements - Case 00025590	43
Table 25. Native vegetation impacts not requiring offset	44
Table 26. Threatened species impacts requiring offset	44

Figure index

Figure 1. Site Map	2
Figure 2. Location Map	3
Figure 3. Landscape Features	6
Figure 4. Native and Non-Native Vegetation	13

Figure 5. Development Consent and Subject Land Native and Non-Native Vegetation	14
Figure 6. Vegetation Integrity Zones.....	16

Acronyms and abbreviations

BAM	Biodiversity Assessment Methodology
BAM-C	Biodiversity Assessment Method Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCAR	Biodiversity Certification Assessment Report
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BLE	Buronga Landfill Expansion
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offsets Scheme (NSW)
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environment Management Plan
cm	centimetre
CWTH	Commonwealth
DBH	Diameter at Breast Height
DPE	Department of Planning and Environment (NSW)
DPI	Department of Primary Industry (NSW)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (CWTH)
FM Act	Fisheries Management Act 1994 (NSW)
GIS	Geographic Information System
ha	hectare
HBT	Hollow Bearing Trees
HTW	High-Threat Weeds
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key Threatened Species
LEP	Local Environmental Plan
LGA	Local Government Area
LLS Act	Local Land Services Act 2013 (NSW)
m	metre
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
PCT	Plant Community Type
REAP	Regional Environmental Action Plan (NSW)
SAII	Serious and Irreversible Impact
SEARS	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy (NSW)
Sp.	Species
Spp.	Multiple Species
SSD	State Significant Development
TEC	Threatened Ecological Community
VEC	Vulnerable Ecological Community

1 Introduction

Wentworth Shire Council in the far west of NSW is seeking project approval to expand a waste and resource management facility in Buronga under section 4.55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). A map of the location is below (Figure 1). The Buronga landfill expansion proposal (BLE) is classified as a State Significant Development (SSD) (SSD 10096818) under the *State Environmental Planning Policy (State and Regional Development) 2011* and is considered a 'major project'. The BLE will cater for projected waste management requirements for the region.

It is important to note that an existing development consent for establishing borrow pits was issued in January 2017 (DA15/154 – Appendix B). The development consent covers part of the BLE, including the progressive removal of native vegetation to establish borrow pit sites until 2053.

DPIE has requested that the impacts and offset requirements within the area covered by the existing development consent be accounted for separately from the area outside of the existing development consent.

This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the BLE in accordance with the NSW Biodiversity Assessment Method (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. Pinion Advisory has prepared this BDAR on behalf of the proponent (Case 24826). The team was led by Troy Muster (Senior Environmental Consultant), who is accredited under Section 6.10 of the NSW *Biodiversity Conservation Act 2016* (BC Act), reference BAAS18175. Pinion Advisory commenced fieldwork on 29 March 2021; further site assessments occurred on: 31 March, 6, 7 and 8 April, 4 and 6 May, and 20 July 2021.

The following terms have been used in this document.

Subject land	The land directly impacted by the proposed development incorporating the landfill footprint, stormwater management area, and waste resource recovery areas.
Development site	All landholdings which are directly involved in the development proposal, including the existing waste and resource management facility. Lots 1 DP 1037845, 197 DP 756946, and 212 DP 756946.
Buffer area	Land within 1,500 m of the Subject land.
Extended landscape	Landscape features beyond the buffer area are notable for understanding fauna, flora, geological, and assessment decisions.
Vegetation Zone	A subset of a Plant Community Type (PCT) is based on a broad condition scale.

1.1 The Proposal

The Subject land covers an area of 67.8 ha within Lot 1 DP 1037845 (Figure 1). Approximately 45.75 ha is native vegetation, and approximately 22.05 ha is not native vegetation.

The Subject land (Figure 1) outlines the proposed development of a waste and resource management facility. The proposed development would delineate 11 substages which are then divided into three cells within the operational footprint; only one cell would be operating at any one time until its completion, then a transitioned rehabilitation program would be undertaken for that

cell. This development is expected to operate cell by cell for approximately 119.8 years, with each cell operating for approximately three years. It is noted that each substage will likely be deigned and cleared (worst case) as one with each cell constructed and rehabilitated in turn.

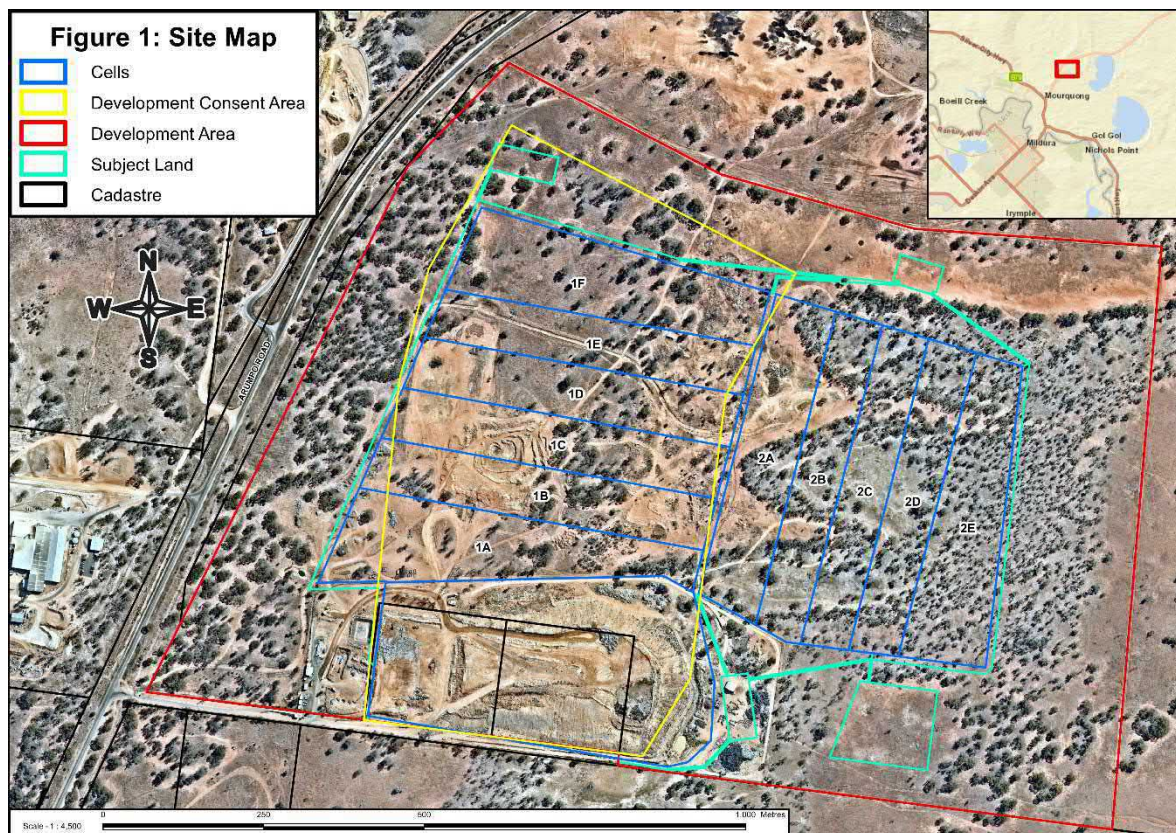


Figure 1. Site Map

1.2 General description

The Subject land is located within the Wentworth Shire Council (WSC) Local Government Area (LGA) on the east side of Arumpo Road, approximately 6 km north of Buronga, NSW. The Subject land and development site are zoned SP2 (Infrastructure) under the Wentworth Local Environmental Plan (LEP). The Subject land is within Lot 1 DP 1037845, while the development site includes Lots 197 DP 756946 and 212 DP 756946.

Four Plant Community Types (PCT) have been mapped within the Subject land, divided into five vegetation zones (Figure 2):

- PCT 15 - Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion) - (Vegetation Zone 1 – Good condition)
- PCT 58 - Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – (Vegetation Zone 2 – Good condition; Vegetation Zone 3 – Moderate condition; Vegetation Zone 4 – Poor condition)
- PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – (Vegetation Zone 5 – Good condition)
- PCT 252 - Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion - (Vegetation Zone 6 – Good condition)

There has been historic clearing of native vegetation and preliminary development of a waste and resource management facility within the development site as prescribed by a previous development consent (DA15/154) issued by Wentworth Shire Council. In addition, a zone directly north of the preliminary development (within the Subject land) has been assessed as historic clearing and regrowth that is Category 1 exempt land as per Part 60H (1) of the *Local Land Services Act 2013*.

During the field work, the assessment team noted that there had been widespread dumping of small volumes of waste throughout the property. There are also randomly scattered areas where minor earthworks have been conducted, such as digging a borrow pit or dumping overburden.

Some of the rubbish dumping and earthworks appear to be historic; however, most appears to be more recent. A high proportion of the plastic materials is windblown.

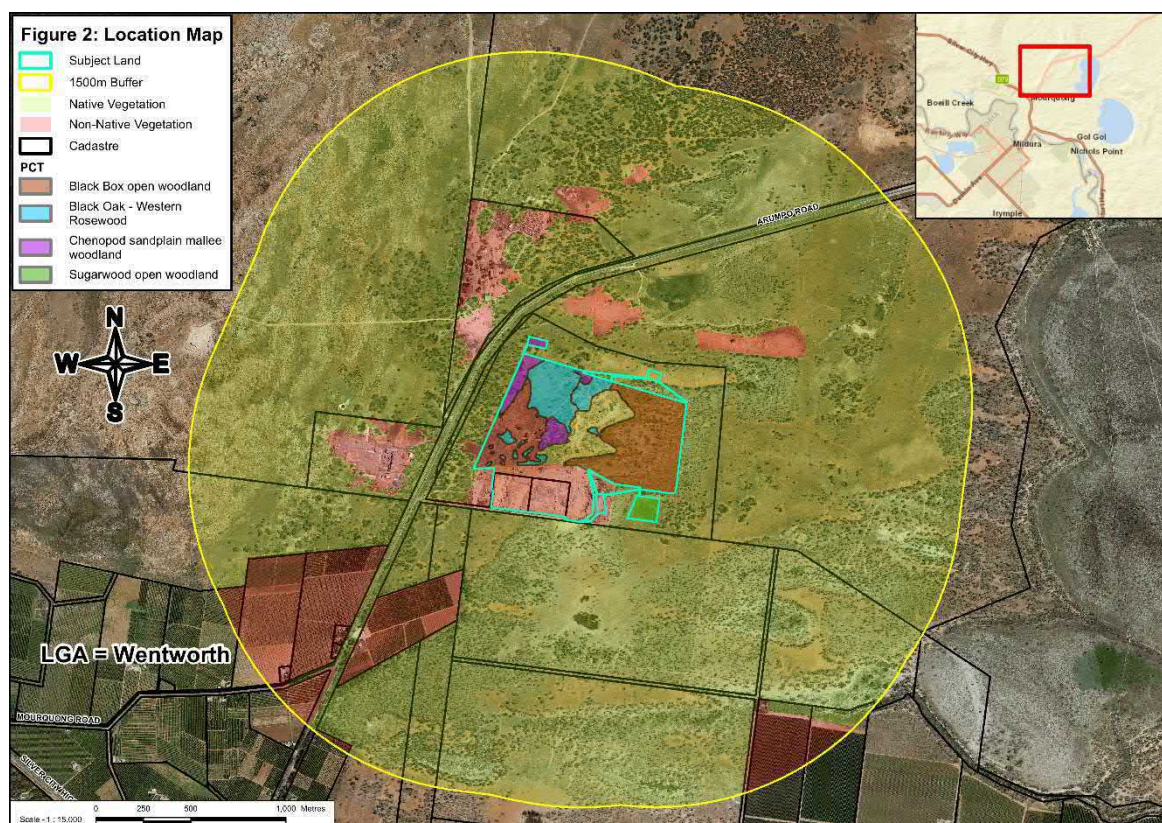


Figure 2. Location Map

1.3 Information sources

Data sources researched include:

- NSW OEH's Biodiversity Assessment Method (BAM) calculator
www.lmbc.nsw.gov.au/bamcalc
- NSW OEH's BioNet threatened biodiversity database
www.bionet.nsw.gov.au/
- OEH Threatened Species Profiles
www.environment.nsw.gov.au/threatenedSpeciesApp/
- OEH BioNet Vegetation Classification Database (OEH 2017)
www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx
- OEH BioNet VIS Mapping
www.environment.nsw.gov.au/research/VISmap.html
- Office of Environment and Heritage (OEH) (2021).
Biodiversity Assessment Method
- NSW Government SEED Mapping
geo.seed.nsw.gov.au/Public_Viewor/index.html?viewer=Public_Viewor&locale=en-AU
- SW Biodiversity Values Map
www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Commonwealth Legislation:

- Environment Protection and Biodiversity Conservation Act 1999
http://classic.austlii.edu.au/au/legis/cth/consol_act/epabca1999588

State Legislation:

- Environmental Planning and Assessment Act 1979
http://classic.austlii.edu.au/au/legis/nsw/consol_act/epaaa1979389/
- Biodiversity Conservation Act 2016
http://classic.austlii.edu.au/au/legis/nsw/consol_act/bca2016309/
- Local Land Services Act 2016
http://classic.austlii.edu.au/au/legis/nsw/consol_act/lisa2013178/

Local Legislation:

- Wentworth Local Environmental Plan 2011
http://classic.austlii.edu.au/au/legis/nsw/consol_reg/wlep2011363/

2 Site Context and Landscape Features

2.1 Landscape Features

The landscape features for the site are described in Table 1.

Table 1. Landscape features

Landscape features	Description
IBRA Bioregion	<p>The Subject land is within the Riverina IBRA Bioregion. Directly north of the Subject land within the buffer zone is the Murray Darling Depression IBRA Bioregion.</p> <p>Some features described in the BDAR reflect on the biodiversity of the Subject land concerning the nearby presence of the Murray Darling Depression IBRA Bioregion.</p>
IBRA Sub-region	<p>The Subject land resides within the Robinvale Plains IBRA Sub-region. Directly north of the Subject land is the South Olary Plain IBRA Sub-region.</p>
LGA	<p>The Subject land and buffer zone are located within the Wentworth Shire Council Local Government Area (LGA)</p>
Mitchell landscape	<p>The Subject land and buffer zone contain three Mitchell landscapes: The dominant landscape is the Murray Lakes, Swamps and Lunettes, which covers approximately 60% of the Subject land.</p> <p>Murray Lakes, Swamps and Lunettes (Mll): Large active freshwater lakes and swamps frequently flooded by the river, generally round or kidney-shaped. Often nested within larger relict Quaternary Lake features. Beaches, sand, and clay pellet lunettes and sandhills on the eastern margins. Lake beds and associated channels of grey cracking clay, beaches of brown to white sands, lunettes of deep cemented yellow to white sands, with or without interbedded strata of pelleted clay. Relief of lakes and channels to 10 m, lunettes to 20 m. Cover: 60%</p> <p>Murray Channels and Floodplains (Muc): Active channels and seasonally inundated floodplains of the Murray streams in Quaternary alluvium with associated billabongs, swamps, channels, levees and source bordering dunes, relief to 10 m. Includes scalded alluvial flats, broad elevated floodplains and associated relict channels; isolated sandy rises, relief to 5 m. Cover: 35%</p> <p>Mallee Cliffs Sandplains (Mcs): Extensive, slightly undulating sandplain of Quaternary aeolian sands with east-west trending dunes, often with blowouts, partly scalded broad swales and small depressions, relief 6 to 10 m. Solonized brown soils, calcareous loamy sand, texture-contrast soils on the plain, red and brown sands on dunes, non-cracking grey or brown clays in depressions. Cover: 5%</p>
Native vegetation cover	<p>Native vegetation within the Subject land covers 45.7 ha, and non-native vegetation covers 22.1 ha.</p> <p>Native vegetation within the Subject land and buffer area covers 1154.9 ha, and non-native vegetation covers 149.8 ha.</p>
Rivers, streams, and estuaries	<p>There are no rivers, streams, or estuaries within the Subject land; however, there are two notable features in the extended landscape:</p> <p>Murray River: The Murray River is a nationally significant and highly regulated waterway. Location: 3.7 km southwest of Subject land</p> <p>Gol Gol North Creek: This creek is maintained at the weir pool level (Lock 11) to supply water to irrigators and residents and operates as an inlet channel for Gol Gol Swamp and Lake Gol Gol. Location: 2 km east of the Subject land</p>
Wetlands	<p>There is no wetland present within the Subject land. There are three water bodies in the extended landscape; however, several factors such as inadequate environmental watering or heavy salt content makes these waterways not worthy of further assessment:</p> <p>Mourquong Saltwater Disposal Basin: Also known as the Mourquong Evaporation Basin, is a disposal site for saline drainage water pumped via a salt interception scheme that minimises saline groundwater discharge to the Murray River. The Basin receives a low volume of highly saline groundwater. It is not expected to present any direct interactions with the Subject land. Location: 3.5 km west of the Subject land</p>

	<p>Lake Gol Gol: has not received environmental water since early 2017. The lake is infrequently inundated; water is only present during a high river or local high rainfall events, thereover water does not persist for extended periods due to evapotranspiration.</p> <p>Location: 2 km east of the Subject land</p> <p>Gol Gol Swamp: infrequently contains water, as the natural drainage channel has been diverted along North Gol Gol Creek for irrigation and controlled ecological purposes.</p> <p>Location: 4.3 km east of the Subject land</p>
Connectivity of different areas of habitat	<p>The Subject land has several connective habitat features.</p> <p>Spanning north and south along the western boundary of the Subject land is mallee woodland vegetation made up of predominantly <i>Eucalyptus dumosa</i> and <i>Eucalyptus oleosa</i> overstorey with a range of Chenopods, other small shrubs, and herbs; similar to, and mapped as predominantly PCT 170 transitioning to PCT 58 to the north.</p> <p>Along the eastern perimeter and part of the southern perimeter of the development, the footprint is an open woodland dominated by <i>Eucalyptus largiflorens</i> overstorey and a sparsely covered Chenopod understorey; similar to and mapped as PCT 15.</p>
Areas of geological significance and soil hazard features	No areas of geological significance are present within the Subject land or the surrounding landscape.
Areas of outstanding biodiversity value	There are no declared AOBVs within the Subject land or the surrounding landscape.
Landscape features identified in the SEARs	A SEARs has been addressed as part of the development of this BDAR; there are no landscape features on the Subject land, or the surrounding landscape addressed within the SEARs.

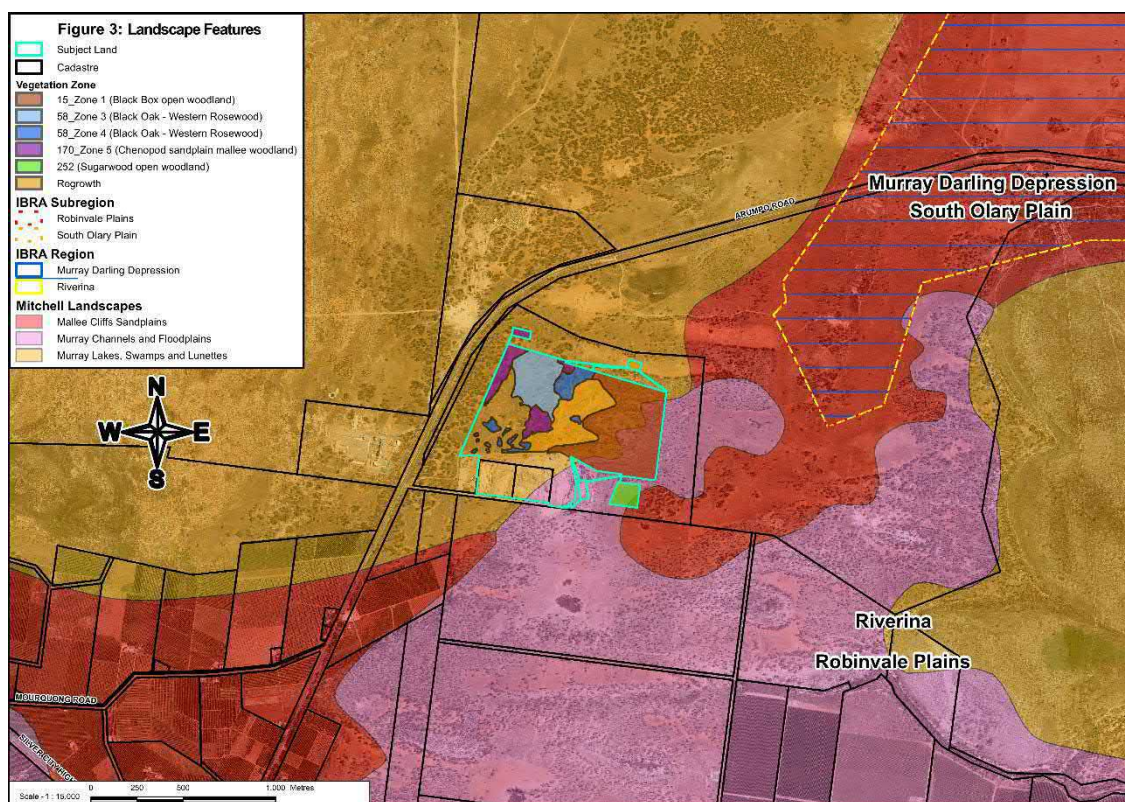


Figure 3. Landscape Features

3 Native Vegetation

3.1 Native vegetation extent

There is approximately 45.75 ha of native vegetation occurring within the Subject land, based on aerial photo interpretation; this is comprised of:

- 19.76 ha (PCT 15: Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)) (Table 2)
- 10.50 ha (PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion) (Table 3)
- 4.54 ha (PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones) (Table 4)
- 1.70 ha (PCT 252: Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion) (Table 5)
- 8.93 ha Regrowth (Table 6)
- 22.05 ha Exotic ground cover, or bare ground

Aerial interpretation of the Subject land and buffer area has determined that there is 88.52% cover of native vegetation and 11.48% cover of clearing, non-native vegetation, or infrastructure.

Table 2. Description of PCT 15 in the Subject land


Black Box open woodland wetland with chenopod understory mainly on the outer floodplains in south-western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)			
Vegetation Formation	Semi-arid woodlands (Grassy sub-formation)		
Vegetation Class	Inland floodplain woodlands		
Vegetation Type	PCT ID	15	
	Common Community Name	Black Box open woodland wetland	
The approximate extent within the Subject land	19.76 ha	Percentage of PCT cleared in Bioregion	50%
Species relied upon for PCT information	Species Name	Relative abundance	
	<i>Eucalyptus largiflorens</i>	40%	
	<i>Rhagodia spinescens</i>	20%	
	<i>Maireana pyramidata</i>	10%	
	<i>Atriplex vesicaria</i>	5%	
Justification of evidence used to identify the PCT	<i>Eucalyptus largiflorens</i> is the dominant overstorey species in this vegetation community. The vegetation is relatively intact and open. Most of the <i>Eucalyptus largiflorens</i> appear to have grown during a single episodic event. There is evidence of past logging for posts, poles, or firewood. The understory species are sparsely diverse, with a low number of plants present in this vegetation community.		
	<p>PCT 15 is considered to be the most appropriate PCT to identify this community based on:</p> <ul style="list-style-type: none"><i>Eucalyptus largiflorens</i> is the dominant overstorey species, contributing to nearly 100% of canopy cover.The understory species present in this vegetation community are characteristic of the identified PCT.The location of this development area is within the Riverina Bioregion.It is located appropriately within the outer floodplains of south-western NSW. <p>This PCT has been assessed and identified as the formation, class, and type associated with the PCT Mapping.</p>		
TEC Status	Not a TEC		
Examples image			

Table 3. Description of PCT 58 in the Subject land


Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion			
Vegetation Formation	Semi-arid woodlands (Shrubby sub-formation)		
Vegetation Class	Semi-arid sand plain woodlands		
Vegetation Type	PCT ID	58	
	Common Community Name	Black Oak - Western rosewood	
The approximate extent within the Subject land	10.50 ha	Percentage of PCT cleared in Bioregion	50%
	Species Name		Relative abundance
Species relied upon for PCT information	<i>Sclerolaena patenticuspis</i>		35%
	<i>Dissocarpus paradoxus</i>		30%
	<i>Casuarina pauper</i>		15%
	<i>Alectryon oleifolius</i> subsp. <i>canescens</i>		10%
Justification of evidence used to identify the PCT	<i>Casuarina pauper</i> is the dominant overstorey species in this vegetation community. The vegetation is widely dispersed in an open woodland formation. The Black Oak varies distinctly in height and form; however, it appears in moderate abundance. The understorey species are sparsely diverse, stands of Rosewood are scattered across the PCT.		
	PCT 58 is considered to be the most appropriate PCT to identify this community based on:		
	<ul style="list-style-type: none"><i>Casuarina pauper</i> is the dominant overstorey species, contributing up to 100% of canopy cover.The understorey species present in this vegetation community are characteristic of the identified PCT.The development area is on the fringe of the Murray Darling Depression Bioregion.		
TEC Status	This PCT has been assessed and identified as the formation, class, and type associated with the PCT Mapping.		
Examples image	Not a TEC		
			

Table 4. Description of PCT 170 in the Subject land


Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones			
Vegetation Formation	Semi-arid Woodlands (Shrubby sub-formation)		
Vegetation Class	Sand plain mallee woodlands		
Vegetation Type	PCT ID	170	
	Common Community Name	Chenopod sandplain mallee woodland	
The approximate extent within the Subject land	4.54 ha	Percentage of PCT cleared in Bioregion	41%
	Species Name		Relative abundance
Species relied upon for PCT information	<i>Dissocarpus biflorus</i>		30%
	<i>Eucalyptus dumosa</i>		12%
	<i>Eucalyptus oleosa</i>		10%
	<i>Pittosporum angustifolium</i>		8%
Justification of evidence used to identify the PCT	<i>Eucalyptus oleosa</i> and <i>Eucalyptus dumosa</i> are the dominant overstorey species in this vegetation community. The overall density of the vegetation is relatively higher than the other PCT's in this area. A variety of episodic events have formed a range of tree forms. The understorey species form a diverse shrubby sub-formation.		
	<p>PCT 170 is considered to be the most appropriate PCT to identify this community based on:</p> <ul style="list-style-type: none"><i>Eucalyptus dumosa</i> and <i>E. oleosa</i> dominate the overstorey species composition.The understorey species present in this vegetation community are characteristic of the identified PCT.The location of this development area is within the Riverina Bioregion.The landscape elements are predominantly characteristic of a sand plain. <p>This PCT has been assessed and identified as the formation, class, and type associated with the PCT Mapping.</p>		
TEC Status	Not a TEC		
Examples image			

Table 5. Description of PCT 252 in the Subject land



Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion			
Vegetation Formation	Semi-arid woodlands (Shrubby sub-formation)		
Vegetation Class	Semi-arid sand plain woodlands		
Vegetation Type	PCT ID	252	
	Common Community Name	Sugarwood open woodland	
The approximate extent within the Subject land	1.7 ha	Percentage of PCT cleared in Bioregion	50%
Species relied upon for PCT information	Species Name	Relative abundance	
	<i>Myoporum platycarpum</i>	2%	
	<i>Sclerolaena pentatropis</i>	60%	
	<i>Dissocarpus biflorus</i>	10%	
	<i>Enchylaena tomentosa</i>	8%	
Justification of evidence used to identify the PCT	<i>Myoporum platycarpum</i> is the dominant overstorey species in this vegetation community. The vegetation is sparse, with only a few overstorey species standing out as identifiers. The few <i>Myoporum platycarpum</i> have grown separately and are not the same age. The understorey species are limited to <i>Sclerolaena pentatropis</i> and <i>Dissocarpus biflorus</i> .		
	PCT 252 is considered to be the most appropriate PCT to identify this community based on: <ul style="list-style-type: none"><i>Myoporum platycarpum</i> is the only overstorey species contributing to 100% of the available canopy cover.The understorey species present in this vegetation community most closely represent the identified PCT.The development area is on the fringe of the Murray Darling Depression Bioregion.There are representative PCT 252 mapped nearby, which match the composition of this location.		
TEC Status	Not a TEC		
Examples image			

Table 6. Description of regrowth in the Subject land

Regrowth			
Vegetation Formation	N/A		
Vegetation Class	N/A		
Vegetation Type	PCT ID	N/A	
	Common Community Name	N/A	
The approximate extent within the Subject land	8.93 ha	Percentage of PCT cleared in Bioregion	N/A
Species relied upon for PCT information	Species Name		Relative abundance
			%
			%
			%
			%
Justification of evidence used to identify the PCT	<p>The area identified as regrowth provides clear visual evidence of historical soil extraction activities. This evidence includes: a stark difference in surface levels when compared to the adjoining native vegetation; uneven terrain caused by earthmoving activities; the lack of topsoil and presence of exposed heavier subsoil; the presence of large areas of bare ground and exotic plant ground cover; and the lack of mature native vegetation. The flora present within these sections is characteristic of young, early colonisation and regrowth; subsequently, many of these plants do not directly fit the surrounding PCTs.</p> <p>Regrowth is defined in Part 60H (1) of the <i>Local Land Services Act 2013</i>. as any native vegetation regrown since 1 January 1990. Previously soil extraction activity records cannot be sourced for this property, yet aerial photography provides evidence indicating that these areas have been impacted by clearing and soil extraction activities since the mid to late 1980s.</p>		
TEC Status	N/A		
Examples image			

3.2 Justification for non-native vegetation

Areas that comprise primarily bare ground and exotic ground cover flora were identified through aerial imagery and on-site assessment. The areas considered non-native have been historically used as borrow pits for loam, access for waste and resource management traffic. A wide range of weeds dominates these areas and juvenile Narrow-leaf Hopbush is present in some locations (Figure 4).

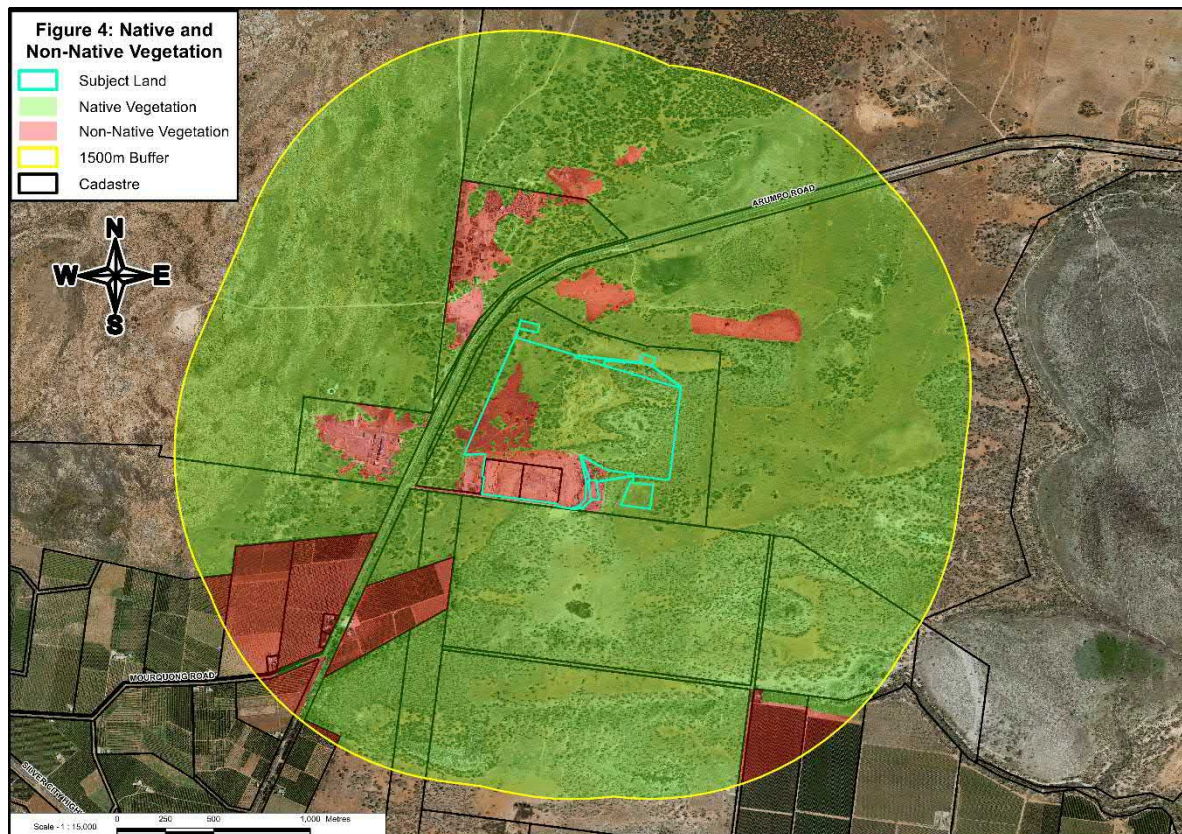


Figure 4. Native and Non-Native Vegetation

3.3 Vegetation integrity assessment

As described in Section 1, an existing development consent for establishing borrow pits was issued in January 2017 (DA15/154); this covers part of the BLE and is identified in Figure 1. The development consent included the progressive removal of native vegetation to establish borrow pit sites until 2053.

DPIE has requested that the impacts and offset requirements within the area covered by the existing development consent be accounted for separately from the area outside of the existing development consent. Table 8 describes the vegetation zones outside the existing consent area, and Figure 5 describes the vegetation zones inside the existing consent area.

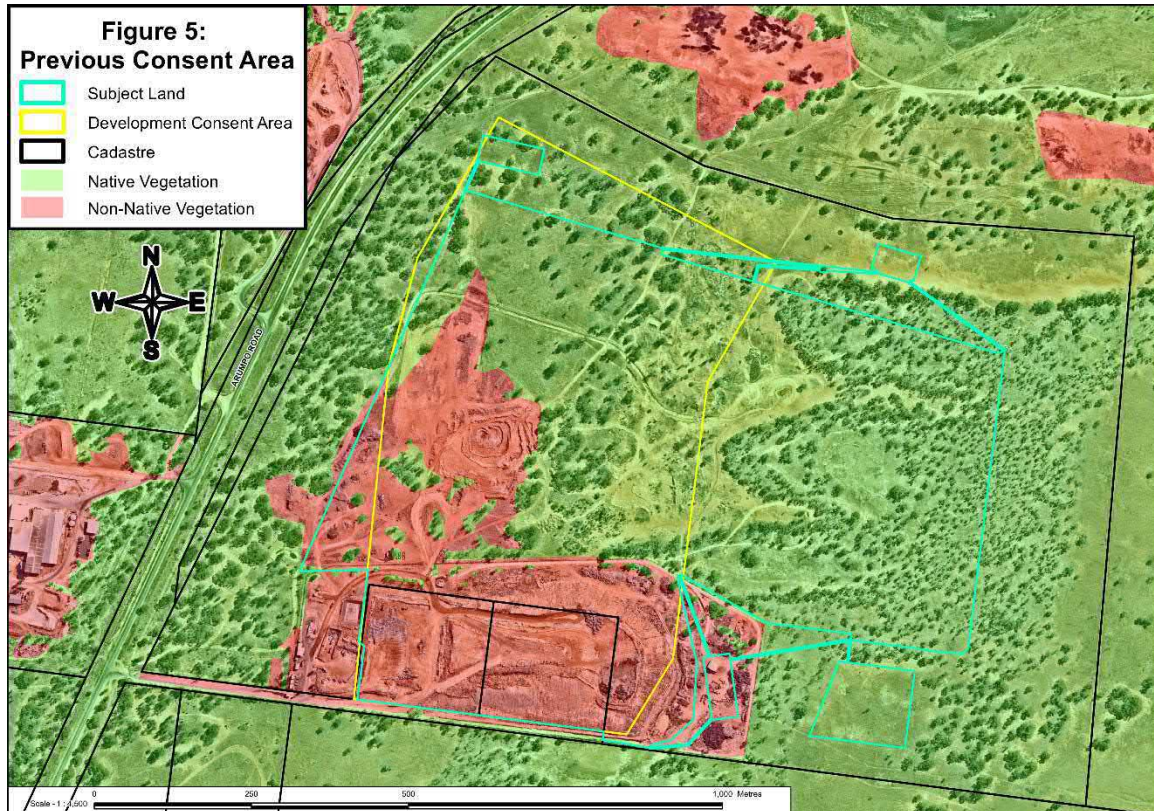


Figure 5. Development Consent and Subject Land Native and Non-Native Vegetation

3.3.1 Vegetation zones

An overview inspection, analysis of aerial imagery, detailed floristic plots, and in-situ analysis have been used to identify the vegetation zone conditions. Four PCT's were identified within the Subject land, stratified into five distinct broad condition states. The zones were defined based on their overall health, overstorey composition, understorey condition, and land management. A sixth vegetation zone (Zone 2) in the southwest corner of the development site was identified to account for proposed vegetation removal under a previous concept design. Zone 2 consisted of good quality vegetation (PCT 58) and was subsequently avoided in the final concept design.

Sixteen vegetation integrity plots were assessed, evenly representative of the zone size, and randomly distributed across individual zones (Figure 6, Table 7, and Table 8).

The BAM was used for each plot, and the composition, structure, function, and vegetation integrity scores were obtained from the BAM-C (Table 9 and Table 10).

Table 7. Vegetation zones including the existing consent area - Case 00024930

PCT ID	Zone Number	Stratification unit / Condition class	The area impacted (ha)	Survey effort (# plots)	Zone size (ha)
15	1	15_Zone_1_CA Good quality vegetation, aligns closely with the representative PCT benchmark; there is little bare ground or litter within this zone.	0.57	5	0.57
58	3	58_Zone_3_CA Poor quality vegetation, aligns closely with the representative PCT benchmark; this zone shows very little disturbance from earthworks and vehicles/machinery.	6.99	3	6.99
	4	58_Zone_4_CA Moderate quality vegetation, aligns with the representative PCT benchmark; however, there is significant disturbance from earthworks and vehicles/machinery. This zone has a wider range of understorey plants which increased the subsequent diversity of flora.	3.38	2	3.51
170	5	170_Zone_5_CA Moderate quality vegetation, aligns mostly with the representative PCT benchmark; there is significant degradation in areas from litter and roadways; however, most of the old growth is healthy.	4.49	4	4.54

Table 8. Vegetation zones outside the existing consent area - Case 00025590

PCT ID	Zone Number	Stratification unit / Condition class	The area impacted (ha)	Survey effort (# plots)	Zone size (ha)
15	1	15_Zone_1_Outside_CA Good quality vegetation, aligns closely with the representative PCT benchmark; there is little bare ground or litter within this zone.	19.19	5	19.2
58	4	58_Zone_4_Outside_CA Poor quality vegetation, aligns closely with the representative PCT benchmark; this zone shows very little disturbance from earthworks and vehicles/machinery.	0.12	2	0.12
170	5	170_Zone_5_Outside_CA Moderate quality vegetation, aligns with the representative PCT benchmark; however, there is significant disturbance from earthworks and vehicles/machinery. This zone has a wider range of understorey plants which increased the subsequent diversity of flora.	0.05	4	0.05
252	6	252_Zone_6_Outside_CA Poor quality vegetation, very sparse overstorey of <i>Myoporum platycarpum</i> with a low diversity understorey, dominated by shrubs.	1.70	2	1.7

Table 9. Current vegetation integrity scores including the existing consent area - Case 00024930

Zone ID	Composition score	Structure score	Function score	Vegetation integrity score
15_Zone_1_CA	44.9	58.7	70.7	57.1
58_Zone_3_CA	12.3	66.3	17.3	24.2
58_Zone_4_CA	24.4	80.6	34.6	40.8
170_Zone_5_CA	27.4	81.5	54.3	49.5

Table 10. Current vegetation integrity scores outside the existing consent area - Case 00025590

Zone ID	Composition score	Structure score	Function score	Vegetation integrity score
15_Outside_CA	44.9	58.7	70.7	57.1
58_Outside_CA	24.4	80.6	34.6	40.8
170_Outside_CA	27.4	81.5	54.3	49.5
252_Outside_CA	6.9	65.7	6.4	14.2

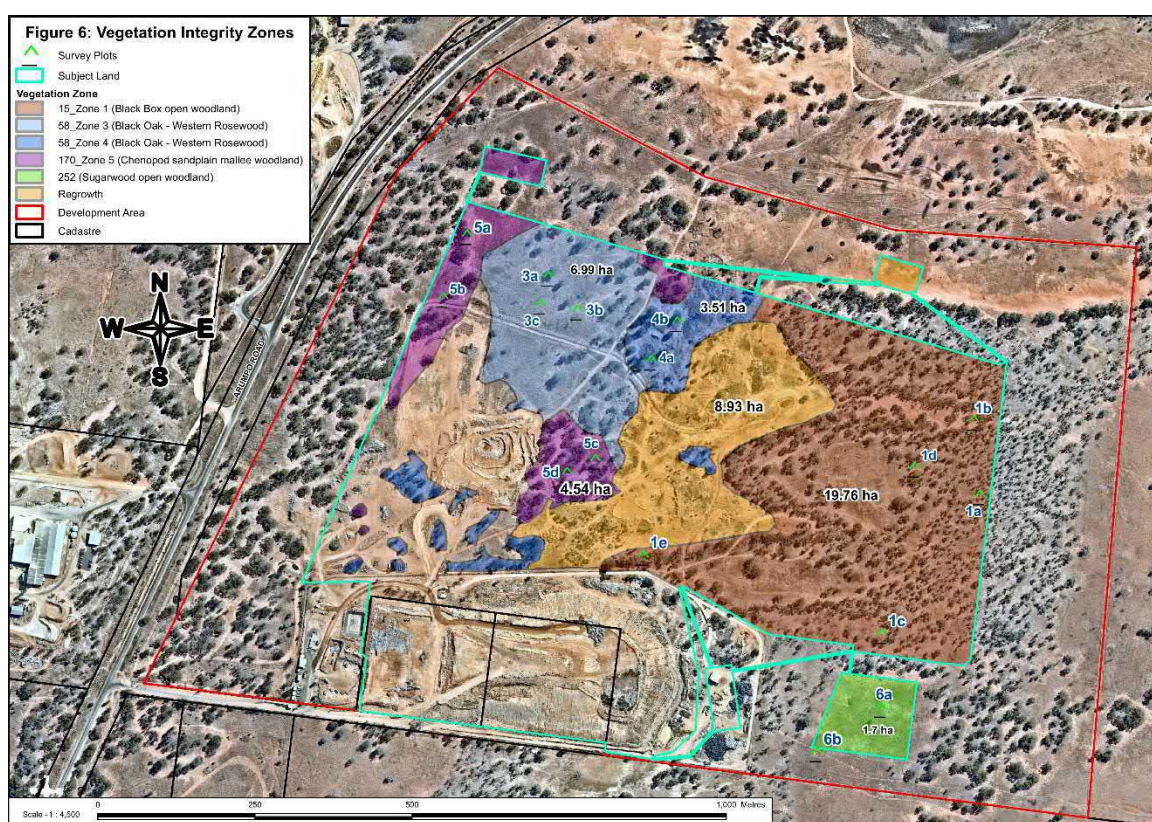


Figure 6. Vegetation Integrity Zones

4 Threatened Species

4.1 Ecosystem credit species

The Biodiversity Assessment Method Calculator (BAM-C) determined the ecosystem credit species associated with the PCTs present on the Subject land. The species have been listed in Table 11 along with their associated habitat, state listing, and national listing.

Table 11. Ecosystem credit species

Ecosystem credit species	Vegetation Type(s)	NSW: BC Act listing status	National: EPBC Act listing status
<i>Artamus cyanopterus</i> subsp. <i>cyanopterus</i> (Dusky Woodswallow)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Certhionyx variegatus</i> (Pied Honeyeater)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Chalinolobus picatus</i> (Little Pied Bat)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Cinclosoma castanotum</i> (Chestnut Quail-thrush)	PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Circus assimilis</i> (Spotted Harrier)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Falco hypoleucos</i> (Grey Falcon)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Endangered	Not Listed
<i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)	PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Grus rubicunda</i> (Brolga)	PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Hamirostra melanosternon</i> (Black-breasted Buzzard)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed

	PCT 252: Sugarwood open woodland		
<i>Hieraaetus morphnoides</i> (Little Eagle)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Lichenostomus cratitius</i> (Purple-gaped Honeyeater)	PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Lophochroa leadbeateri</i> (Major Mitchell's Cockatoo)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Lophoictinia isura</i> (Square-tailed Kite)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Melanodryas cucullata</i> subsp. <i>cucullata</i> (Hooded Robin (south-eastern form))	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland PCT 252: Sugarwood open woodland	Vulnerable	Not Listed
<i>Ninox connivens</i> (Barking Owl)	PCT 15: Black Box open woodland wetland	Vulnerable	Not Listed
<i>Nyctophilus corbeni</i> (Corben's Long-eared Bat)	PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Pachycephala inornata</i> (Gilbert's Whistler)	PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Polytelis anthopeplus</i> subsp. <i>monarchoides</i> (Regent Parrot (eastern subspecies))	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Endangered	Not Listed
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Stagonopleura guttata</i> (Diamond Firetail)	PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed
<i>Vespadelus baverstocki</i> (Inland Forest Bat)	PCT 15: Black Box open woodland wetland PCT 58: Black Oak - Western Rosewood PCT 170: Chenopod sandplain mallee woodland	Vulnerable	Not Listed

4.2 Species credit species

The BAM-C has provided several species credit species listed as threatened species under the BC Act predicted to occur within the Subject land. Thereover, the BAM-C has concluded that the proposal may cause a significant impact to threatened species based upon the location and the presence of the previously detailed PCTs (Table 12).

Table 12. Species credit species

Species credit species	Sensitivity to gain class	NSW: BC Act listing status	Nation: EPBC Act listing status	Listed Habitat Constraints (TBDC)	Included or excluded	Reason for inclusion or exclusion
<i>Austrostipa metatoris</i> (A Spear-grass)	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	- N/A	Included	Likely to occur on-site
<i>Burhinus grallarius</i> (Bush Stone-curlew)	High Sensitivity to Potential Gain	Endangered	Not Listed	- Fallen/standing dead timber including logs	Included	Likely to occur on-site
<i>Casuarina obesa</i> (Swamp She-oak)	Very High Sensitivity to Potential Gain	Endangered	Not Listed	- Waterbodies: brackish or saline areas within 100 m from rivers or lakes.	Excluded	Geographical constraints
<i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i> (Yellow Gum)	High Sensitivity to Potential Gain	Vulnerable	Not Listed	- N/A	Included	Likely to occur on-site
<i>Haliaeetus leucogaster</i> (White-bellied Sea-eagle)	High Sensitivity to Potential Gain	Vulnerable	Not Listed	- Other: living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands, and coastlines. - Waterbodies: Within 1 km of a rivers, lakes, large dams or creeks, wetlands, and coastlines	Excluded	Habitat constraints
<i>Hamirostra melanosternon</i> (Black-breasted Buzzard)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	- Waterbodies: land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts.	Excluded	Habitat constraints
<i>Hieraaetus morphnoides</i> (Little eagle)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	- Other: nest trees - live (occasionally dead) large old trees within vegetation.	Included	Likely to occur on-site
<i>Lophochroa leadbeateri</i> (Major Mitchell's cockatoo)	High Sensitivity to Potential Gain	Vulnerable	Not Listed	- Hollow bearing trees: living or dead tree with hollows greater than 10 cm diameter.	Included	Likely to occur on-site
<i>Lophoictinia isura</i> (Square-tailed Kite)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	- Other: Nest trees	Included	Likely to occur on-site
<i>Ninox connivens</i> (Barking Owl)	High Sensitivity to Potential Gain	Vulnerable	Not Listed	- Hollow bearing trees: living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	Included	Likely to occur on-site
<i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i> (Thyme Rice-flower)	High Sensitivity to Potential Gain	Endangered	Not Listed	- N/A	Included	Likely to occur on-site
<i>Polytelis anthopeplus</i> subsp. <i>monarchoides</i> (Regent Parrot (eastern subspecies))	High Sensitivity to Potential Gain	Endangered	Vulnerable	- Hollow bearing trees: living or dead <i>E. camaldulensis</i> with hollows greater than 5 cm diameter, greater than 5 m above the ground, or trees with DBH of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of larger patches of mallee.	Excluded	Habitat constraints

4.2.1 Justification for exemptions

One flora species and three fauna species have been identified as unlikely to occur within the Subject land due to habitat constraints and have been excluded from the species credit species.

4.2.1.1 Flora

Casuarina obesa

Casuarina obesa is a branching shrub to small form tree that grows between 3-15 m in height. This species is not commonly found in known communities in which it occurs in NSW; most occurrence records are present in salt-affected areas and communities placed as plantings for agroforestry. This species grows in slightly moist saline soil and along shorelines of permanent, ephemeral, or relict lakes.

Casuarina obesa is not likely to occur within the Subject land. The BAM-C requires a habitat constraint that is not present: *waterbodies, brackish or saline areas within 100 m from rivers or lakes*. Therefore, a targeted survey is not required.

4.2.1.2 Fauna

Haliaeetus leucogaster

Haliaeetus leucogaster is a large bird of prey, reaching an adult height of 75-85 cm and a 180-220 cm wingspan. This species is commonly found in known communities in which it occurs in NSW; most occurrence records are distributed across the Australian coastline and along the rivers and wetlands of the Murray-Darling Basin. This species inhabits large areas of open water, particularly larger rivers, swamps, lakes, and the ocean.

Haliaeetus leucogaster is not likely to occur within the Subject land. The BAM-C requires a habitat constraint that is not present: *other: living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands, and coastlines*. Therefore, a targeted survey is not required.

Hamirostra melanosternon

Hamirostra melanosternon is a large bird of prey, reaching an adult height of 51-61 cm and a 150 cm wingspan. This species is not commonly found in known communities in which it occurs in NSW; most occurrence records are found throughout mainland Australia, except for the Western Australian deserts. This species inhabits a range of inland habitats; however, spending much of its time around watercourses within proximity to grasslands and sparsely timbered woodlands.

Hamirostra melanosternon is not likely to occur within the Subject land. The BAM-C requires a habitat constraint that is not present: *waterbodies: land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts*. Therefore, a targeted survey is not required.

Polytelis anthopeplus subsp. *Monarchoides*

Polytelis anthopeplus subsp. *monarchoides* is a slim, medium-sized parrot, reaching an adult height of 37-42 cm and a 53-57 cm wingspan. This species is commonly found in known communities in which it occurs in NSW; most occurrence records are found along the Murray River and adjoining areas of mallee; however, there are also scattered records along the Darling River. This species inhabits forests along the Murray, Wakool, and lower Murrumbidgee Rivers, particularly nesting in mature and healthy River Red Gum.

Polytelis anthopeplus subsp. *monarchoides* is not likely to occur within the Subject land. The BAM-C requires a habitat constraint that is not present: *hollow bearing trees: living or dead E. camaldulensis with hollows greater than 5 cm diameter, greater than 5 m above the ground OR*

trees with DBH of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee. Therefore, a targeted survey is not required.

4.2.2 Species requiring further assessment

4.2.2.1 Flora

Austrostipa metatoris

Austrostipa metatoris is a perennial spear-grass that grows in a tussock form up to 1 m in height. This species is commonly found in known communities of which it occurs in NSW; most occurrence records are present in the Murray Valley, with scattered records in Lake Cargelligo and Nymagee. This species grows in the Murray Valley's sandy areas, including sandhills, sand ridges, undulating plains, and flat open mallee country.

Austrostipa metatoris is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Eucalyptus leucoxylon subsp. *pruinosa*

Eucalyptus leucoxylon subsp. *pruinosa* is a long-lived small to medium-sized tree that grows erect from a single stump up to 20 m in height. This species is not commonly found in known communities in which it occurs in NSW; most occurrence records are present in scattered remnants through Barham, Euston, along the Murray River, and in some south-western NSW State Forests. This species grows at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.

Eucalyptus leucoxylon subsp. *pruinosa* is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Pimelea serpyllifolia subsp. *serpyllifolia*

Pimelea serpyllifolia subsp. *serpyllifolia* is a long-lived small woody shrub that grows in a densely branched, sprawling yet rarely prostrate form up to 1.5 m in height. This species is not commonly found in known communities in which it occurs in NSW; most occurrence records are present along far south-western NSW in the Euston district. This species grows in scrub and woodland on calcareous soils. Often found in sandy red soils supporting mallee scrub.

Pimelea serpyllifolia subsp. *serpyllifolia* is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4.2.2.2 Fauna

Burhinus grallarius

Burhinus grallarius is a large, slim, ground-dwelling bird, reaching an adult height of 55 cm and a 55-60 cm wingspan. This species is not commonly found in known communities in which it occurs in NSW; most occurrence records are scattered across Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. This species inhabits open forests and woodlands, which have a sparse grassy ground layer and fallen timber.

Burhinus grallarius is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Hieraaetus morphnoides

Hieraaetus morphnoides is a small, stocky bird of prey, reaching an adult height of 45-55 cm and a 120 cm wingspan. This species is commonly found in known communities of which it occurs in NSW; most occurrence records are found throughout mainland Australia. This species inhabits open Eucalypt forest, woodland, and open woodland, including She-oak and Acacia woodlands.

Hieraaetus morphnoides is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lophochroa leadbeateri

Lophochroa leadbeateri is a small parrot, reaching an adult height of 40 cm and an 80 cm wingspan. This species is commonly found in known communities in which it occurs in NSW; most occurrence records are found across the arid and semi-arid inland of Australia. This species inhabits both treed and treeless arid zone communities, always within reach of a water body.

Lophochroa leadbeateri is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Lophoictinia isura

Lophoictinia isura is a small to medium-sized, long-winged bird of prey, reaching an adult height of 55-60 cm and a 130 cm wingspan. This species is commonly found in known communities in which it occurs in NSW; most occurrence records are predominantly located to the northeast and along the major west-flowing river systems; however, records show its migration south-east for breeding during summer. This species inhabits dry woodlands, open forests, open Acacia scrub, and low open Eucalypt woodland patches.

Lophoictinia isura is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Ninox connivens

Ninox connivens is a medium-sized, large-winged hawk-owl, reaching an adult height of 40-45 cm and a 120 cm wingspan. This species is not commonly found in known communities of which it occurs in NSW; most occurrence records are sparsely scattered across the Australian mainland except for arid regions. This species inhabits woodland and open forest, including fragmented remnants and partly cleared farmland.

Ninox connivens is believed to potentially occur within the Subject land. The geographical distribution and habitat requirements, along with BAM-C identification, have determined that a targeted survey is required.

Months of Survey											
January	February	March	April	May	June	July	August	September	October	November	December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

4.2.3 Targeted surveys required

Targeted species surveys are proposed for completion in October of 2021. Until the surveys are completed, all species will be regarded as 'present' for this BDAR.

5 Matters of National Environmental Significance

A protected matters search tool (PMST) report under the *Environmental Protection and Biodiversity Conservation Act 2009* was generated on 22 June 2021 to identify Matters of National Environmental Significance (MNES) that potentially occur within the Subject land. The PMST report was based on a 10 km buffer taken from a point at the centre of the Subject land (Appendix A); the relevant protected matters relating to biodiversity include:

- Wetlands of International Importance (Ramsar)
- Listed Threatened Ecological Communities
- Listed Threatened Species
- Listed Migratory Species
- State and Territory Reserves
- Nationally Important Wetlands

5.1 Wetlands of international importance (Ramsar)

The protected matters report indicated three wetlands of international importance:

- Banrock Station wetland complex
- Riverland
- Coorong and Lakes Alexandrina and Albert

The Subject land is many hundreds of river kilometres upstream of these three wetlands, which are situated in South Australia. The nearest of these is 'Riverland', which is 170 km as the crow flies and approximately double this distance by the Murray River.

5.2 Listed threatened ecological communities

The protected matters report indicated one threatened ecological community:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregion

Buloke has not been identified within the Subject land, buffer area, or known to occur within the extended landscape.

5.3 Listed threatened species

The protected matters report indicated twenty-five threatened species, comprising twelve birds, six fish, one frog, two mammals, and four plants. As described in the habitat assessment for the listed threatened species (Table 13), two of these species are considered to have potential habitat within the Subject land; these species are:

- *Falco hypoleucos* (Grey Falcon)
- *Nyctophilus corbeni* (Corben's Long-eared Bat)

Table 13. Listed Threatened Species

Name	Habitat	Habitat present	Likelihood of occurrence	Potential for impact
Birds				
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	Permanent freshwater wetlands with tall, dense vegetation.	Absent	Unlikely	No
<i>Calidris ferruginea</i> (Curlew Sandpiper)	Intertidal mudflats of sheltered coasts and non-tidal swamps.	Absent	Unlikely	No
<i>Falco hypoleucos</i> (Grey Falcon)	Arid to semi-arid shrubland, grassland and wooded watercourses.	Present	Unlikely	Possible
<i>Grantiella picta</i> (Painted Honeyeater)	Boree, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests.	Absent	Unlikely	No
<i>Leipoa ocellata</i> (Malleefowl)	Tall, dense, and floristically rich mallee with Spinifex understorey.	Absent	Unlikely	No
<i>Limosa lapponica</i> subsp. <i>baueri</i> (Nunivak Bar-tailed Godwit)	Coastal, intertidal habitats around seagrass, and infrequently saltmarsh.	Absent	Unlikely	No
<i>Manorina melanotis</i> (Black-eared Miner)	Mature, unfragmented mallee on fertile soil.	Absent	Unlikely	No
<i>Numenius madagascariensis</i> (Eastern Curlew)	Intertidal sand and mudflat habitat around seagrass vegetation.	Absent	Unlikely	No
<i>Pedionomus torquatus</i> (Plains-wanderer)	Semi-arid lowland grasslands on hard red-brown soils.	Absent	Unlikely	No
<i>Pezoporus occidentalis</i> (Night Parrot)	Spinifex grasslands in stony or sandy areas.	Absent	Unlikely	No
<i>Polytelis anthopeplus</i> subsp. <i>monarchoides</i> (Regent Parrot)	Large, mature, healthy River Red Gum along the Murray River.	Absent	Unlikely	No
<i>Rostratula australis</i> (Australian Painted Snipe)	Fringes of swamps, marshes and dams with Lignum or low scrub.	Absent	Unlikely	No
Fish				
<i>Bidyanus bidyanus</i> (Silver Perch)	Upper reaches and highlands or turbid slow-flowing rivers.	Absent	Unlikely	No
<i>Craterocephalus fluviatilis</i> (Murray Hardyhead)	Open, shallow, slow, or still habitats, often dense aquatic vegetation.	Absent	Unlikely	No
<i>Galaxias rostratus</i> (Flathead Galaxias)	Still or gentle flowing rocky or sandy habitats, the margin of waterbodies.	Absent	Unlikely	No
<i>Maccullochella macquariensis</i> (Trout Cod)	Fast-flowing rocky, gravel habitats; or slow-flowing lowland rivers.	Absent	Unlikely	No
<i>Maccullochella peelii</i> (Murray Cod)	Freshwater, clear, rocky streams or slow-flowing turbid water bodies.	Absent	Unlikely	No
<i>Macquaria australasica</i> (Macquarie Perch)	Deep sandy or clay rivers or small rocky upland streams.	Absent	Unlikely	No
Frogs				
<i>Litoria raniformis</i> (Growling Grass Frog)	Still or slow-flowing water with mats of floating or submerged vegetation.	Absent	Unlikely	No
Mammals				
<i>Nyctophilus corbeni</i> (Corben's Long-eared Bat)	Mallee, box, Buloke communities, or Ironbark, Cypress-pine vegetation.	Present	Unlikely	Possible
<i>Phascogale cinereus</i> (Koala)	Eucalypt woodlands and forests.	Present	Unlikely	No
Plants				
<i>Lepidium monoplacoides</i> (Winged Pepper-creep)	Open Buloke or Eucalypt woodlands, seasonally waterlogged and fertile.	Absent	Unlikely	No
<i>Solanum karsense</i> (Menindee Nightshade)	Solonchized brown soils or floodplain grey clays, open Black Box woodland.	Present	Unlikely	No
<i>Swainsona murrayana</i> (Slender Darling-pea)	Floodplains or grassy woodlands with grey, red or brown cracking clay soils.	Absent	Unlikely	No
<i>Swainsona pyrophila</i> (Yellow Swainson-pea)	Mallee scrub on sandy or loamy soil, including disturbed woodland.	Present	Unlikely	No

5.4 Listed migratory species

The protected matters report indicated 15 listed migratory species, comprising one marine bird, one terrestrial bird, and 13 wetland birds. As described in the habitat assessment for the listed migratory species (Table 14), none of these species are considered to have potential habitat within the Subject land.

Table 14. Listed migratory species

Name	Habitat	Habitat present	Likelihood of occurrence	Potential for impact
Migratory Marine Birds				
<i>Apus pacificus</i> (Fork-tailed Swift)	Ranging habitats, coastal, inland, urban, open plains, and semi-arid.	Absent	Unlikely	No
Migratory Terrestrial Birds				
<i>Motacilla flava</i> (Yellow Wagtail)	Brackish wetlands, salt marshes, coastal and partly inland pastures.	Absent	Unlikely	No
Migratory Wetland Birds				
<i>Actitis hypoleucos</i> (Common Sandpiper)	Coastal or inland wetlands, saline, or fresh, rocky, and muddy shores.	Absent	Unlikely	No
<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)	Inland freshwater wetlands and mudflats, shallow with vegetation.	Absent	Unlikely	No
<i>Calidris ferruginea</i> (Curlew Sandpiper)	Intertidal sand and mudflat habitat or littoral and estuarine habitats.	Absent	Unlikely	No
<i>Calidris melanotos</i> (Pectoral Sandpiper)	Sand and mudflats, Fresh and saltwater marshes, or dry lakes.	Absent	Unlikely	No
<i>Calidris ruficollis</i> (Red-necked Stint)	Intertidal mudflats, or partly inland around coastal wetlands.	Absent	Unlikely	No
<i>Charadrius bicinctus</i> (Double-banded Plover)	Saltmarshes, beaches, estuaries, and coastal and inland pastures.	Absent	Unlikely	No
<i>Gallinago hardwickii</i> (Latham's Snipe)	Vegetated freshwater wetlands, salt marshes, and coastal pastures.	Absent	Unlikely	No
<i>Limosa lapponica</i> (Bar-tailed Godwit)	Estuarine mudflats, mangroves, and coastal regions.	Absent	Unlikely	No
<i>Limosa limosa</i> (Black-tailed Godwit)	Intertidal sand and mudflat habitat, or inland muddy lakes and swamps.	Absent	Unlikely	No
<i>Numenius madagascariensis</i> (Eastern Curlew)	Intertidal sand and mudflat habitat around seagrass vegetation.	Absent	Unlikely	No
<i>Tringa glareola</i> (Wood Sandpiper)	Inland freshwater wetlands, particularly shallow with vegetation.	Absent	Unlikely	No
<i>Tringa nebularia</i> (Common Greenshank)	Estuarine mudflats, mangroves, coastal regions, and inland pastures.	Absent	Unlikely	No
<i>Tringa stagnatilis</i> (Marsh Sandpiper)	Brackish wetlands, particularly lagoons, rivers, and swamps.	Absent	Unlikely	No

5.5 State and Territory Reserves

The protected matters report identified two State Reserves, both occurring in Victoria. The reserves are:

- Kings Billabong Park
- River Murray Reserve

Kings Billabong Park borders the Murray River. However, it is 8.4 km from the BLE and is well upstream, so there will be no impact from the BLE.

The River Murray Reserve is a continuous linear reserve along the Victorian bank of the Murray River. The nearest point is 3.7 km from this development. There is no waterway connecting the development with the Murray River, so there will be no impact on the river from the BLE.

5.6 Nationally Important Wetlands

The protected matters report identified one Nationally Important Wetland, which is in Victoria. The wetland is:

- Kings Billabong Wetlands

Kings Billabong Wetlands is on the Victorian bank of the Murray River and one of the main features in the Kings Billabong Park. Kings Billabong Wetlands is 9.8 km from the BLE and is well upstream, so there will be no impact from the BLE.

6 Avoid and minimise impacts

6.1 Assessment of impacts

The potential for direct impacts on biodiversity is limited to the clearing of native vegetation and habitat. Direct and indirect impacts are identified below. This section of the BDAR addresses several impacts associated with the BLE, such as nature, extent, frequency, duration, and the timing of impacts. In addition, the likelihood and consequences of impact risk have been addressed with a risk matrix (Appendix F) (ISO 31000).

6.1.1 Direct impacts

The construction and operational phases of the BLE present direct impacts (Table 15) on biodiversity values that cannot be avoided. In addition, the BLE will sequentially impact all native vegetation within the Subject land.

Table 15. Direct Impacts

Impact	Nature (Description)	Extent	Frequency	Duration	Timing	Risk Rating	Consequence
<ul style="list-style-type: none"> Native flora destruction Habitat loss 	Loss of overstorey and shrub layer for a long period, potential reduction in flora diversity and threatened flora, impact on fauna species due to habitat loss, i.e., loss of tree hollows and logs, loss of large old trees suitable for raptor nesting and parrots, understorey, further infringement on threatened species habitat. Habitat loss and consequent reductions of connectivity for movement of fauna across the site.	Construction area	Every 3-4 years	At all times	During construction	Very High	Significant for flora, however, adoption of controls will reduce the impact on fauna
<ul style="list-style-type: none"> Native fauna injuries/fatalities/displacement 	Fauna displacement/injuries/death during clearing operations.	Subject land	Infrequently	At all times	At all times	High	Minor

6.1.2 Indirect impacts

There are several factors (Table 16) that may have indirect impacts on biodiversity values. The indirect impacts may not be an immediate or obvious effect; however, long-term may have severe impacts on flora and fauna if not addressed.

Table 16. Indirect Impacts

Impact	Nature	Extent	Frequency	Duration	Timing	Risk Rating	Consequence
• Hazardous and waste materials	Waste materials presenting a risk to wildlife.	Active cells	Ongoing	Regularly	During event	Moderate	Very High
• Landscape and visual amenity	Construction and operational visual impacts and landscape/topographical changes may exacerbate habitat fragmentation and fauna displacement.	Active cells	Ongoing	Regularly	All times	Moderate	High
• Native fauna injuries/fatalities/displacement	Traffic collisions, entrapment of fauna in excavations, trenches or pipes/conduits during construction, displacement, or injuries to fauna during clearing operations.	Subject land	Regularly	At all times	At all times	High	Minor
• Noise and Vibration	Construction-related noise and vibration may cause an impact relating to the displacement of fauna (plant and traffic).	Active cells and construction zones	Ongoing	Regularly	Operational hours	Moderate	Very High
• Odour, gas, and dust	Construction and operational phase odour, gas (methane), noise, vibration, dust, and light generation may affect fauna.	Active cells	Ongoing	Regularly	At all times	Moderate	High
• Pest animals	Waste attracting pest animals to the site, e.g., foxes, predation by foxes and feral cats, loss of natural regeneration or damage to revegetation by rabbits, land disturbance by rabbits encourages weeds, potential loss of native forbs and grasses by rabbits.	Subject land	Ongoing	Regularly	At all times	Moderate	High
• Priority noxious weeds	Competition for space, harbour for pest animals, reduced biodiversity value.	Subject land	Ongoing	Regularly	At all times	Moderate	Moderate
• Soils and groundwater contamination	Leachate intercepts groundwater and potential contamination of groundwater or soil because of construction activities.	Active cells and construction area	Regularly	Infrequently	Rain or watering events	Moderate	High
• Fauna disturbance/fatalities by traffic	Construction and operational traffic for landfills may directly impact native fauna and flora, particularly if vehicles stray from designated tracks and roads.	Subject land	Ongoing	Infrequently	During event	High	High

• Water erosion	Stormwater runoff causes soil erosion and sedimentation.	Active cells and construction zones	Ongoing	Regularly	Rain or watering events	Moderate	High
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6.2 Safeguards and management measures

All construction and operational works will be managed to minimise the impacts on native flora and fauna. The proponent has considered the controls below, which aim to preserve habitat, minimise interactions with wildlife, manage biosecurity footprint, discourage (where manageable) wildlife from entering the development site while operational, and ensure that personnel are aware of flora fauna carers and their contact details.

The Buronga landfill and BLE have a biosecurity duty legislatively monitored through the NSW *Biosecurity Act 2015* and NSW *Biodiversity Regulation 2017*. The Biosecurity legislation provides controls for selected pest animals and noxious pest plants. In addition, the BLE will have a Landfill Environmental Management Plan (LEMP) developed for the construction and operation phases. A LEMP will include the industry-standard controls for landfill construction and development, including traffic, machinery, materials, soils, water, weed, and pollutant management.

The safeguards and management measures detailed in Table 17 are designed to inform the development of a CEMP and minimise impacts on the biodiversity of the Subject land.

Table 17. Safeguards and management measures

Impact	Safeguards and management measures	Timing	Responsibility
<ul style="list-style-type: none"> • Soils and groundwater contamination • Hazardous and waste materials • Water discharge 	The LEMP covers: <ul style="list-style-type: none"> - Erosion and sediment control stormwater and wastewater management. - Solid waste management. 	During construction and operation	Land Manager
<ul style="list-style-type: none"> • Pest plant and animals 	Action should be taken that any priority noxious weeds occurring on the site will not be further dispersed and pest animals controlled. It is recognised that complete eradication of noxious weeds is unlikely as much green waste and external soil receipts are likely to carry the seed or other vegetative material of noxious weeds. Therefore, the following measures should be adopted: <ul style="list-style-type: none"> - Priority noxious weeds are managed under the <i>Biosecurity Act 2015</i>, priority noxious weeds covered in the LEMP. - Pest animal control is addressed in the LEMP. 	During construction and operation	Land Manager
<ul style="list-style-type: none"> • Native fauna injury, fatality, and displacement 	Native fauna and flora must be protected from construction activities to comply with the legislative requirements of the State BC Act and Federal EPBC Act. The following measures should be adopted: <ul style="list-style-type: none"> - Engaging an environmental consultant to provide detailed advice prior to clearing a new cell. 	During construction	Land Manager

	<ul style="list-style-type: none"> - Establishing controls to prevent works from occurring outside the Subject land. - Engage a suitably qualified ecologist during native vegetation clearing operations to rescue and relocate any native fauna which may be injured or displaced. 		
<ul style="list-style-type: none"> • Odour, gas, noise, vibration, and dust • Landscape and visual amenity 	<p>Covering and storage:</p> <ul style="list-style-type: none"> - Covering the storage face daily to minimise odour and gas emissions. <p>Wetting, filling, and capping roads with road base:</p> <ul style="list-style-type: none"> - Wetting any unsealed roads and tracks during heavy use or high wind days. - Cap main access roads with compacted rubble. 	During construction and operation	Land Manager
<ul style="list-style-type: none"> • Native flora destruction • Habitat loss 	<p>It is expected that all operators consider the implications of native vegetation removal on threatened and non-threatened flora and fauna. A vast quantity of vegetation is likely to be permitted for removal; however, it is unnecessary to remove all permitted vegetation unless it obstructs or impedes the development footprint. The staging of clearing for cell development reduces impacts.</p> <p>Avoiding non-permitted vegetation and engaging in revegetation and rehabilitation can strongly counteract the detrimental effects of habitat loss. Providing an alternative and often necessary location for displaced fauna will mitigate the long-term effects of habitat destruction; measures may include:</p> <ul style="list-style-type: none"> - Informing and training staff and contractors where destruction of flora is not permitted. - Clearing of native vegetation will conversely include relocation and spreading of logs and dead trees with hollows, outside of the development footprint instead of disposal or burning. - Clearing of a cell is undertaken as soon as practicable to needing the cell for landfill. - Rehabilitation with local flora species to match soil type is undertaken as soon as practicable after a cell reaches capacity. 	During construction and operation	Land Manager

6.3 Location, Construction, and Operation

6.3.1 Modes and technologies

There is a range of methods and technologies identified in this section that will assist in avoiding and minimising impacts on biodiversity during the establishment and operation of the BLE. Some of these technologies also apply to the whole property, including the existing landfill.

Location

There are no modes or technologies involved with the location of the BLE.

Construction

- Accurate mapping and assessment.
- Strategic approach in determining cell size.
- Identification of habitat trees.
- Relocation of important habitat – logs/fallen trees.
- Care in topsoil management.
- Accurate survey of cells and any other construction works and adherence to boundaries.
- Clarity in the on-ground marking of activity areas.

Operation

- Adherence to the on-ground marking of activity areas.
- Careful timing of key operations involving habitat destruction, revegetation etc.
- Erosion control and dust suppression.
- Monitoring and response.
- Actions and controls to protect wildlife.
- Containment of liquid waste.
- Prevention of off-site movement of solid waste.

6.3.2 Site selection - Alternative locations

Location

The BLE is suitably located to avoid and minimise impacts.

The development site was selected because:

- More than half of the Subject land for the BLE has an existing consent, as described earlier in this report. Logically, this consent is followed through and expanded to meet the community's needs in the long term. Not capitalising on the existing consent would mean the costs already accrued in obtaining that consent would be lost, along with a great deal of data and knowledge and result in a major delay in having a new landfill site approved and operational. The additional costs incurred in abandoning the current location would be significant.
- The BLE extends the footprint of the current landfill, consolidating disturbance to one location instead of creating a separate disturbance at a greenfield site. Clustering of land development to one location rather than separating them across more than one site minimises biodiversity impacts.
- Most of the Subject land for the BLE has been heavily disturbed by the existing landfill's past and current operational activities. Furthermore, previous land use of rangeland grazing, loam extraction, and cutting of trees for firewood, fence posts or vine trellising (being so

close to an irrigation district and towns) has significantly reduced the quality of native vegetation.

- There is existing infrastructure already on-site, such as access tracks, site office, staff amenities, machinery sheds, and fencing in place on the property that will serve the BLE, avoid biodiversity impacts, and avoid the cost of constructing/duplicating these features on a greenfield site.
- A high-quality bitumen road runs past the entrance to the current property which will require upgrading if the BLE proceeds. Alternative sites may require major road upgrades with additional biodiversity impacts and the added cost of road works.
- The BLE is located where there is existing electricity and town water supply infrastructure serving the existing landfill. Therefore, expanding the facility negates the potential impact on biodiversity and increased cost of constructing a new transmission line and water main to a greenfield site that may not have these services close by and unlikely to have them on-site.
- The BLE is centrally located, being a short distance from the main sources of waste (Gol Gol, Buronga, Dareton, and Wentworth in NSW, and Mildura, Red Cliffs, Irymple, and Merbein in Victoria). The Mildura landfill is likely to close in a few years as it is near capacity with no possibility of expansion at the current location near the city's heart. The BLE is ideally located to receive all forms of waste from Mildura Rural City Council in the near future, minimising the distance for transport, hence reducing cost.
- The BLE location is not in or near a flood zone or wetland, thus avoiding impacts on biodiversity and not needing investment in flood levies and building and maintaining all-weather access roads across a floodplain above flood level.

Construction

There are no construction phase elements involved in site selection for the BLE.

Operation

There are no operation phase elements involved in site selection for the BLE.

6.3.3 Avoid and minimise through proposal design

Location

There are no further proposal design elements associated with the location of the BLE. The presence of existing infrastructure already in place on cleared land will serve the BLE and not need to be built or relocated. This point has been covered in several dot points in Section 6.3.2.

Construction

The design of the BLE consists of 11 substages which are then each divided into three cells, which will be progressively cleared, developed, and rehabilitated over the life of the landfill. This approach will reduce biodiversity impacts both in the short term and longer term, as only the operational cells will be completely devoid of native vegetation at any one time.

Landfill cells will be rehabilitated in accordance with NSW Solid Waste Landfill Guidelines to provide a suitable surface for revegetation with endemic native trees, shrubs, and grasses. The capping soil will be at least 1.2 m deep and consist of overburden from cell construction, i.e. topsoil (nominally upper 0.2 m) and subsoil (nominally within 2 m of the surface) of the natural soil profile. The vegetation will be selected from species associated with the natural open woodland species, with the exact species selected dependent on the seed or tube stock available at the time of final capping construction.

In brief, there will be three stages in the life of a cell:

- Clearing native vegetation, removal of topsoil and overburden, placement of liner, leachate collection system, and surface stormwater drains in readiness for receipt of waste.
- Landfill operation until a cell is full – mean life of a cell is estimated to be approximately three years.
- Rehabilitation: including capping with overburden, placement of topsoil, and revegetation.

This will minimise loss of habitat at any one time and allow fauna to relocate closer to adjoining undisturbed and rehabilitated areas when land clearing occurs.

Incorporating a buffer zone along the Arumpo Road boundary avoids visual impacts of the development from the road and provides refuge and connectivity for wildlife when adjacent cells of the same vegetation type are cleared. A buffer zone along the eastern boundary similarly will provide refuge and connectivity for wildlife when cells to the west with similar vegetation types are cleared. Areas of buffer zones being retained have a higher overall vegetation quality than the area to be cleared.

Three leachate storage dams and a stormwater dam planned for the BLE have been sited to minimise impacts on native vegetation. The areas selected has almost no overstorey trees, and the understorey is of poor quality, dominated by weeds and bare ground. Stormwater ponds have also been sited to avoid and minimise impacts on native vegetation, i.e. by utilising previously disturbed sites where possible (current landfill footprint or footprint of previous soil extraction).

For the clearing operation and related works, a range of measures/actions should be adopted to avoid or minimise impacts on wildlife as follows:

- The cell boundary (area to be cleared) should be surveyed and marked with labelled white pegs, only the target area cleared.
- Clearing of native vegetation should not occur in Spring to avoid breeding time for most bird species.
- Before clearing overstorey, trees should be inspected by a suitably qualified expert to determine which trees have a high habitat value; such trees identified should be marked “H” with white paint on the trunk at chest height.
- During the removal of habitat trees, a suitably qualified expert must be present to rescue and relocate displaced wildlife or convey injured wildlife to a suitable carer or veterinary surgery.
- Logs and trees (live and dead) with hollows as determined and marked by a suitably qualified expert should be carefully relocated to the adjoining rehabilitation area or nearest buffer zone and conserved to provide habitat for reptiles displaced during the clearing operation.
- The boundary between a buffer zone and any adjoining cell being developed should be delineated with a temporary fence consisting of steel star posts and bunting. This fence should remain in place during the cell's life and remain until the rehabilitation earthworks are completed.
- During construction, any trenches left open overnight should be inspected for entrapped wildlife and action taken to relocate them.
- Any pipelines or conduits being installed should be sealed off overnight to ensure wildlife does not enter and become trapped.

- Any lengths of pipes or conduits in stockpiles or laid out on the ground (power, water, or drainage) should be inspected before placement to ensure wildlife is not present.
- Any new access tracks being constructed through non-cleared areas should be outside the dripline of overstorey trees.
- Topsoil must be removed from the entire cell area after clearing and transferred directly to a cell being rehabilitated. If topsoil is being stored, it should be placed in an area away from the clearing, with the stockpile having 2V:1H batter and a maximum height of 1.5 m. If storage of overburden and topsoil is required, it should be at locations not deemed to be native vegetation.

Operation

For rehabilitation, a range of measures/actions/technologies should be adopted to minimise impacts on flora and fauna as follows:

- Care should be taken to ensure that overburden does not contaminate topsoil during removal, storage, and placement.
- The best timing of the earthworks involved in removing, storage and placement of overburden and topsoil is between January and April, which would precede revegetation works in May. These timelines would minimise the length of time for exposing bare, freshly placed soil to erosion by wind and water. The batter slopes around the perimeter of a cell undergoing rehabilitation should be as specified in the guidelines.
- A rehabilitation plan including revegetation is outlined in the next few points. The proponent is advised to seek a suitably qualified expert in the year before the first round of rehabilitation to expand this outline and provide advice.
- The proponent should consider using light contour ripping and applying surface stabilisers e.g. polymers, organic mulches, or a cover crop (rye corn) to temporarily stabilise a cell undergoing rehabilitation. The establishment of the naturally occurring native vegetation such as PCT 15 and PCT 58 (as mapped in this report) should follow local provenance seed/seedlings. Method to be used could be either direct seeding, planting of tube stock, or a combination of both. It is suggested that tree guards be used for tube stock unless effective rabbit control has been undertaken. A target density that is consistent with the relevant PCT benchmark is considered reasonable for a revegetation area. In all but the wettest years, planted tube stock will require several water applications to each planted seedling during the first year of establishment.
- Just before planting, the need for weed control or the use of weed mats should be assessed. This need is unlikely but should be considered.
- It is noted that for direct seeding, not all seeds will germinate in the first year.
- Placement of logs/hollow trees on a rehabilitation area to be stored during the clearing of the adjacent cell should occur on completion of the capping with overburden and topsoil, but before revegetation commences.
- A revegetated area should be monitored in the Spring of the year of planting, and if considered a failure (number of plants are well below the target density) due to drought, rabbits, locust plague etc., then replanting should occur in late Autumn of the next year.
- Rabbits should be monitored and controlled, taking advice from Western Local Lands Services or a suitably qualified expert, before any rehabilitation works commence and then be routinely monitored (and controlled if necessary) for the entire property.

6.3.4 Other site constraints

Location

There are no other site constraints involved in the location of the BLE.

Construction

There are no construction phase elements involving other site constraints.

Operation

Controls should be put in place to ensure indiscriminate dumping of waste and random earthworks do not occur, particularly for the buffer zones, as this may create a rabbit/fox/feral cat harbour.

Aside from potential pest animal harbour, the presence of heaps of soil and waste materials, particularly hard rubbish, and plastic, in the buffer zone is not consistent with the notion of increasing/protecting the biodiversity value of these areas *per se*.

Another constraint (risk) in having much of the BLE adjacent to a buffer zone is wildfire. A fire could originate from three locations:

- Outside the property, particularly from Arumpo Road.
- The buffer zone – lightning strike.
- An active cell or other location in the BLE due to dumping of smouldering rubbish, machinery malfunction, or any common fire causation.

The ingress of wildfire to the landfill area and surroundings will have a high impact on biodiversity and the operation of the landfill. Maintenance of firebreaks is one possible method of reducing this risk. Fire management has been addressed in a separate report by others.

Site constraints that need to be addressed to minimise biodiversity impacts during construction and operation of the landfill are:

- Each winter, the property should be monitored for infestations of priority noxious weeds. This BDAR identifies four weeds in this category (Wheel Cactus, Prickly Pear, Bridal Creeper, and African Boxthorn). If any of these invasive weeds are detected, they should be controlled by physical removal if small or treatment with a registered herbicide if large. These weeds will spread slowly through the property if present; birds and foxes eat the fruit and transport and disperse the seed. These weeds should be tackled when they are at low density, as they can readily invade undisturbed areas of mature native vegetation.
- Domestic livestock and feral goats may be present; they should be excluded from the property.
- Firewood collection should be prohibited in buffer zones but could be allowed to remove woody debris from clearing a cell after hollow trees and logs have been relocated and conserved for wildlife habitat.
- Prohibiting non-essential traffic from the non-operational parts of the BLE, particularly the buffer zones.

6.4 Prescribed impacts

The BC Regulations (Clause 6.1) identifies prescribed actions as ‘impacts on biodiversity values’ under the biodiversity offset scheme. The following listed impacts are relevant to the BLE:

- The impacts of development on ... habitat of threatened species or ecological communities – human-made structures.

- The impacts of development on ... habitat of threatened species or ecological communities – non-native vegetation.
- The impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.
- The impacts of development on the movement of threatened species that maintains their lifecycle.
- The impact of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

6.4.1 Structures

There are no identified human-made structures that exist or are subject to be cleared during the construction of the BLE.

6.4.2 Non-native vegetation

The BLE will impact up to 22.05 ha of highly disturbed exotic groundcover vegetation. No identified threatened species are likely to forage or inhabit the sparse and heavily disturbed exotic vegetation within the Subject land.

Several non-threatened bird species are commonly present in the existing Buronga landfill (Table 18) due to the facility operating as a waste and resource management facility; however, the BLE is not expected to disturb the foraging of these species; contrastingly, the BLE is anticipated to increase fauna foraging.

Table 18. Non-Threatened species observations

Scientific name	Common name
<i>Pelecanus conspicillatus</i>	Australian Pelican
<i>Threskiornis moluccus</i>	Australian White Ibis
<i>Vanellus miles</i> subsp. <i>novaehollandiae</i>	Black-shouldered Lapwing (Masked Lapwing)
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Eolophus roseicapilla</i>	Galah
<i>Columba livia</i>	Rock Dove
<i>Chroicocephalus novaehollandiae</i>	Silver Gull

All observations were made on 29 March 2021.

6.4.3 Vegetation corridors

The Subject land is located within a much larger body of native vegetation; contiguous vegetation spans the north, south, and eastern perimeter. The BLE is expected to clear all native vegetation within the Subject land progressively.

The habitat within the Subject land is not likely to greatly impact important corridors for any assessed threatened species. In addition, the BLE would not impact the connectivity of habitats for threatened species that can move through the Subject land due to the highly intact buffer zone and extended landscape.

6.4.4 Threatened species movement

Due to the progressive use and rehabilitation intended in the BLE, the edge effect of clearing is not likely to cause any major impacts on the health and life cycles of threatened species; furthermore, progressive rehabilitation is likely to reduce habitat fragmentation and unlikely to lead to long-term decreases in local threatened populations.

6.4.5 Vehicles

The BLE is not likely to increase vehicle strikes on threatened species, although there will be a potential increase in traffic due to increasing operations and access. The frequent change of vehicle access routes over the BLEs life will be limited to a single landfill cell except for transition periods where two cells will temporarily be active.

The traffic accessing the waste and resource management facility will have a limited speed for travelling, which will inherently limit the frequency and likelihood of collisions. Furthermore, there are no additional vehicle entrances along Arumpo Road outlined in the BLE, which does not increase the likelihood of vehicle strikes. An emergency access gate for light vehicles has been requested in the north-eastern corner of the property, however it will be locked and rarely used.

Any increase in vehicle strikes on native fauna resulting from the BLE will be negligible.

6.4.6 Impacted threatened entities

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed, impacted threatened entities cannot be identified in this BDAR.

6.4.7 Habitat feature importance

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed, habitat feature importance will not be identified in this BDAR.

7 Impact summary

7.1 Identification and assessment of entities at risk of SAI

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed. Serious and Irreversible Impacts will not be addressed in this BDAR.

7.1.1 TEC at risk of SAI

Not assessable until targeted species surveys are completed.

7.1.2 Threatened species at risk of SAI

Not assessable until targeted species surveys are completed.

7.1.3 Assumptions

Not assessable until targeted species surveys are completed.

7.1.4 Sources

Not assessable until targeted species surveys are completed.

7.1.5 Justification

Not assessable until targeted species surveys are completed.

7.2 Impacts requiring offsets

The development impacts requiring offsets for native vegetation impacts are outlined in Table 19. The development impacts requiring offsets for threatened species and threatened species habitat are outlined in Table 20.

Table 19. Native vegetation impacts requiring offset

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
PCT 15	Black Box open woodland wetland with chenopod understory mainly on the outer floodplains in south-western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland floodplain woodlands (PCT 15)	Semi-arid woodlands (Grassy sub-formation)	19.76
PCT 58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Semi-arid sand plain woodlands (PCT 58 & 252)	Semi-arid woodlands (Grassy sub-formation)	10.50
PCT 170	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Sand plain mallee woodlands (PCT 170)	Semi-arid woodlands (Grassy sub-formation)	4.54

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed, Table 20 cannot be completed.

Table 20. Threatened species impacts requiring offset

Ecosystem Or Species credits*	Scientific name	Common name	Direct impact of habitat	NSW listing status	EPBC listing status

* E = Ecosystem Credit Species, S = Species Credit Species

7.2.1 Impacts on native vegetation

The development impacts within the subject area on the allocated vegetation zones require offsetting due to their area and vegetation integrity scores. The ecosystem credit requirements have been calculated using the floristic survey data and are listed in Table 21 and Table 22.

Table 21. Ecosystem credits for plant community types - Case 00024930

Vegetation zone	Vegetation zone name	Area (ha)*	Current vegetation integrity score	Future vegetation integrity score	Credits required	BAM case NO.
1	15_Zone_1_CA	0.6	53.8	N/A	14	00024930
3	58_Zone_3_CA	7.0	57.5	N/A	74	
4	58_Zone_4_CA	3.4	35.8	N/A	60	
5	170_Zone_5_CA	4.5	49.5	N/A	83	
Total credit requirements for Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)					14	00024930
Total credit requirements for Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion					134	
Total credit requirements for Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones					83	

* Numbers have been rounded

Table 22. Ecosystem credits for plant community types - Case 00025590

Vegetation zone	Vegetation zone name	Area (ha)*	Current vegetation integrity score	Future vegetation integrity score	Credits required	BAM case NO.
1	15_Zone_1_Outside_CA	19.2	57.1	N/A	479	00025590
4	58_Zone_4_Outside_CA	0.1	40.8	N/A	2	
5	170_Zone_5_Outside_CA	0.05	49.5	N/A	1	
6	252_Zone_6_Outside_CA	1.7	14.2	N/A	0	
Total credit requirements for Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)					479	00025590
Total credit requirements for Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion					2	
Total credit requirements for Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones					1	
Total credit requirements for Sugarwood open woodland of the inland plains (mainly Murray Darling Depression Bioregion)					0	

* Numbers have been rounded

7.2.2 Impacts on credit species

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed, Table 23 and Table 24 will be given zero for all credit requirements for this BDAR.

Table 23. Species credit requirements - Case 00024930

Species Name	Vegetation zones	Current vegetation integrity score	Area (ha)/Count (no. individuals)	Biodiversity risk weight	Credits required	BAM case NO.
<i>Austrostipa metatoris</i> / A spear-grass	15_Zone_1_CA	57.1	0	2	0	00024930
	58_Zone_3_CA	24.2	0	2	0	
	58_Zone_4_CA	40.8	0	2	0	
	170_Zone_5_CA	49.5	0	2	0	
Total credit requirements for <i>Austrostipa metatoris</i>					0	
<i>Burhinus grallarius</i> / Bush Stone-curlew	15_Zone_1_CA	57.1	0	2	0	00024930
	58_Zone_3_CA	24.2	0	2	0	
	58_Zone_4_CA	40.8	0	2	0	
	170_Zone_5_CA	49.5	0	2	0	
Total credit requirements for <i>Burhinus grallarius</i>					0	
<i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i> / Yellow Gum	15_Zone_1_CA	57.1	0	2	0	00024930
	58_Zone_3_CA	24.2	0	2	0	
	58_Zone_4_CA	40.8	0	2	0	
	170_Zone_5_CA	49.5	0	2	0	
Total credit requirements for <i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i>					0	
<i>Hieraaetus morphnoides</i> / Little Eagle	15_Zone_1_CA	57.1	0	1.5	0	00024930
	58_Zone_3_CA	24.2	0	1.5	0	
	58_Zone_4_CA	40.8	0	1.5	0	
	170_Zone_5_CA	49.5	0	1.5	0	
Total credit requirements for <i>Hieraaetus morphnoides</i>					0	
<i>Lophochroa leadbeateri</i> / Major Mitchell's Cockatoo	15_Zone_1_CA	57.1	0	2	0	00024930
	58_Zone_3_CA	24.2	0	2	0	
	58_Zone_4_CA	40.8	0	2	0	
	170_Zone_5_CA	49.5	0	2	0	
Total credit requirements for <i>Lophochroa leadbeateri</i>					0	
<i>Lophoictinia isura</i> / Square-tailed Kite	15_Zone_1_CA	57.1	0	1.5	0	00024930
	58_Zone_3_CA	24.2	0	1.5	0	
	58_Zone_4_CA	40.8	0	1.5	0	
	170_Zone_5_CA	49.5	0	1.5	0	
Total credit requirements for <i>Lophoictinia isura</i>					0	
<i>Ninox connivens</i> / Barking Owl	15_Zone_1_CA	57.1	0	2	0	00024930
	58_Zone_3_CA	24.2	0	2	0	
	58_Zone_4_CA	40.8	0	2	0	
	170_Zone_5_CA	49.5	0	2	0	
Total credit requirements for <i>Ninox connivens</i>					0	
<i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i> / Thyme Rice-Flower	15_Zone_1_CA	57.1	0	3	0	00024930
	58_Zone_3_CA	24.2	0	3	0	
	58_Zone_4_CA	40.8	0	3	0	
	170_Zone_5_CA	49.5	0	3	0	
Total credit requirements for <i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i>					0	

* E = Ecosystem Credit Species, S = Species Credit Species

Table 24. Species credit requirements - Case 00025590

Species Name	Vegetation zones	Current vegetation integrity score	Area (ha)/Count (no. individuals)	Biodiversity risk weight	Credits required	BAM case NO.
<i>Austrostipa metatoris</i> / A spear-grass	15_Zone_1_Outside_CA	57.1	0	2	0	00025590
	58_Zone_4_Outside_CA	40.8	0	2	0	
	170_Zone_5_Outside_CA	49.5	0	2	0	
	252_Zone_6_Outside_CA	14.2	0	2	0	
Total credit requirements for <i>Austrostipa metatoris</i>					0	
<i>Burhinus grallarius</i> / Bush Stone-curlew	15_Zone_1_Outside_CA	57.1	0	2	0	00025590
	58_Zone_4_Outside_CA	40.8	0	2	0	
	170_Zone_5_Outside_CA	49.5	0	2	0	
	252_Zone_6_Outside_CA	14.2	0	2	0	
Total credit requirements for <i>Burhinus grallarius</i>					0	
<i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i> / Yellow Gum	15_Zone_1_Outside_CA	57.1	0	2	0	00025590
	58_Zone_4_Outside_CA	40.8	0	2	0	
	170_Zone_5_Outside_CA	49.5	0	2	0	
	252_Zone_6_Outside_CA	14.2	0	2	0	
Total credit requirements for <i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i>					0	
<i>Hieraetus morphnoides</i> / Little Eagle	15_Zone_1_Outside_CA	57.1	0	1.5	0	00025590
	58_Zone_4_Outside_CA	40.8	0	1.5	0	
	170_Zone_5_Outside_CA	49.5	0	1.5	0	
	252_Zone_6_Outside_CA	14.2	0	1.5	0	
Total credit requirements for <i>Hieraetus morphnoides</i>					0	
<i>Lophochroa leadbeateri</i> / Major Mitchell's Cockatoo	15_Zone_1_Outside_CA	57.1	0	2	0	00025590
	58_Zone_4_Outside_CA	40.8	0	2	0	
	170_Zone_5_Outside_CA	49.5	0	2	0	
	252_Zone_6_Outside_CA	14.2	0	2	0	
Total credit requirements for <i>Lophochroa leadbeateri</i>					0	
<i>Lophoictinia isura</i> / Square-tailed Kite	15_Zone_1_Outside_CA	57.1	0	1.5	0	00025590
	58_Zone_4_Outside_CA	40.8	0	1.5	0	
	170_Zone_5_Outside_CA	49.5	0	1.5	0	
	252_Zone_6_Outside_CA	14.2	0	1.5	0	
Total credit requirements for <i>Lophoictinia isura</i>					0	
<i>Ninox connivens</i> / Barking Owl	15_Zone_1_Outside_CA	57.1	0	2	0	00025590
	58_Zone_4_Outside_CA	40.8	0	2	0	
	170_Zone_5_Outside_CA	49.5	0	2	0	
	252_Zone_6_Outside_CA	14.2	0	2	0	
Total credit requirements for <i>Ninox connivens</i>					0	
<i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i> / Thyme Rice-Flower	15_Zone_1_Outside_CA	57.1	0	3	0	00025590
	58_Zone_4_Outside_CA	40.8	0	3	0	
	170_Zone_5_Outside_CA	49.5	0	3	0	
	252_Zone_6_Outside_CA	14.2	0	3	0	
Total credit requirements for <i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i>					0	

* E = Ecosystem Credit Species, S = Species Credit Species

7.3 Impacts not requiring offset

PCT 252 (Zone 6) does not require an offset as the vegetation integrity was not ≥ 20 (where a PCT does not represent a TEC) as per 9.2.1 of the BAM. The development impacts not requiring an offset for native vegetation impacts are outlined in Table 25. The development impacts not requiring offset for threatened species and threatened species habitat are outlined in Table 26.

Table 25. Native vegetation impacts not requiring offset

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
PCT 252	Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion	Semi-arid sand plain woodlands (PCT 58 & 252)	Semi-arid woodlands (Grassy sub-formation)	1.70

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed, Table 26 cannot be completed.

Table 26. Threatened species impacts requiring offset

Ecosystem Or Species credits*	Scientific name	Common name	Direct impact of habitat	NSW listing status	EPBC listing status

7.4 Areas not requiring assessment

There has been historic clearing of native vegetation and preliminary development of a waste and resource management facility within the development site. In addition, a zone directly north of the preliminary development (within the Subject land) has been assessed as historic clearing and regrowth that is Category 1 exempt land as per Part 60H (1) of the *Local Land Services Act 2013*. Therefore, these areas do not require assessment for ecosystem credits.

8 References

Green Edge Environmental (2016), Statement of Environmental Effects, Borrow Pits for Buronga Landfill Cover, Buronga Landfill for Wentworth Shire Council

NSW OEH's Biodiversity Assessment Method (BAM) calculator

www.lmbc.nsw.gov.au/bamcalc.

NSW OEH's BioNet threatened biodiversity database

www.bionet.nsw.gov.au/.

OEH Threatened Species Profiles

www.environment.nsw.gov.au/threatenedSpeciesApp/

OEH BioNet Vegetation Classification Database (OEH 2017)

www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx

OEH BioNet VIS Mapping

www.environment.nsw.gov.au/research/VISmap.html

Office of Environment and Heritage (OEH) (2021).

Biodiversity Assessment Method

NSW Government SEED Mapping

geo.seed.nsw.gov.au/Public_Viewier/index.html?viewer=Public_Viewier&locale=en-AU

SW Biodiversity Values Map

www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

Environment Protection and Biodiversity Conservation Act 1999

http://classic.austlii.edu.au/au/legis/cth/consol_act/epabca1999588

Environmental Planning and Assessment Act 1979

http://classic.austlii.edu.au/au/legis/nsw/consol_act/epaaa1979389/

Biodiversity Conservation Act 2016

http://classic.austlii.edu.au/au/legis/nsw/consol_act/bca2016309/

Local Land Services Act 2013

http://classic.austlii.edu.au/au/legis/nsw/consol_act/lisa2013178/

Wentworth Local Environmental Plan

http://classic.austlii.edu.au/au/legis/nsw/consol_reg/wlep2011363/

ISO 31000 Risk Management

<https://www.iso.org/iso-31000-risk-management.html>

9 Appendices

Appendix A: EPBC Protected Matters Search Tool – 10 km Buffer



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/06/21 09:27:57

[Summary](#)

[Details](#)

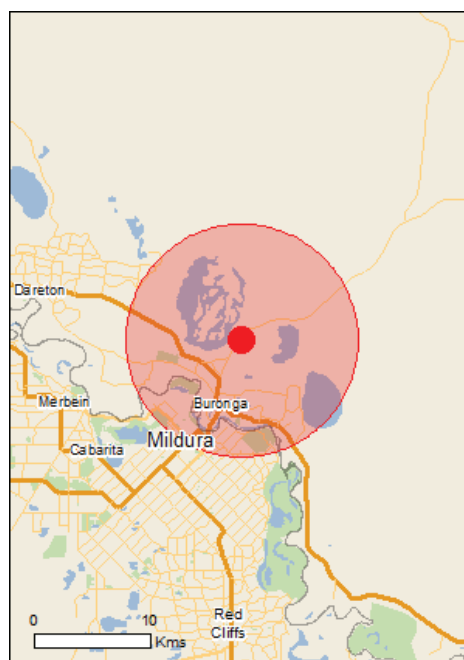
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

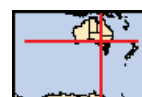
[Acknowledgements](#)



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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	25
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	24
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	28
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	150 - 200km upstream	
Riverland	100 - 150km upstream	
The coorong, and lakes alexandrina and albert wetland	200 - 300km upstream	

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	Community may occur within area
River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	Community may occur within area
River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Manorina melanotis Black-eared Miner [449]	Endangered	Species or species

Name	Status	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	habitat may occur within area Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis anthopeplus monarchoides Regent Parrot (eastern) [59612]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Fish		
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area
Craterocephalus fluviatilis Murray Hardyhead [56791]	Endangered	Species or species habitat likely to occur within area
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat likely to occur within area
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Plants		
Lepidium monoplacoides Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area
Solanum karsense Menindee Nightshade [7776]	Vulnerable	Species or species habitat may occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Swainsona pyrophila Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Migratory Terrestrial Species

Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
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Migratory Wetlands Species

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name

Commonwealth Land - Australian Telecommunications Corporation
Defence - KAIRIVU BARRACKS - MILDURA

Listed Marine Species [[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
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Birds

[Actitis hypoleucos](#)

Common Sandpiper [59309]

Species or species habitat may occur within area

[Apus pacificus](#)

Fork-tailed Swift [678]

Species or species habitat likely to occur within area

[Ardea ibis](#)

Cattle Egret [59542]

Species or species habitat may occur within area

[Calidris acuminata](#)

Sharp-tailed Sandpiper [874]

Species or species habitat known to occur within area

[Calidris ferruginea](#)

Curlew Sandpiper [856]

Critically Endangered

Species or species habitat known to occur within area

[Calidris melanotos](#)

Pectoral Sandpiper [858]

Species or species habitat may occur within area

[Calidris ruficollis](#)

Red-necked Stint [860]

Species or species habitat known to occur within area

[Charadrius bicinctus](#)

Double-banded Plover [895]

Species or species habitat known to occur within area

[Charadrius ruficapillus](#)

Red-capped Plover [881]

Species or species habitat known to occur within area

[Chrysococcyx osculans](#)

Black-eared Cuckoo [705]

Species or species habitat known to occur within area

[Gallinago hardwickii](#)

Latham's Snipe, Japanese Snipe [863]

Species or species habitat may occur within area

[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle [943]

Species or species habitat known to occur within area

[Himantopus himantopus](#)

Pied Stilt, Black-winged Stilt [870]

Species or species habitat known to occur within area

[Limosa lapponica](#)

Bar-tailed Godwit [844]

Species or species habitat known to occur

Name	Threatened	Type of Presence
Limosa limosa Black-tailed Godwit [845]		within area Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Kings Billabong Park	VIC
River Murray Reserve	VIC

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.	

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat may occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within

Name	Status	Type of Presence
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		area Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name		State
Kings Billabong Wetlands		VIC

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.12638 142.19865

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix B: Previous Development Consent



Wentworth Shire Council

26-28 Adelaide Street WENTWORTH NSW 2648
PO Box 81 WENTWORTH NSW 2648

Our Reference: HH:DOC/17/1166
Your Reference: DA15/134
Contact: Health & Planning Division
Phone: 03 5027 5027
Date: 24 January 2017

Mr Peter Kozlowski
Wentworth Shire Council
PO Box 81
WENTWORTH NSW 2648

Email: council@wentworth.nsw.gov.au

Dear Peter

DA15/134 BURONGA LANDFILL BORROW PIT / PITS ARUMPO ROAD LOT 1 DP 1037845 WENTWORTH

I refer to your development application regarding the above mentioned property. Development consent has now been granted subject to conditions. Please read the attached notice of determination and conditions contained within schedule 1 carefully to ensure your obligations in regard to this consent are adhered to.

If you require any further information please contact the Health & Planning Division on Tel: (03) 5027 5027.

Yours faithfully

KEN ROSS
DIRECTOR HEALTH & PLANNING
ATTACHMENT



Health & Planning Division
26- 28 Adelaide Street
Po Box 81
WENTWORTH NSW 2648
Tel: 03 5027 5027
council@wentworth.nsw.gov.au

Notice of Determination of a Development Application

issued under the *Environmental Planning and Assessment Act 1979*
Section 81(1)(a)

Our Ref:	DOC/17/1166
Development application no:	DA15/134
Applicant name:	Wentworth Shire Council
Applicant address:	PO Box 81 WENTWORTH NSW 2648
Owner name:	Wentworth Shire Council
Owner address:	PO Box 81 WENTWORTH NSW 2648
Land to be developed:	Arumpo Road Lot 1 DP 1037845 Wentworth
Type of approved development:	Buronga Landfill Borrow Pits
Determination:	In accordance with Section 80 of the EP&A Act 1979 your application has been granted subject to conditions.
Conditions of granting consent and reasons	The conditions imposed on the consent in accordance with Section 80A of the EP&A Act 1979 and the reason for imposition of those conditions are attached as Schedule 1.
Review of determination	Section 82A of the EP&A Act 1979 provides that the applicant may request Council review a condition(s) of the development consent. Any such request for a review of the determination by Council must be lodged with Council within six (6) months (as provided by Sec 97 of the Act)
Right of appeal of determination:	<p>An applicant who is dissatisfied with the determination of their development application (including a determination on a review under Section 82A) may appeal to the Land and Environment Court within 6 months after;</p> <ul style="list-style-type: none">a) the date on which the applicant receives this notice of determination or review, orb) the date on which the application is taken to have been determined. <p>(refer to Sec 97 of the EP&A Act).</p>
Date of determination:	24 January 2017
Date from which consent operates:	<p>24 January 2017</p> <p><i>Note - If granted subject to a condition that the consent is not to operate until the applicant satisfies a consent authority with respect to a particular condition then the date from which the determination operates must not be endorsed on the application until that condition has been satisfied.</i></p>

Date on which consent lapses: 23/01/2022 at midnight
(refer to Sec 95 and 95A of the EP&A Act)

Building Code of Australia building classification Nil

Details of any review by Planning Assessment Commission N/A

Integrated development N/A
approval bodies that have given general terms of approval in relation to the development as per section 93 of the EP&A Act

Rights of appeal of objectors N/A

Other approvals N/A
List Local Government Act 1993 approvals granted under S 78A(5)

Signed **KEN ROSS**
DIRECTOR HEALTH & PLANNING
under delegation on behalf of the Shire of Wentworth

Date 24 January 2017

Note 1 *If there is any discrepancy between the approved plan attached to this determination and the conditions in Schedule No 1 to this determination, then the conditions override the plan. All conditions listed in Schedule No 1 must be complied with to comply with this consent*

Note 2 *Schedule 2 contains advisory notes which assists in compliance with conditions listed on Schedule 1.*

Note 3 *This approval relates to development consent only and before any building, demolition or subdivision works are carried out a construction certificate must be obtained.*

SCHEDULE 1

PRESCRIBED CONDITIONS

1.	The Proponent shall comply with the prescribed conditions of approval under Clause 98 of the Environmental Planning and Assessment Regulation 2000, in relation to the requirements of the Building Code of Australia.
2.	<p>A sign must be erected in a prominent position on any site on which building work, subdivision work or demolition work is being carried out:</p> <ul style="list-style-type: none"> (i) Showing the name, address and telephone number of the principal certifying authority for the work, and (ii) Showing the name of principal contractor (if any) for any building work and a telephone number on which that person may be contacted outside working hours, and (iii) Stating that unauthorized entry to the work site is prohibited.

GENERAL CONDITIONS

3.	<p>The development hereby authorised shall be carried out strictly in accordance with the conditions of this approval and stamped approved documents listed below</p> <ul style="list-style-type: none"> • Locality & Zoning Map by Aurecon • Conceptual Site Plan by Geolyse 214455 01C_E01 Dated 14 July 2015 • Review of Environmental Factors - Vegetation Removal Map by Ece Tunali Page 14 of 17 • Statement of Environmental Effects by Greenedge Environmental W1602 Dated 23 June 2016 <p>NOTE: Where there is inconsistency between the Environmental Impact Statement and these conditions, the conditions of this approval shall apply.</p>
4.	Approval is for the quarrying and extraction of material for landfill covering.
5.	Without the further consent of the Wentworth Shire Council, in writing, this permit shall lapse and have no force or effect unless the use or development hereby permitted is substantially commenced within 5 years of the date of this permit.
6.	<p>To ensure Aboriginal objects identified in the Aboriginal Cultural Heritage Assessment are not harmed during the construction of the proposal, an Aboriginal Heritage Impact Permit (AHIP) in accordance with Part 6 of the National Parks and Wildlife Act 1974 will need to be obtained from the Office of Environment and Heritage. Works must not commence until the AHIP is sought and granted. The AHIP application must be accompanied by appropriate documentation and mapping as outlined on page 6 of Applying for an Aboriginal Heritage Impact Permit, Guide for Applicants (OEH 2011). Consultation with the Aboriginal community undertaken as part of an AHIP application must be in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010. All works undertaken must be in accordance with the conditions of the AHIP.</p>
7.	If any Aboriginal object is discovered and/or harmed in, on or under the land, the proponent must:

	<ul style="list-style-type: none"> a) not further harm the Aboriginal object b) immediately cease all work at the particular location c) secure the area so as to avoid further harm to the Aboriginal object d) notify the Office of Environment and Heritage (OEH) as soon as practicable on 131555, providing any details of the Aboriginal object and its location, and e) not recommence any work at the particular location unless authorised in writing by OEH.
8.	No removal of gravel and fill or disturbance of vegetation outside of the designated work area will be permitted without the written approval of the Wentworth Shire Council.
9.	Operations within the worksite shall be carried out in accordance with the requirements of the NSW Workcover Code of Practice for excavation work.
10.	Quarrying and ancillary activities must be carried out in a manner that will minimise emissions of dust from the site.
11.	<p>The beneficiary of this consent must ensure that any plant and equipment used on site, or in connection with the project is:</p> <ul style="list-style-type: none"> a) Maintained in a proper and efficient condition; and b) Operated in a proper and efficient manner.
12.	<ul style="list-style-type: none"> 1) A sign must be erected in a prominent position on any work site on which work involved in the erection or demolition of a building is being carried out: <ul style="list-style-type: none"> a) Stating that unauthorised entry into the work site is prohibited; b) Showing the name of the principal contractor (or person in charge of work site), and a telephone number at which that person may be contacted at any time for business purposes and outside working hours; and c) Showing the name, address and telephone number of the Principal Certifying Authority for the work. 2) Any sign must be maintained while building work or demolition work is being carried out, but must be removed when the work has been completed.
13.	<p>The work undertaken must satisfy applicable occupational health and safety and construction safety regulations, including any WorkCover Authority requirements to prepare a health and safety plan. Site fencing must be installed sufficient to exclude the public from the site. Safety signs must be erected that; warn the public to keep out of the site, and provide a contact telephone number for enquiries.</p> <p>Further information and details regarding occupational health and safety requirements for construction sites can be obtained from the internet at www.workcover.nsw.gov.au</p>
14.	<p>The beneficiary of this consent must ensure that all necessary licences, permits and approvals are obtained and kept up-to-date as required throughout the life of the project. No condition of this approval removes the obligation for the beneficiary of this consent to obtain, renew or comply with such licences, permits or approvals.</p>


15.	In addition to meeting the specific performance criteria established under this approval, the beneficiary of this consent must implement all reasonable and feasible measures to prevent and /or minimise any harm to the environment that may result from the construction, operation or decommissioning of the project.
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CONDITIONS FROM AGENCIES

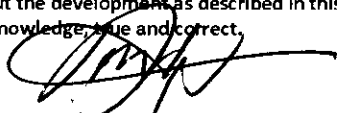
Office of Environment & Heritage - have provided advisory notes. These are attached in their entirety and therefore form part of this determination.

REASONS FOR CONDITIONS

- a) To ensure compliance with the terms of the Environmental Planning and Assessment Act.
- b) To ensure work is sustainable and that an appropriate level of provision of amenities and services occurs within the Shire and to occupants of lots.
- c) To minimise environmental impact and impact on public assets, degradation of natural resources and to enhance amenity.
- d) To provide for a quality environment, safe and efficient movement of people and to ensure public safety and interest.

 Health & Planning Division 26- 28 Adelaide Street PO Box 81 WENTWORTH NSW 2648 Tel: 03 5027 5027 council@wentworth.nsw.gov.au	<h2>Application for Development</h2> <p>made under the <i>Environmental Planning and Assessment Act 1979</i></p> <p align="right">Section 78A</p>
	<p><i>R/No 212923 13/10/2015</i></p>

FEES & CHARGES			
DA No.	Assessment No.	Receipt No.	Date
Lodgement Fee 830.00 <small>Job No: 1410-1140</small>	Plan Reform Fee 140.80 <small>Job No: 9915-5910</small>	Advertising Fee <small>Job No: 1410-1050</small>	
Would you like a copy of the receipt? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

PART A – APPLICANT'S DETAILS
Name/s Peter Kozlowski Company Name (if applicable) Wentworth Shire Council Postal Address PO Box 81 Wentworth, NSW 2648 Contact No. 03-5027 5027 Alternate No. Email peter.kozlowski@wentworth.nsw.gov.au <small>I apply for approval to carry out the development as described in this application. I declare that all the information in this application and checklist is to the best of my knowledge, true and correct.</small> Signature/s  Date 27/6/16

PART B - PROPERTY DETAILS
<small>Lot/ Section / DP Numbers can be found on the Rates Notice or Certificate of Title for the land. In relation to mooring sites, Part B relates to the property adjacent to the proposed site.</small> Street No. Street Name Arumpo Road Town/Locality Buronga Postcode 2739 Lot No/s Lot 1 Section DP No/s 1037845

PART C – DEVELOPMENT DETAILS
<div> <input type="checkbox"/> Erection of Dwelling <input type="checkbox"/> Erection of Shed / Garage <input type="checkbox"/> Additions / Alterations to Dwelling </div> <div> <input type="checkbox"/> Swimming Pool <input type="checkbox"/> Demolition <input type="checkbox"/> Subdivision </div> <div> <input checked="" type="checkbox"/> Use of Land/ building <input type="checkbox"/> Deferred Commencement <input type="checkbox"/> Mooring Site </div> <div> <input type="checkbox"/> Other – Please specify </div>
Detailed description of development The proposed area will be used as borrow pits to provide soil to Buronga Landfill's waste operations to use as daily cover material to bury the waste, disposed and also interim and final cover material. Existing development / use – e.g. existing dwelling, vacant land Vacant Land Total estimated cost (inclusive GST) \$220,000

PART D – OWNER'S DETAILS

☒ Details are the same as Part A – Applicant's Details (Note: All owners are still required to sign the form)

Name/s

Company Name (if applicable)

Postal Address

Contact No.

Alternate No.

Email

Do you agree to receive all correspondence via email? ☒ Yes ☐ No

As owner/s of the land to which this application relates to, I/we consent to carry out the development described in this application. I/we also authorise:

- Council representatives to enter the property for the purpose of site inspections;
- Council to make copies of all the documents for the purpose of determining the application or to people who may be affected by the proposal

Note:

- If more than one owner every owner must sign.
- If you are signing on the owner's behalf as their legal representative, you must state the nature of your legal authority and attach documentary evidence (e.g. power of attorney, executor, trustee, company director)
- If the owner is a company, a current ASIC extract must be supplied as documentary evidence and application must be signed by 2 directors.
- If the land is Crown Land, consent will be required from NSW Trade & Investment – Crown lands. Please refer to separate attachment Landowner's Consent: Landowner's consent application.

Name Peter Kozlowski

Signature

Date

27/6/16

Name

Signature

Date

If more than two signatures are required please attach a separate document.

PART E – SUBDIVISION

No. of Lots:

Existing

Proposed

Are you proposing to install a new road/s? ☐ Yes ☒ No If yes, how many?

Will this be a staged development? ☐ Yes ☒ No If yes, how many?

Description of stages

PART F – OTHER APPROVALS

I require consideration as Integrated Development ☐ Yes ☒ No If yes, include Attachment A

I require consideration as a Mooring Site ☐ Yes ☒ No If yes, include Attachment B

I require a Construction Certificate (CC) to be lodged at the same time as the development application. If yes, include Construction Certificate Application Form. ☐ Yes ☒ No

NOTE: Additional fees may apply for the relevant approvals.

PART G – ENVIRONMENTAL IMPACT

One of the following must be completed for all applications

- ☒ Statement of Environmental Effects (SEE) – refer Attachment C
or
☐ Environmental Impact Statement (EIS) - Designated Development Only

Is your proposal on land, that is, or part of critical habitat? Or is your proposal likely to have a significant effect on threatened species, populations, ecological communities or their habitats?

- ☐ Yes – Please attach a Species Impact Statement
☒ No – Please explain in the Statement of Environmental Effects

PART H – DISCLOSURE OF POLITICAL DONATIONS AND GIFTS

Under Section 147 of the Environmental Planning and Assessment Act 1979, any reportable political donations to a councillor and / or any gift to a Councillor or Council Employee within a two (2) year period before the date of this application must be publicly disclosed.

Are you aware of any person with a financial interest in this application who made a reportable donation or gift within the last two (2) years?

- ☐ Yes – Please complete the Political Donations and Gifts Disclosure Statement and lodge it with this application (available from the Council website)
☒ No – In signing this application I undertake to advise the Council in writing if I become aware of any person with a financial interest in this application who has made a political donation or has given a gift in the period from the date of lodgement of this application and the date of determination.

NOTE: Failure to disclose relevant information is an offence under the Act. It also an offence to make a false disclosure statement.

PART I – SUPPORTING INFORMATION


To enable assessment of your application, Council requires the following supporting information. Please note, if the information is not provided this may lead to your application being rejected or delayed.

- ☒ 3 x A3 copies of each of the following plans for approval
 ☐ Floor Plan
 ☐ Site Plan
 ☐ Elevation Plan
☐ 3 copies of the BASIX Certificate
☒ Completed Statement of Environmental Effects (refer Part G above)

NOTE: If both the applicant and owner are happy to receive all correspondence via email, only 1 set of plans needs to be submitted with application. However if hard copies are required, submit 3 copies.

Privacy and Personal Information Protection Notice

The personal information provided on this form is collected by Wentworth Shire Council for the purposes of processing this application by Council Employees and other authorised persons. This form will be stored within Council's record management system and may be available for public access and/or disclosure under various NSW Government legislation.

	Health & Planning Division 26- 28 Adelaide Street Po Box 81 WENTWORTH NSW 2648 Tel: 03 5027 5027 council@wentworth.nsw.gov.au	<h2 style="margin: 0;">Development Application</h2> <p style="margin: 10px 0 0 0;">Notes for completing a Development Application</p>
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FEES & CHARGES

There are two fees that are payable on lodgement of this application. These are:

- **Lodgement Fee** – This is a fee charged by Council that is set by the NSW Government, which is aimed at covering a portion of Council's costs for the processing of the application.
- **Advertising Fee** – Charged in accordance with NSW Legislation for Designated and Integrated Developments.

A schedule of fees are available on the Wentworth Shire website under the Council Business Tab. Alternatively you can call Council's Health & Planning Division on 03 5027 5027.

PART A – APPLICANT'S DETAILS

Anyone can apply for approval; it does not necessarily have to be the owner of the land; however the owner will still need to provide consent in Part D – Owner's Details. Please complete the details of the person who is applying for this consent.

NOTE: It is the applicant's responsibility to provide Council with any additional details that may be requested.

PART B – PROPERTY DETAILS

This section asks you to provide details on the land where the development / building work is to be situated. These details are available on your rates notice or a Certificate of Title.

NOTE: Not all properties have a section number.

PART C – DEVELOPMENT DETAILS

Select from the list the most appropriate description of your development. Note: you can select more than one option.

Provide a detailed description of your proposal including any details such as building works, earthworks and any demolition work to be carried out. If there is not enough room, please attach a separate document.

The cost of the project should include but not limited to building construction, building materials, landscaping, drainage, fencing, labour and drainage but not include the cost of the land.

PART D – OWNER'S DETAILS

The owner of the land is generally the people/ company listed on the Title to the Land. All owners listed on the title must sign the application form giving consent to the proposed development / building works. If there is not enough room, please attach a separate document.

If the owner is a Company/ partnership etc, then evidence of role of signatories is to be supplied in the form of an Company Extract from the ASIC website.

PART E – SUBDIVISION

Only complete this section if your development is a subdivision.

PART F – OTHER APPROVALS

You can apply for other approvals at the same time as lodging your Development Application. If you require on of these approvals, please complete the appropriate paperwork and submit with your DA.

Note: Additional fees may apply for the relevant approval. Contact Council's Health & planning Division on 03 5027 5027 if you are unsure.

PART G – ENVIRONMENTAL IMPACT

Environmental Impact is an important part of the application and must be completed in order for your development application to be assessed. Council has developed a Statement of Environmental Effects to assist you in preparing this information.

PART H – DISCLOSURE OF POLITICAL DONATIONS & GIFTS

This section must be completed by applicant and owners. If you selected yes, you will need to fill out the Political Donations and Gifts Disclosure Statement and lodge it with this application.

PART I – SUPPORTING INFORMATION

Most applications will require a Site Plan, Floor Plan and Elevations. Below is a guide to assist in what information is required to be submitted with your development application.

Site Plan

A site plan is a birds-eye view of the existing and proposed development on the site and its position in relation to boundaries and neighbouring developments.

- North point and scale
- Street name and number
- Name and contact details of who prepared the plans
- Location of
 - property boundaries and
 - any existing physical and natural features e.g. building, vegetation, driveways etc
 - Existing easements and/or utility services e.g. water, sewer, stormwater drains, discharge points etc
 - Existing and proposed structure/s and/or additions
 - Vehicle access and car parking
 - New vehicle crossings
- Site dimensions (length, width and site area)
- Relative location of adjoining buildings
- Existing and proposed site ground levels and floor levels
- Contour lines of site and spot levels at all corners of the building
- Extent of cut and fill to be carried out
- Swimming Pools must show pool fencing, gates, reduced height levels (RLs) reduced to existing/proposed levels, location of filters/pumps and backwash connections.

Floor Plans

A floor plan is a birds-eye view of your existing and/or proposed layout of rooms within the development.

- Existing Internal layout (required for alterations and additions)
- Proposed internal layout

The above plans should include:

- Room uses, wall/partitions, areas and dimensions
- Location of stairs and essential fire safety measures (if any)
- Floor levels and steps in floor levels (RLs)
- Wall structure type and thickness
- Calculations of all existing and proposed floor areas

Elevation Plans

Elevation plans are a side on view of your proposal that shows all 4 sides (north, south, east and west).

- Height of existing and proposed structure/s and/or additions
- Existing and proposed surface finishes e.g. brick wall, tile, colourbond roof
- Location and heights of windows
- Levels for roof ridge, floor and ceiling (expressed as Reduced Levels (RLs) or levels to AHD
- Roof Pitch

PART I – SUPPORTING INFORMATION CONTINUED
--

BASIX Certificate

- A BASIX Certificate is required for:
 - all new habitable buildings
 - alterations and additions over \$50,000
 - swimming pools and spas with a capacity of 40,000 litres or more
- For further information or to apply visit: www.basix.nsw.gov.au

**Statement of
Environmental Effects**

- A template version is available to be filled out, refer to Part G Environmental Impact

NOTE:

- All plans are to be drawn to scale and provided in A3 size (where possible).
- If both the applicant and owner are happy to receive all correspondence via email, only 1 set of plans needs to be submitted with the application. However if hard copies are required, submit 3 copies.

Statement of Environmental Effects: Borrow pits for Buronga Landfill Cover



greenedge
environmental

Buronga Landfill
For Wentworth Shire
Council

Business name Green Edge Environmental P/L

ABN 17 707 655 926

Postal address c/o Springton Post Office, Springton SA 5235

Principle Chris Alderton

Point of contact

Email and chris@geenvironmental.com.au

Mobile 0438 345 109

Rev	Purpose of document	Author	Reviewer	Issue date
A	Draft report for internal review	C. Alderton	L. Alderton	12 April 2016
B	Draft report for client review	C. Alderton	C. Alderton	15 June 2016
0	For lodgement with DA	C. Alderton	C. Alderton	23 June 2016

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Executive Summary

The Buronga Landfill is located on Arumpo Road, approximately 28km east of Wentworth. Access to the proposed site is via the sealed Arumpo Road and service road into the landfill (refer to Appendix A).

The proposed project site is for the development of borrow pits to provide landfill cover for the existing landfill and then be converted to landfill cells for future use. The proposal will allow for the continued operations and management of the existing facility. It is expected based on the current level of demand that the cells will be used for landfill until the year 2053. The site is located in the municipality of Wentworth, and referred to as Lot 1 DP1037845. The land is freehold owned by the Wentworth Shire Council (WSC).

The objective of this proposal is to develop soil borrow pits to be used at the adjacent landfill site as landfill cover, to adhere to the Environmental Protection Licence conditions. The borrow pits created would be converted to landfill cells for future expansion of the landfill site.

The proposed location of the borrowing is in previously disturbed area, with black oak, mallee and hopbush requiring removal. The groundcover species, cannonball, poverty bush and common heliotrope and agricultural weeds dominate the site. The operation will be undertaken in various stages over the lifespan of the project.

Site preparation will involve removing trees and shrubs by mechanical grubbing. Topsoil (where applicable) will be windrowed for re-spreading across the top of the landfill site when it is full. During the borrowing process, the read loam soil will be ripped by a Cat D6 dozer and a front end loader (938) will load the soil directly onto a tip truck and trailer. No crushing or processing is required. Minimal stockpiling will occur, and only as required.

The following table summarises the potential impact of the project, following a thorough on-site assessment and various database searches on threatened species and cultural heritage. Overall, the level of impact is expected to be low and this is further reduced through the implementation of mitigation measures summarised in Section 4.

Summary of potential impacts

Section	Potential Impact	Summary of Impacts
4.1	Natural resource use	Removal of borrow material
4.2	Hydrology and geomorphology	No impact
4.3	Erosion and sedimentation	No impact
4.4	Surface water	No impact
4.5	Groundwater	No impact
4.6	Soils	Removal and stockpile of topsoil for respreading, borrow material for landfill cover
4.7	Matters of NES	No impact
4.8	Flora	Removal of vegetation, no impact on threatened species

4.9	Fauna	No impact on critical habitat for threatened species
4.10	Weeds and pests	No impact
4.11	Heritage	Unlikely impacts to unknown sites and objects based on desktop and on site assessment. AHIP will be gained for the open site located as part of the due diligence process.
4.12	Air quality	Some vehicle emissions and dust from borrowing activity, will not cause problems due to low population density
4.13	Socio and economic	No adverse impacts
4.14	Transport	No public roads to be used for carting activities
4.15	Noise and vibration	Use of machinery to extract, load and cart borrow material
4.16	Bushfire hazards	No impacts
4.17	Chemical and Hazardous Substance	No impacts, none stored on site, oils, grease, fuel
4.18	Waste Minimisation	No impacts
4.19	Stormwater Management	No off-site impacts

The cumulative environmental impacts from the proposal will be minimal. As stated throughout Section 4 of this Statement of Environmental Effects, each identified impact has been assessed for its potential threat to the environment. Mitigation measures will help minimise the impact the proposal will have on the study area as well as off-site impacts.

TABLE OF CONTENTS

1.0	The proposal	1
1.1	Locality	1
1.2	Objective of the proposal	1
1.3	Estimated costs and commencement	1
1.4	Description of borrow operations	2
1.5	Site lay out plans	2
1.6	Site preparation	2
1.7	Infrastructure considerations	2
1.8	Rehabilitation	2
1.9	Previous and existing operations	2
1.10	Consideration of the alternatives and justification	3
2.0	Planning context	4
2.1	Purpose of this report	4
2.2	Legislation and approvals required	4
2.3	Relevant policies	5
2.4	Local environmental plans	6
2.5	Relevant guidelines	7
2.6	Zoning	7
2.7	Determining authority	7
2.8	Stakeholder consultation	7
3.0	Location	8
3.1	Site description	8
3.2	Land systems and geology	8
3.3	Hydrology and geomorphology	9
3.4	Soil	9
3.5	Climate	9
4.0	Environmental impacts and management	10
4.1	Natural resource use	10
4.2	Hydrology and geomorphology	10
4.3	Erosion and sedimentation	10
4.4	Surface water	11
4.5	Groundwater	11
4.6	Soils	13

4.7	Matters of National Environmental Significance	14
4.8	Flora	15
4.9	Fauna	18
4.10	Weeds and pests.....	21
4.11	Heritage	22
4.12	Air quality	27
4.13	Socio and economic.....	28
4.14	Transport.....	28
4.15	Noise and vibration	29
4.16	Bushfire hazards	30
4.17	Chemical and hazardous substance management.....	31
4.18	Waste minimisation and management	31
4.19	Stormwater management	31
4.20	Cumulative environmental impacts.....	32
4.21	Summary of mitigation measures.....	32
5.0	Risk Management.....	34
6.0	Summary of impacts and conclusions	37
7.0	References	38

TABLES

Table 1:	Characteristics of the proposed project	1
Table 2:	Mildura Airport Rainfall Data.....	9
Table 3:	Groundwater Well Data.....	12
Table 4:	PCT characteristics	15
Table 5:	Flora Species recorded on-site	17
Table 6:	Listed Fauna Species	19
Table 7:	Fauna species recorded on site	21
Table 8:	Weed and pest observed	22
Table 9:	Due diligencce process	24
Table 10:	Predicted dB(A) noise levels at various distances	29
Table 11:	Approximate generated ground vibration levels (mm/s) for various sources 30	
Table 12:	Environmental Risk Identification Matrix	35
Table 13:	Summary of potential impacts	37

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APPENDICES

Appendix A: Map Series

Appendix B: Assessment of significance and threatened species searches

Appendix C: AHIMS Database Search

Appendix D: Artefact Scatter 1 – site card

Appendix E: Cultural Heritage Contingency Plan

Appendix F: Site Photos

1.0 The proposal

1.1 Locality

The Buronga Landfill is located on Arumpo Road, approximately 28km east of Wentworth. Access to the proposed site is via the sealed Arumpo Road and service road into the landfill (refer to Appendix A).

The proposed project site is for the development of borrow pits to provide landfill cover for the existing landfill and then be converted to landfill cells for future use. The proposal will allow for the continued operations and management of the existing facility. It is expected based on the current level of demand that the cells will be used for landfill until the year 2053. The site is located in the municipality of Wentworth, and referred to as Lot 1 DP1037845. The land is freehold and owned by the Wentworth Shire Council (WSC).

1.2 Objective of the proposal

The objective of this proposal is to develop soil borrow pits (extraction of soil) to be used at the adjacent landfill site as landfill cover, to adhere to the Environmental Protection Licence conditions. The borrow pits created would be converted to landfill cells for future expansion of the landfill site. Up to five additional borrow/cells are proposed, covering an area of 43.82ha (Appendix A).

Table 1 outlines the proposed project characteristics.

Table 1: Characteristics of the proposed project

Cell no	Cell area (ha)	Estimated commencement	Operational period	Comments
One	8.73	2015/2016	To June 2020	Part of existing landfill
Two	7.21	2019/20	July 2020 to June 2026	Staged development as landfill cover for existing landfill.
Three	7.22	2025/26	July 2026 to June 2032	Cover material for cell one (existing landfill)
Four	6.22	2031/32	July 2032 to June 2040	Staged development as landfill cover for existing landfill.
Five	8.19	2039/40	July 2040 to June 2048	Staged development as landfill cover for existing landfill.
Six	6.25	2047/48	July 2048 to June 2053	Staged development as landfill cover for existing landfill.

1.3 Estimated costs and commencement

The project will cost in the order of \$220,000 (ex GST) and cell three to be used as landfill cover is proposed to commence in mid-2016.

1.4 Description of borrow operations

The proposed location of the borrow pits is in a previously disturbed area, with black oak, mallee and hopbush requiring removal. The groundcover species, cannonball, poverty bush and common heliotrope and agricultural weeds dominate the site. The operation will be undertaken in various stages over the lifespan of the project.

Site preparation will involve removing trees and shrubs by mechanical grubbing. Topsoil (where applicable) will be windrowed for re-spreading across the top of the landfill site when it is full. During the borrowing process, the red loam soil will be ripped by a Cat D6 dozer and a front end loader (938) will load the soil directly onto a tip truck and trailer. No crushing or processing is required. Minimal stockpiling will occur, and only as required.

The soil will be progressively removed in small sections, working in an orderly pattern. The site will be dug down to between 5 and 9m deep.

1.5 Site lay out plans

The site layout is presented in Appendix A along with coordinates for each corner of the proposed cells. All mapping coordinates are GDA 1994, MGA Zone 54.

1.6 Site preparation

Site preparation for the proposed development will consist of:

- formally marking the proposed development area (including 'no go' zones) using flagging or bunting
- marking trees to be retained outside of proposal area
- grubbing trees and shrubs that will not be retained in the proposal area, staged to ensure no soil erosion occurs
- stripping and windrowing of topsoil as required for each stage
- installing 'truck entering' signs and general safety signs.

1.7 Infrastructure considerations

No permanent infrastructure will be required on site.

1.8 Rehabilitation

Other than ensuring erosion does not occur to the cell wall, and a safe and gentle slope (1:2 batters) is achieved, no rehabilitation is proposed as the borrow pits will become landfill cells.

1.9 Previous and existing operations

The site has been subject to historical grazing, wood cutting and quarrying activity. These activities no longer occur and the area has been fenced (security and six-strand stock fence).

1.10 Consideration of the alternatives and justification

All viable alternatives have been considered, including:

- trucking in borrow material from other areas
- using old soil quarries from other properties
- finding new sites in new locations and importing to Buronga landfill.

All above options have been considered and costed. The preferred option is presented in this SEE. The option relevant to this proposal is favoured, as it:

- has a good supply of borrow material
- will have minimal impact on the immediate and surrounding environment
- will not cause impacts to threatened flora or fauna
- will enable soil to be extracted and used near to where it is required and allow for future landfill expansion
- the site adheres to the siting restrictions of the Environmental Guidelines: Solid Waste Landfills, Second edition 2016 (EPA, 2016)

No other existing or likely future uses or activities on or near the site would be disadvantaged by this proposal. The land is zoned for the purpose of waste disposal. The land was purchased by the WSC for this purpose. The proposal will not affect any world heritage properties, national heritage places, wetlands of international importance (Ramsar sites) or Commonwealth marine areas.

2.0 Planning context

2.1 Purpose of this report

This Statement of Environmental Effects (SEE) has been prepared by Green Edge Environmental on behalf of WSC, which is the proponent and the consent authority under the Wentworth Local Environmental Plan 2011 (Reg 1.6) and Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the SEE is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented.

The description of the proposed works and associated environmental impacts have been undertaken in context of the Environmental Planning and Assessment Regulation 2000, the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This SEE helps to fulfil the requirements of Section 79C of the EP&A Act that WSC examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

2.2 Legislation and approvals required

The WSC is the consent authority to which this SEE will be lodged. The proposed location is in south-western New South Wales.

The overarching state legislation in relation to this activity is the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Environmental Planning and Assessment Regulation 2000. The activity is required for the operation and management of the existing licenced waste facility and is not listed under schedule 3 of the Environmental Planning and Assessment Regulation 2000, therefore not designated development.

The *Mining Act 1992* does not apply to this proposal as under the Mining Regulations (2012), schedule 1, soil is not a listed mineral.

An EPA licence under the protection of the *Environment Operations Act 1997*, is currently in place (EPL 20209).

The *Native Vegetation Act 2003* (NV Act) regulates the clearing of native vegetation in NSW. All clearing of remnant native vegetation or protected regrowth requires landholders to seek approval by obtaining a Property Vegetation Plan (PVP) from Local Land Services. WSC will work with the Western Local Lands Service to ensure appropriate offsets are in place utilising their existing offset area.

The development complies with the requirements of the *Fisheries Management Act 1994*, including the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A.

The *Threatened Species Conservation Act 1995* (TSC Act) lists a number of factors to consider when deciding whether there will be a significant impact on threatened species, populations or ecological communities and their habitats.

A Species Impact Statement (SIS) is required when the level of determined significance is 'likely'. As stated in Section 4, the proposal is not likely to significantly impact on a

threatened species, population or ecological community. Therefore, the proposal does not require approval under the TSC Act, or the completion of a SIS.

The National Parks and Wildlife Act 1974 (NPW Act), administered by the Office of Environment and Heritage (OEH), is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in New South Wales.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. There are a number of defences and exemptions to the offence of harming an Aboriginal object or Aboriginal place. One of the defences is that the harm was carried out under an Aboriginal Heritage Impact Permit (AHIP).

This project has assessed that impacts to any unknown cultural heritage sites of significance is unlikely, but as an isolated scatter was found a cultural heritage assessment adhering to the *Code of Practice for Archaeological Investigation of Aboriginal objects in NSW* and an AHIP is required (refer to section 4.11).

Under the Federally administered *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), actions which are likely to have a significant impact on matters of National Environmental Significance (NES) require approval from the Commonwealth Minister for Environment and Heritage. Matters of NES include:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development.

No matters of NES will be impacted upon by the proposed project.

The objectives of the *Water Management Act (2000)* are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations. One key aim is to integrate the management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna. This act will not be triggered as the water will be extracted through existing water licences.

2.3 Relevant policies

The State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) aims to assist in the effective delivery of public infrastructure across the NSW. This is achieved by improving certainty and regulatory efficiency through a consistent planning assessment and approvals regime for public infrastructure and services, and through the clear definition of environmental assessment and approval processes for public infrastructure and services facilities.

The Infrastructure SEPP 2007 is applicable as the projects will assist in maintaining public infrastructure:

Under Clause 121 Development without consent—general states

(3) Development for the purpose of the recycling of construction and demolition material, or the disposal of virgin excavated natural material (as defined by the *Protection of the Environment Operations Act 1997*) or clean fill, may be carried out by any person with consent on land on which development for the purpose of industries, extractive industries or mining may be carried out with consent under any environmental planning instrument.

2.4 Local environmental plans

Wentworth Local Environmental Plan (LEP) 2011

The site is located within the Wentworth local government area and as such the Wentworth LEP 2011 applies. Under the LEP, WSC is the determining authority. Applicable sections of the LEP include:

Cultural Heritage Conservation

Clause 5.10 of the LEP specifies the requirements of the consent authority in relation to impacts on areas of cultural and heritage significance. This project has assessed that impacts to any unknown cultural heritage sites of significance is unlikely (refer to section 4.11).

Biodiversity Conservation

Clause 7.4 of the LEP specifies the consent authority must consider any adverse impacts from the proposal on the following:

- the condition, ecological value and significance of the fauna and flora on the land
- the importance of the vegetation on the land to the habitat and survival of native fauna
- any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land
- any likely adverse impact on the habitat elements providing connectivity on the land.

An assessment of the likely impacts of the proposal is located in Section 4.

Draft Western Local Strategic Plan

The State Strategic Plan and the Western Local Strategic Plan (in draft) will assist Local Land Services achieve its vision of resilient communities in productive healthy landscapes. To achieve this vision, Local Land Services needs to align all of its work with its mission of being a customer-focused business that enables improved primary production and better management of natural resources. The goals of the Plan include:

- Self-reliant, adaptive and prepared communities
- Productive, biosecure and sustainable primary industries operating in resilient landscapes
- Effective, efficient and integrated service delivery underpinned by collaboration, adaptive management and local decision making

The strategies that underpin these goals are around supporting land managers capacity to improve land management and enterprise viability, collaborate with industry and government to adapt to climate change, involve local people in decision making to drive continuous improvement in the services, policies and projects and an adaptive approach to planning, implementation and service delivery

Other than the implementation of the NV Act, the Local Lands Service has no regulatory authority on this project.

2.5 Relevant guidelines

A number of guidelines were consulted during the preparation of this SEE including:

- Environmental Guidelines: Solid Waste Landfills, Second edition, NSW EPA (2016)
- Agricultural Issues for Extractive Industries Development Factsheet (Department of Primary Industries)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft, 2004, Department of Environmental and Conservation)
- Threatened Species Assessment of Significance Guidelines (DEH, undated)
<http://www.environment.nsw.gov.au/threatenedspecies/tsaguide.htm>

2.6 Zoning

Under the Wentworth LEP, the proposed project area is zoned Special Purpose Zone - Infrastructure (SP2). Under this zone, 'waste or resource management facility' means a waste or resource transfer station, a resource recovery facility or a waste disposal facility.

2.7 Determining authority

Under the Wentworth Local Environmental Plan 2011 - Reg 1.6, the determining authority is the WSC.

2.8 Stakeholder consultation

The following relevant stakeholders have been consulted on the proposal and their recommendations and requirements have contributed to the development of the SEE, where applicable, including:

- NSW Office of Environment and Heritage
- Local Lands Service - Western
- Wentworth Shire Council

3.0 Location

3.1 Site description

The proposed project area is located on land that has been historically used for grazing, wood cutting and quarrying. The area is located to the east of the Arumpo Road, approximately 2.5km north of the Silver City Highway.

Two vegetation types occur on site which meet the Plant Community Type criteria, including:

- Black Oak - Western Rosewood open woodland on deep sandy loams of Murray-Darling Depression and Riverina Bioregions (Benson 58 or plant community type LM108)
- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (Benson 170 or plant community type LM116)

These PCT's are mapped in Appendix A.

3.2 Land systems and geology

The proposed project is located within the Murray Basin Geological province. Quaternary material covers almost all of the area. Quaternary alluvial deposits comprise the riverine plain. Scattered aeolian (windblown) deposits also occur throughout (Cunningham *et al* 1992).

The Murray Basin is a shallow depression filled with marine and terrestrial sediments to a maximum depth of 600m over the last 50-60 million years. Shallow seas have moved back and forth across the plains several times, leaving traces of parallel beach ridges and limestone sediments under the dunefields. At one stage, the coast reached as far inland as Balranald (OEH, 2011).

Sandy surface sediments have been extensively reworked into dunes and sandplains that have blown onto the Cobar peneplain. Some dunes have consistent east-west linear patterns, others are parabolic, suggesting differences in vegetation cover, sand supply or age. The Darling River and streams in the Riverina have cut through the sands and constructed numerous overflow lakes such as the Sayers Lake system and the abandoned pleistocene channels and basins of the Willandra Lakes complex (OEH, 2011).

Saline groundwaters have formed salt basins in many places where the sandplain or dune topography intersects the water table. All lakes and swamps have well-formed lunettes on their eastern margins that record evidence of climate change and human occupation. A few bedrock ridges rise above the sandplains as isolated ranges (OEH, 2011).

The proposed project area is gently undulating with a gentle slope towards the east. The site is on a slight north-south ridge and the elevation across the site is between 37 and 44m Australian Height Datum (AHD).

3.3 Hydrology and geomorphology

No creeks, streams or waterways run through the proposed site. The proposed activity will not impact on the hydrogeology and geomorphology of the site.

3.4 Soil

Soils in the depositional basin are deep red sands with variable sandy profiles under dunes, and gradational profiles in the sandplains. Most soils have a moderate to high level of calcium carbonate in the profile (ANRA, 2009).

Sandplains contain deep calcareous loams to loamy sands. These are associated with sandy red-brown duplex soils. Limestone nodules are exposed in some areas (ANRA, 2009).

Soils and vegetation differ according to the landform. On the dunefields red, brown and yellow calcareous sands occur with more clayey materials in the swales. On sandplains the soil tends to be heavier with brown gradational or texture contrast profiles, and mallee is found only on sandy rises (OEH, 2011).

Vegetation communities on site are linked to soil type. The deep red loams support the Black oak community and the heavier loam over clay soil support the mallee communities. To the east, outside of the project area, is a Black box community on silty sand over riverine clay.

3.5 Climate

The annual average minimum temperature is 10.3 °C, monthly values varying from 4.3°C during July (the lowest on record is -4.4°C) to 16.5°C during January. There are four nights per annum when the temperature falls below 0°C. The annual average maximum temperature is 23.6°C - monthly values vary from 15.2°C in July to 31.9°C in January (the highest on record is 50.8°C). There are, on average, 77 days per annum when the temperature exceeds 30°C, including 30 hot days when the temperature rises above 35°C (BOM, 2012).

The mean annual rainfall for the Wentworth area is 292mm (refer to Table 2). The lowest rainfall on record is 113mm and the highest on record is 705mm. Rainfall reliability in the area is generally very low (BOM, 2015).

Table 2: Mildura Airport Rainfall Data

	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Au	Sep	Oct	Nov	Dec
Mean monthly rainfall (mm)	21.1	20.3	18	18.5	25.6	22.9	26.4	26.7	27.8	30.6	24	23.4
Highest monthly rainfall (mm)	92.2	100.9	128.2	120.4	86.3	82.2	59.4	74.8	88.3	120.6	129.9	181.2
Lowest monthly rainfall (mm)	0	0	0	0	0	0	0.6	1.2	3	0	0	0
Highest daily rain (mm)	3.6	3.1	3.4	4.2	6.8	7.9	9.3	9	7.6	7.1	5.5	4.3

4.0 Environmental impacts and management

This section outlines the environmental impacts of extracting soil for landfill, covering the existing landfill and converting the borrow areas to landfill cells for future use.

4.1 Natural resource use

The natural resource to be won is soil, which is required to be used for cover on the nearby existing landfill. Under the EPL held by WSC, the landfill is to be covered each night. The borrow areas will then be converted to landfill cells for future use.

4.1.1 Mitigation measures

- Borrow pit sites to be marked out using permanent markers indicating 'no go zones'
- The development will be staged, removal of trees and stripping of topsoil will only occur as required based on the demand level for cover material
- Supervision of earthworks will be undertaken by a suitably qualified/experienced person as per WSC policies
- Staff trained in best practice management in earthworks to minimise impacts on non-target natural resources

4.2 Hydrology and geomorphology

No creeks, streams or waterways run through the proposed project site. The nearest permanent natural water supply is the Gol Gol Creek, which is approximately 2km south east, and the Murray River, approximately 4.2km to the south west of the site. Due to the distances from these water sources and the shallow depth over which earthworks will occur, no impacts to the hydrology and geomorphology of the surrounding environment are expected.

4.2.1 Mitigation measures

- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015)
- Adhere to the Environmental Protection Licence (20209) conditions and reporting requirements.

4.3 Erosion and sedimentation

The proposal is unlikely to cause erosion down slope, due to the gentle slope in topography of the surrounding land. To minimise erosion, topsoil will only be stripped as required to develop the borrow pits. During borrowing, controls such as sediment fences will be employed as required. Borrow pit walls will be developed so a safe and gentle slope (1:2 batters) is achieved

The existing access track will be maintained by spreading gravel (if required) to protect the soil during carting activity to minimise fugitive dust.

4.3.1 Mitigation measures

- Borrow pit sites to be marked using permanent markers indicating 'no go zones'

- Temporary sediment control structures shall be maintained at all times during borrowing and checked, repaired, replaced or cleaned out after any significant rainfall event
- Staff trained in best practice management in erosion and sedimentation control
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015)

4.4 Surface water

No creeks, streams or waterways run through the proposed project site. The proposal will not impact on any Ramsar listed wetlands.

No hazardous materials will be stored on site and no sewerage facilities will be established that could impact on surface water flows, should they occur.

The water to be used on site for dust suppression and earthworks will come from existing WSC water licence supplies.

Most plant and equipment will be serviced either at the WSC depot off site, or at another designated location. Contingency plans adhering to relevant Australian standards and guidelines will be developed to deal with any spills that may occur. Machinery will be checked daily to ensure that there are no leakages of oil, fuel or other liquids.

4.4.1 Mitigation measures

- Daily pre-start machinery checks will be made for leaks of oil, fuel or other liquids
- Contingency plans will be in place to deal with spills, adhering to relevant Australian standards and guidelines and conforming to leading practice
- All vehicles to be serviced off-site
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- No machinery, fuels, oils, chemicals, hazardous substances or other earthmoving equipment will be stored within the borrow site when not in use
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015)

4.5 Groundwater

The site is situated within the Murray Geological Basin, which is located within the Murray-Darling surface water drainage basin. The Murray Geological Basin comprises up to 600 m of Cenozoic sedimentary deposits with basin contours showing dominant north east trending troughs and ridges.

The main depositional centre is known as the Renmark Trough bounded to the west by the Hamley Fault, separating it from a smaller depression to the west. The Neckerboo Ridge is a basement high located east of the Darling River. The site is situated on the eastern flank of the Renmark Trough, west of the Neckerboo Ridge (in GHD, 2012).

The site is underlain by the Lower Remark Group aquifer hosted by fluvio-lacustrine sediments comprising fine to medium grained quartz sand and carbonaceous silt and clay. The regional groundwater flow direction in the vicinity of the site is expected to be in a south westerly direction towards the Murray River. Recharge to the aquifer is typically from the basin margins, with groundwater flow being towards the basin depocentre in the vicinity of Renmark (in GHD, 2012).

Aquifer yields are generally high and commonly exceed 5 L/s. This reflects significant thicknesses of interbedded fine to medium-grained micaceous quartz sands in the fluvial sequences. A search of the NSW groundwater database identified aquifer yields only over 50 L/s are estimated for the central basin, due to partial filling of the troughs by medium to coarse quartz sands of the Warina Sand basal deposit (GHD, 2012).

Groundwater in the Lower Renmark Group is suitable for stock use only, with typical salinities between 11,000 and 13,000 mg/L total dissolved solids (TDS). In this area, recharge is mostly via bed leakage from the Darling River further to the north (in GHD, 2012).

A search of the NSW Natural Resource Atlas database was conducted identifying groundwater bores within 2 km of the site (by GHD on 1 December 2009) and is presented in Table 3. A total of five boreholes were listed within 1 km, and a further 20 bores 1 - 2 km from the site. Based on the information available, a total of nine boreholes were considered, details of which are summarised in Table 3.

Table 3: Groundwater Well Data

Number	Approx RL	BH Depth (mbgl)	Water level (mbgl)	Water level (RL)
GW088479	40.5	61	7.37	33.13
GW087083	39	20	9.29	29.71
GW088168	40	10.5	nd	na
GW087039	40	11	nd	na
GW087074	40	14	nd	na
GW087038	40	11	nd	na
GW087328	40	16	nd	na
GW087325	45	14	nd	na
GW088305	35	21	1.54	33.46

All boreholes considered within the vicinity of the site were registered as monitoring wells, suggesting that they are not used for groundwater abstraction to any significant degree. These boreholes vary in depth from 10.5 to 61.0 metres below ground level (mbgl). Information on water levels was only available for three of the boreholes and varied from 1.5 to 7.4 mbgl (RL29.71 to RL33.46). Note that the majority of the borehole RLs (and hence the RLs of the water levels) are based on limited topographical information and are only accurate to +/- 5 m (GHD, 2012).

Geolyse (2015) undertook a hydrogeological assessment based on the data provided in GHD (2012) of the Buronga landfill and made the following conclusions:

Based on Geolyse's review of existing hydrogeological assessments and available groundwater monitoring data for the Buronga Landfill, this assessment finds that sufficient information exists to demonstrate that groundwater impacts have not yet been detected, and can be managed such that any future impact can be minimised.

Conclusions from the GHD Geotechnical Investigation demonstrate that during groundwater monitoring in 2010 and 2012 there was no indication of existing leachate migration into the off-site groundwater. In addition, the GHD Engineering Report identifies a thick, low permeability clay layer (undisturbed, 3.3×10^{-10} m/s) that forms an effective aquitard beneath the landfill. It is also noted material can and will be sourced on-site to provide a capping layer that will meet EPA's criteria of 1×10^{-8} m/s).

Further, the comparison of groundwater data obtained by GHD to data reported in the 2013-14 Annual Return (for EPL 20209) indicates that changes observed in groundwater quality parameters are likely due to natural fluctuations in regional groundwater quality, as opposed to existing leachate migration into off-site groundwater.

Appropriate leachate minimisation and management measures are already identified in the Buronga Landfill LEMP; these measures are implemented at the Buronga Landfill to mitigate the risk of leachate contaminating groundwater aquifers below the site, and to manage any groundwater contamination should it occur.

Based on the above conclusions, this assessment adequately addresses the requirements of condition U5.1 of EPL 20209 as:

- *No adverse impacts to groundwater have been identified in this assessment and given that the site has been operating as a landfill for several years (since 1934), it is unlikely that leachate is emanating from the existing unlined Buronga Landfill and adversely impacting on groundwater; and*
- *There are adequate leachate minimisation and management measures implemented at the landfill to mitigate the risk of adverse impacts to groundwater, and to manage any groundwater contamination.*

Based on Geolyse (2015) review no groundwater impacts are expected.

4.5.1 Mitigation measures

- Daily pre-start machinery checks for leaks of oil, fuel or other liquids
- Contingency plans will be in place to deal with spills, adhering to relevant Australian Standards and Guidelines and conforming to leading practice
- No machinery, fuels, oils, chemicals, hazardous substances or other earthmoving equipment will be stored within the borrow site when not in use
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015).

4.6 Soils

All of the proposed project area has been disturbed due to continuous grazing by livestock, rabbits, and timber removal to facilitate grazing and for fencing materials. More recently, quarrying activity in the north-eastern section has occurred. The material to be won consists of suitable borrow material required to adhere to the EPL.

The topsoil will be managed to ensure that on completion of borrowing, topsoil can be re-spread on the landfill capping and rapid germination of the seed store can occur. Regularly servicing machinery off-site, adhering to the WSC's refuelling policy and

ensuring a spill kit is on-site at all times will ensure that existing soil retained on site will be free from contamination.

4.6.1 Contamination

The existing soil is not known to be contaminated and no new contamination is expected as a result of undertaking the proposed activity.

4.6.2 Acid sulphate soils

There are no areas that are subjected to periods of sustained inundation followed by drying which can lead to the production of acid sulphate soils. When potential acid sulphate soils are disturbed or exposed to oxygen, the iron sulphides are oxidised to sulfuric acid and the soil becomes strongly acidic (usually below pH 4). These soils are then called actual acid sulphate soils and they have a pH of less than 4.0 (Department of Environmental Resources Management, 2009).

4.6.3 Mitigation measures

- Staff to be trained in best practice management in soil conservation and management
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- A spill kit will be permanently attached to the portable fuel cart, which is brought on to site each day
- All machinery to be serviced off site
- Supervision of earthworks will be undertaken by a suitably qualified/experienced person as per WSC policies
- Borrow material will only be extracted and used as required
- Borrowing will only occur during suitable conditions e.g not on days of rain, high wind or flooding.

4.7 Matters of National Environmental Significance

An Environmental Protection and Biodiversity Conservation (EPBC) Act Protected Matters Search Tool report was generated for the study area on a 5km buffer. The report indicated:

- no World Heritage Areas near the proposed site
- no items of National Heritage Places near the proposed site
- the study site is located upstream from three (3) wetlands of international importance
- no Commonwealth Marine areas near the proposed site
- potential for two (2) threatened ecological communities to exist within the proposed site
- potential for sixteen (16) threatened species to occur in the vicinity of the proposed site
- potential for eight (8) migratory species to occur within the vicinity of the proposed site.

Further assessments undertaken as part of this project revealed that no matters of national significance will be impacted upon, and therefore, no referral under the EPBC Act is required.

4.8 Flora

4.8.1 Bioregion and PCT type

The proposed project site is located in the Murray Darling Depression Bioregion of the Lower Murray-Darling Catchment.

According to the NSW Native Vegetation Classification and Assessment Project (NSWVCA), two vegetation communities occur on-site:

- Black Oak - Western Rosewood open woodland on deep sandy loams of Murray-Darling Depression and Riverina Bioregions (Benson 58 or plant community type LM108)
- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (Benson 170 or plant community type LM116).

Details of this PCT are shown in Table 4.

Table 4: PCT characteristics

PCT	Dominant canopy spp	Main associated spp	Landscape position	Characteristic mid-storey spp	Characteristic groundcover spp	Other diagnostic features
LM108	Black Oak (<i>Casuarina pauper</i>), Western Rosewood (<i>Alectryon oleifolius</i> subsp. <i>canescens</i>)	Sugarwood (<i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>), <i>Pittosporum angustifolium</i>	On level to undulating sandplains, sandy rises and interdune swales.	Wilga (<i>Geijera parviflora</i>), Silver Cassia (<i>Senna</i> form taxon 'artemisioides'), <i>Senna eremophila</i> , <i>Exocarpos aphyllus</i> , Thorny Saltbush (<i>Rhagodia spinescens</i>), Black Bluebush (<i>Maireana pyramidata</i>), <i>Maireana brevifolia</i>	<i>Sclerolaena diacantha</i> , <i>Austrostipa nitida</i> , Speargrass (<i>Austrostipa scabra</i> subsp. <i>scabra</i>), <i>Zygophyllum apiculatum</i> , <i>Polycalymma stuartii</i> , <i>Tetragonia moorei</i> , <i>Salsola tragus</i> subsp. <i>tragus</i> ,	Mid-high (about 7 m high) low open woodland or isolated clumps of trees. Occurs on calcareous earths (pH >7) of red to red-brown loam, sand and texture contrast soils. Widely distributed in the far south-western NSW mainly in the Murray Darling Depression Bioregion.
LM116	White Mallee (<i>Eucalyptus dumosa</i>), Glossy-leaved Red Mallee (<i>Eucalyptus oleosa</i>), Snap and Rattle (<i>Eucalyptus gracilis</i>), Red Mallee (<i>Eucalyptus socialis</i>), Narrow-leaved Red Mallee	White Cypress Pine (<i>Callitris glaucophylla</i>), Slender Cypress Pine (<i>Callitris gracilis</i> subsp. <i>murrayensis</i>), Western Rosewood (<i>Alectryon oleifolius</i> subsp. <i>canescens</i>), Bulloak (<i>Allocasuarina luehmannii</i>), Black Oak	On aeolian sandplains or in interdune plains or swales.	<i>Chenopodium curvispicatum</i> , Pearl Bluebush (<i>Maireana sedifolia</i>), <i>Maireana georgei</i> , Black Bluebush (<i>Maireana pyramidata</i>), <i>Maireana pentatropis</i> , <i>Maireana brevifolia</i> , <i>Maireana erioclada</i> , Sugarwood (<i>Myoporum platycarpum</i>	Ruby Saltbush (<i>Enchylaena tomentosa</i>), <i>Atriplex stipitata</i> , <i>Zygophyllum apiculatum</i> , <i>Zygophyllum aurantiacum</i> , <i>Dissocarpus paradoxus</i> , <i>Chenopodium desertorum</i> subsp. <i>desertorum</i>	Bull mallee woodland or open mallee shrubland most usually about 8 m tall. Occurs on calcareous red-brown, sandy-loam or loamy clay soils, sometimes containing limestone nodules.

(Eucalyptus leptophylla)	(Casuarina pauper)	subsp. platycarpum), Acacia microcarpa, Silver Cassia (Senna form taxon 'artemisioides'),
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4.8.2 Threatened species

A database search was undertaken on 9 February 2016 of the NSW Environment and Heritage (BioNet Atlas of NSW Wildlife) and the Department of the Environment websites to identify threatened species that may be found within the proposed project site as listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment and Heritage BioNet Atlas of NSW Wildlife (refer to Appendix B)
- Department of the Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report (refer to Appendix B).

No threatened flora species were identified from a 5km² radius database search.

4.8.3 Threatened communities

The above-mentioned databases were also searched for threatened communities. Four threatened communities were listed, including:

- *Acacia loderi* shrublands
- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions
- Bullock Woodlands of the Riverina and Murray-Darling Bioregions

None of these communities occur at the proposed project site or will be impacted upon by the proposal.

4.8.4 Flora site assessment

A general flora assessment was conducted across the proposed project site and the surrounding area on 18 February 2016 by Chris Alderton (B App Sci). The half-day assessment, adhering to Table 5.1 Survey Effort (DEC, 2004), focused on areas of likely higher vegetation values and active searches of likely habitat for reptiles and small mammals. Weather conditions were a clear sky, maximum temperature of 30°C and no wind.

According to the DEC field survey methods (DEC, 2004), the study area was 'random stratified' assessment based on vegetation type, aerial imagery information and the site assessment. The survey method undertaken is described as a 'stratified ramble assessment', where the whole site was assessed, with particular focus on areas of higher quality habitat (older trees with potential for nests and hollows, better quality

vegetation) that could be potentially impacted upon. Two vegetation types occur within the study site. The stratification units included (refer to Appendix A):

- Chenopod sandplain mallee woodland
- Black oak – western rosewood open woodland
- Black box open woodland

The study area does form part of a corridor linking the black box woodlands to the Mallee between the Gol Gol Lake and The Mourquong Swamp. There are other connections between these landscape features so the connectivity value is lower than if there were no other linkages. Hollow and nest bearing trees were observed within the study area and mitigation activities prior to removal should be adhered to (Section 4.8.5). The vegetation condition on-site was observed as 'low' according to DEC (2004).

The flora assessment revealed no vegetation species; populations or communities, which are of local, regional or state conservation significance (refer to Table 5).

Table 5: Flora Species recorded on-site

Scientific name	Common name	Threatened/Status
<i>Acacia homalphylla</i>	Yarran	No
<i>Acacia oswaldi</i>	Umbrella wattle	No
<i>Acacia victoriae</i>	Prickly acacia	No
<i>Alectryon oleifolius</i>	Western rosewood	No
<i>Allocasuarina pauper</i>	Black oak	No
<i>Atriplex stipitata</i>	Bitter saltbush	No
<i>Callitris glaucophylla</i>	White Cypress-pine	No
<i>Chenopodium melanocarpum</i>	Black Crumbweed	No
<i>Dissocarpus paradoxa</i>	Cannon ball	No
<i>Eucalyptus largiflorens</i>	Black box	No
<i>E. socialis</i>	Pointed Mallee	No
<i>Enchylaena tomentosa</i>	Ruby saltbush	No
<i>E. gracilis</i>	Yorrell	No
<i>Lysiana exocarpi</i> ssp. <i>exocarpi</i>	Harlequin mistletoe	No
<i>Marieana brevifolia</i>	Yanga Bush	No
<i>Marieana sedifolia</i>	Peal bluebush	No
<i>Myoporum patycarpum</i>	Sugarwood	No
<i>Nicotiana glauca</i>	Native Tobacco	No

Scientific name	Common name	Threatened/Status
<i>Pittosporum angustifolium</i>	Native apricot	No
<i>Rhagodia spinescens</i>	Hedge saltbush	No
<i>Sclerolaena diacantha</i>	Grey copperburr	No
<i>Solanum esuriale</i>	Quena	No
<i>Zygophyllum apiculatum</i>	Common Twin leaf	No

Denotes introduced species

4.8.5 Mitigation measures

- Borrowing site to be marked out using permanent markers indicating 'no go zones'
- Species profiles to be kept on-site of threatened species that have potential to inhabit the site
- Prior to removal of vegetation, trees shall be checked for fauna that may be present and if found, individuals shall be relocated by suitably trained and accredited persons.

4.9 Fauna

4.9.1 Threatened species

A database search was undertaken on 9 February 2016 of the NSW Environment and Heritage (BioNet Atlas of NSW Wildlife) and the Department of the Environment websites to identify threatened species that may be found within the proposed project site as listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment and Heritage BioNet Atlas of NSW Wildlife (refer to Appendix B)
- Department of the Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report (refer to Appendix B).

None of these species were recorded during site assessments on 18 February 2016.

Table 6 lists the fauna species with state and national conservation significance that have the potential to occur within the study area. The column in Table 6 headed 'comment', identifies the suitability of the site for the particular species, such as for habitat utilisation, nesting/burrowing requirements, food and water requirements and the vegetation type preferred by the species. Five of those species have 'potential habitat' so have been assessed for significance, as per the Threatened Species Assessment Guidelines (DECC, 2007) (Appendix B).

green

Table 6: Listed Fauna Species

Class	Common name	Species name	State	National	Comment
Aves	Freckled Duck	<i>Stictonetta naevosa</i>	V		No potential habitat, prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree.
Aves	Spotted Harrier	<i>Circus assimilis</i>	V		Potential habitat
Aves	Little Eagle	<i>Hieraaetus morphnoides</i>	V		Potential habitat
Aves	Square tailed-kite	<i>Lophoictinia isura</i>	V		Potential habitat
Aves	Curlew Sandpiper	<i>Curlew Sandpiper</i>	E	CE	No potential habitat, it generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts
Aves	Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	V		Potential habitat
Aves	Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>	V		Potential habitat
Aves	Black-chinned Honeyeater	<i>Melithreptus gularis gularis</i>	V		Predicted to occur at this location, unlikely habitat requirements on site. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), White Box (<i>E. albens</i>), Inland Grey Box (<i>E. microcarpa</i>), Yellow Box (<i>E. melliodora</i>), Blakely's Red Gum (<i>E. blakelyi</i>) and Forest Red Gum (<i>E. tereticornis</i>).
Aves	Gilbert's whistler	<i>Pachycephala inornata</i>	V		Unlikely habitat, the Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer.
Aves	Australian Painted Snipe	<i>Rostratula australis</i>	E	E	No potential habitat prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses,

green

Class	Common name	Species name	State	National	Comment
					lignum/low scrub.
Mammal	Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	V	E	No potential habitat and not known from this region.
Amphibia	Southern Bell-frog	<i>Litoria raniformis</i>	E	V	No potential habitat

4.9.2 Fauna site assessment

A general fauna assessment was conducted across the proposed area, including nearby areas of intact vegetation, by Chris Alderton (B App Sci). The assessment also focused on the access to the site and surrounding habitats. It was noted that nests and hollows exist within the area proposed to be removed. To minimise impacts a staged approach to vegetation clearing will be undertaken, that is only vegetation required to be removed is and not all cells at once. The three-step process as outlined in Section 4.9.3 shall be used at all times to minimise disturbance to birds and other hollow dwelling species.

The fauna assessment revealed no species; population or communities, which are of local, regional or state conservation significance (refer to Table 7). The number of species recorded on site was average for the timing of the assessment, weather conditions, quality of habitat foraging areas, food and water sources.

Table 7: Fauna species recorded on site

Scientific name	Common name	Threatened
<i>Columba livia domestica</i>	Pigeon	No
<i>Corvus bennetti</i>	Little Crow	No
<i>Eolophus roseicapilla</i>	Galah	No
<i>Gymnorhina tibicen</i>	Australian Magpie	No
<i>Manorina melanocephala</i>	Noisy Miner	No
<i>Ocyphaps lophotes</i>	Crested Pigeon	No
<i>Psephotus varius</i>	Mulga Parrot	No
<i>Ctenotus sp.</i>	Stripped Skink	No

4.9.3 Mitigation measures

- Borrow pits and stockpiles are to be examined prior to work starting each day to remove any reptiles or other fauna that may be within the work site
- Profiles of threatened species that have potential to inhabit the site will be kept on site.
- A three step tree removal process should be undertaken where:
 - 1. the tree is hit with a hard object (ie sledge hammer or excavator bucket), five minutes before the tree is brought to the ground
 - 2. The tree is felled and left to remain in place overnight to allow any animals to escape
 - 3. The felled tree is removed to the stockpile location for rehabilitation at a later date.

4.10 Weeds and pests

Weed and pest animal assessments were conducted within the proposed borrow area on 18 February 2016, recording weed and pest attributes by Chris Alderton (B App Sci). Twelve weed species were observed and three introduced fauna species refer to Table 8 which also lists the species status.

Table 8: Weed and pest observed

Scientific name	Common name	Status
<i>Carrichtera annua</i>	Wards Weed	
<i>Centaurea calcitrapa</i>	Star thistle	
<i>Cucumis myriocarpus</i>	Paddy melon	
<i>Datura Spp.</i>	Downy thorn-apple	
<i>Heliotropium europaeum</i>	Common heliotrope	
<i>Lycium ferocissimum</i>	African Boxthorn	Class 4 – Locally controlled, WoNS
<i>Marrubium vulgare</i>	Horehound	Class 4 – Locally controlled
<i>Nothoscordum inodorum</i>	Onion weed	
<i>Psilocaulon tenure</i>	Match-head Plant	
<i>Salvia verbenaca</i>	Wild Sage	
<i>Schinus sp.</i>	Peppercorn	
<i>Tribulus terrestris</i>	Caltrop	
<i>Columba livia domestica</i>	Pigeon	
<i>Oryctolagus cuniculus</i>	European Rabbit	
<i>Bos sp.</i>	Cattle	

4.10.1 Mitigation measures

- Machinery will be washed down off-site prior to entering the proposed borrow areas to ensure it is weed free
- The WSC weeds officer to monitor the area regularly.

4.11 Heritage

A site inspection was conducted 18 April 2016 by Sarah Watts from Sunset Archaeological Services who holds a Bachelor of Archaeology with Honours. The site inspection included participation by Noel Johnston and Rodney Lawson of the Barkindji community.

The site inspection involves a pedestrian survey which progressed on north to south transects from the western side of the project area to the eastern side. Participants were spaced between 1.5 to 4 meters apart during the physical survey providing a detailed survey of approximately 80% of the project area. Visibility during the survey varied between 50 to 80 % with the poorer areas of visibility being those around the existing trees due to leaf litter and denser low lying vegetation while the open cleared land (western side) provided great visibility with the only hindrance being small patches of grasses and ground vegetation.

The western side of the project area appears to have only been disturbed by grazing animals and rabbits during warren preparation. While the eastern side of the project area has been significantly disturbed during loam extraction and later motor bike riders. It was noted there was significant amount of rubbish on the ground surface and eroding

out of the soil on the eastern side suggesting repetitive ground disturbances. There are mature trees throughout the project area but none of these trees showed any signs of Aboriginal cultural scarring.

At the conclusion of the onsite inspection only one site was discovered, Buronga Landfill Artefact Scatter 1, at co-ordinates E610565 N 6223164 Zone 54 and consisted of a sandstone core split in two. A site card was lodged with NSW Office of Environment and Heritage and an AHIP should be gained for this site.

The assessment did not reveal any other areas where conservation activities to protect cultural heritage material are required. Historical quarrying in the north-east corner of the project area provides an indication of subsurface conditions.

The Murray River is located approximately 4.2km south west of the project site, which would have provided a permanent water supply and the Gol Gol Creek and lakes would have filled intermittently only during times of a high river and emptied back to the river on flood recession. The proposed borrow area did not contain features that the Aboriginal monitors believed warranted further investigation.

An Aboriginal Heritage Information Management System (AHIMS) database search was undertaken of the lot and DP, with a 1km buffer (refer Appendix C). Two Aboriginal sites were recorded north of the proposed borrow area, both open sites.

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010) was reviewed to determine if an Aboriginal Heritage Impact Permit (AHIP) is required. Section 8 of this document provides a flow chart of the due diligence process.

This project has assessed that impacts to any unknown cultural heritage sites of significance is unlikely, but as an isolated scatter was found, therefore, a cultural heritage assessment adhering to the Code of Practice for Archaeological Investigation of Aboriginal objects in NSW and an AHIP is required.

As outlined in the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW, a number of assessments and tests have been undertaken to ensure no harm is caused to places of Aboriginal significance.

This code sets out the reasonable and practicable steps that individuals and organisations need to take in order to:

1. identify whether or not Aboriginal objects are, or are likely to be, present in an area.
2. determine whether or not their activities are likely to harm Aboriginal objects (if present).
3. determine whether an AHIP application is required.

In following the generic due diligence process, the following processes have occurred (refer to Table 9)

Table 9: Due diligence process

Step	Guide	Response
<i>1a. Will the proposed activity disturb the ground surface or any recorded culturally modified trees?</i>	Review project footprint in relation to the AHIMS search to determine whether the proposed activity will disturb the ground surface or involve vegetation clearance including lopping.	Yes - move to step 2a(i)
<i>2a(i). Search the AHIMS database and determine whether any Aboriginal sites have been recorded in or within 1000 metres of the project area.</i>	If not already undertaken, undertake 'basic' AHIMS search of the project area with a 1000 metre buffer of the project area Lot and DP. Append AHIMS basic search results <input checked="" type="checkbox"/>	Two sites - go to step 2a(ii)
<i>2a(ii). Obtain copies of AHIMS records</i>	If not already undertaken from step 2, undertake 'extensive' AHIMS search of the project area with a 1000 metre buffer of the project area Lot and DP. Append AHIMS extensive search results <input checked="" type="checkbox"/> Map project area and all AHIMS results using GDA94 latitude and longitude data. If not already undertaken at step 2 above, map AHIMS results and append <input checked="" type="checkbox"/> Request and review copies of all site cards within the searched area. Append all site cards <input checked="" type="checkbox"/>	Number of Aboriginal objects in the searched area: Two Aboriginal Sites In all instances, go to step 2a(iii)
<i>2a(iii). Review other sources of information to determine whether Aboriginal objects are likely to be present in the project area?</i>	If you are aware of other sources of information, you need to use these to identify whether or not Aboriginal objects are likely to be present in the project area. Previous studies <input checked="" type="checkbox"/> Previous reports <input checked="" type="checkbox"/> Previous archaeological surveys <input checked="" type="checkbox"/> Review relevant Local Environmental Plan, notably Schedule 5 and maps <input type="checkbox"/> Other <input type="checkbox"/> Append results <input type="checkbox"/>	As a result of step 2a(iii), are there likely to be additional Aboriginal objects or areas of Aboriginal cultural heritage sensitivity present in the project area? Yes - describe nature, extent and significance below. Go to step 2b An Aboriginal Cultural Heritage Assessment (ACHA) was undertaken in around 2000 and a second in 2010 at a Gypsum Mine nearby at the Mourquong Lake which did not locate any cultural heritage assets. An ACHA was undertaken in 2008 at the Australian Vintage Winery waste water expansion site which also did not located are areas of CH significance.

		<p>An ACHA was conducted in 1992 for National Parks and Wildlife by J.L. Craib. The study included the area between Wentworth and Gol Gol with part of the study focusing on Lake Mourquong. During the survey along the eastern lunette of Lake Mourquong only two pieces of chipped stone were discovered, a silcrete core and a quartz flake. No cultural heritage was discovered within the survey areas on the western margins of the lake.</p> <p>Describe the expected nature, extent and significance of the Aboriginal objects and/or areas of Aboriginal cultural heritage sensitivity.</p> <p>As previous studies concluded the higher frequency of cultural heritage sites are likely to be found within one kilometre from a fresh water source. As the activity area is 1.7 kilometres from the Gol Gol Lake and 500 meters from Lake Mourquong there is a possibility of finding Aboriginal cultural heritage. The cultural heritage most likely to be found include hearths, lithic scatter, scarred trees, shell deposits and ancestral burials.</p>
<p>2b. Having regard to landscape features, are Aboriginal objects likely to be present in the project area?</p>	<p>Is any part of the proposed activity on land that is not disturbed land <u>and</u>:</p> <p>Within 200 metres of waters? <input type="checkbox"/></p> <p>Within a sand dune system? <input type="checkbox"/></p> <p>On a ridge top, ridge line or headland? <input type="checkbox"/></p> <p>Within 200 metres below or above a cliff face? <input type="checkbox"/></p> <p>Within 20 metres of, or in a cave, rock shelter, or a cave mouth? <input type="checkbox"/></p> <p>Append mapped results <input type="checkbox"/></p>	<p>No boxes checked and reasonable to conclude that there are no known Aboriginal objects or a low probability of objects occurring in the project area - no further due diligence required. Proceed with caution</p> <p>There are no features present within the project area which are likely to contain Aboriginal Cultural heritage.</p>
<p>3. Can you avoid harm to the object or disturbance of the landscape feature?</p>	<p>Where, as a result of step 2a(i, ii, iii) you think it is likely that there are Aboriginal objects present in the project area, describe whether you can avoid harm to those objects.</p> <p>Where you have checked any boxes in step 2b above, describe whether you can redesign the project area to avoid the landscape feature(s).</p> <p>Append results <input type="checkbox"/></p>	<p>Due diligence site assessment recommended.</p>

<p>4. Engage heritage consultant to undertake visual inspection and desktop assessment for the purposes of due diligence.</p>	<p>Undertake a desktop assessment of Aboriginal heritage. This must consider the project area as a whole, not just the particular area(s) where Aboriginal object(s) have been recorded on AHIMS or where landscape features are located. At a minimum this should include existing knowledge of Aboriginal cultural heritage from previous reports or studies, including any reports from AHIMS.</p> <p>Append results of the desktop assessment <input type="checkbox"/></p> <p>Undertake a visual inspection of the project area to determine whether Aboriginal objects are present, or likely to be present in the project area. Ground truth recorded Aboriginal objects in and adjacent to the project area. The visual inspection must be undertaken by a person with expertise in locating and identifying Aboriginal objects, i.e., a consultant with appropriate qualifications, or an Aboriginal person or landholder with experience in locating and identifying Aboriginal objects.</p> <p>Append results of the visual inspection <input type="checkbox"/></p>	<p>No - no further due diligence required. Proceed with caution</p> <p>A site inspection was conducted 18 April 2016 by Sarah Watts from Sunset Archaeological Services who holds a Bachelor of Archaeology with Honours. The site inspection included participation by Noel Johnston and Rodney Lawson of the Barkindji community. The site inspection involves a pedestrian survey which progressed on north to south transects from the western side of the project area to the eastern side. Participants were spaced between 1.5 to 4 meters apart during the physical survey providing a detailed survey of approximately 80% of the project area. Visibility during the survey varied between 50 to 80 % with the poorer areas of visibility being those around the existing trees due to leaf litter and denser low lying vegetation while the open cleared land (western side) provided great visibility with the only hindrance being small patches of grasses and ground vegetation. The western side of the project area appears to have only been disturbed by grazing animals and rabbits during warren preparation. While the eastern side of the project area has been significantly disturbed during loam extraction and later motor bike riders. It was noted there was significant amount of rubbish on the ground surface and eroding out of the soil on the eastern side suggesting repetitive ground disturbances. There are mature trees throughout the project area but none of these trees showed any signs of Aboriginal cultural scarring. At the conclusion of the onsite inspection only one site was discovered, Buronga Landfill Artefact Scatter 1, at co-ordinates E610565 N 6223164 Zone 54 and consisted of a sandstone core split in two (refer Appendix D).</p>
<p>Step 5. Further investigations and impact assessment</p>	<p>Step 5 must be undertaken by a person with expertise in Aboriginal cultural heritage management.</p>	<p>A cultural heritage assessment adhering to the Code of Practice for Archaeological Investigation of Aboriginal objects in NSW and an AHIP is required.</p>

4.11.1 Other cultural heritage

The State Heritage Register (NSW Environment and Heritage) database was used to determine if any areas of historic value were located on or nearby the proposed project site. There are no other known cultural heritage sites within the proposed project area. This was to be expected due to the remoteness of the proposed project area and the lack of visible remnants located through the on site assessment.

4.11.2 Mitigation measures

- Follow the contingency plan outlined in Appendix E
- If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking earthwork activities, the proponent must:
 1. Not further harm the object
 2. Immediately cease all work at the particular location
 3. Secure the area so as to avoid further harm to the Aboriginal object
 4. Notify OEH as soon as practical on 131555, providing any details of the Aboriginal object and its location
 5. Not recommence any work at the particular location unless authorised in writing by OEH.

4.12 Air quality

The nearest residence and receptor is located more than 1.2km south-west of the borrow site and the nearest public road is approximately 200m west. Given the remoteness from any residence or public road, there will be no impact from the expected minor raised dust that may occur from time to time during heavy vehicle movements and plant operation.

The key performance indicator will be no complaints or raised dust received at the residences over 1.2km away. Ongoing monitoring will occur visually by dust observed around the residences. Records of increased dust will be kept and recorded with the property's rainfall records. The response mechanism will be to stop activity causing dust if possible or to mitigate using sprayed water. Compliance will be enforced by the on-site WSC team leader.

Practices associated with earthworks that could affect air quality include bush fire, exhaust emissions from vehicles and plant and windblown dust during operational periods. To mitigate dust, rock will be applied to the road between the borrow pit and the landfill as required to minimise raised dust from transport activities.

Where dust becomes an issue, despite the laying of crushed rock, water may be sprayed over the tracks.

4.12.1 Mitigation measures

- No burning of timber or other combustible materials will occur on-site
- All plant and equipment will be equipped with fire extinguishers
- Staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles and plant will be regularly serviced, be in good working order and emissions will be kept within manufacturers standards
- Roads between the borrow pit and landfill will be maintained to the WSC quality standards allowing efficient and safe operation

- Borrowing/carting operations will cease if severe wind conditions are present.

4.13 Socio and economic

The objective of this proposal is to secure a source of cover material to allow the landfill to operate within its licence conditions. This borrow material will allow local residences to continue to use the landfill. The beneficiaries of this proposal will be local residents and businesses as they will be able to continue to dispose of their rubbish and recycle products to ensure that there is as little harm to the environment as possible.

4.13.1 Economic

The expected cost of the development is approximately \$220,000 by the time the borrow pits are operational. Additional costs include the maintenance of plant and equipment required for borrowing and carting cover material.

The operation will employ local drivers and operators throughout the life of the landfill. The economic returns to the local economy will be by way of income through employment. The flow-on effects are important to the Wentworth, Dareton and Buronga areas.

4.13.2 Social

The proposal will not disadvantage any individuals or communities, and consultation with all known affected groups has been undertaken.

As required by any construction site in NSW, appropriate signage will be placed around the borrow area, including truck turn in, PPE and general safety signs. Due to the shallow depth of the borrow pit, no safety fencing will be required.

4.13.3 Impact on the community

Although the character of the area would be slightly affected, by minimising the extent of the impact and undertaking rehabilitation, there would be minimal long-term impacts.

4.13.4 Visual impact

The proposed borrow areas will have low visual impact due to the screening of native vegetation between the Arumpo Road and the project area. The Borrow areas will be converted in to landfill cells and repurposed. Ongoing rehabilitation of the existing landfill will occur once it is full.

4.13.5 Mitigation measures

- Appropriate signage as required under legislation and adherence with best practice management
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015).

4.14 Transport

The proposed project will utilise existing tracks from the Arumpo Road to the borrow site. No trucks will be required to use the Arumpo Road (or any other road network) for carting borrow material between the borrow site and the landfill.

A bulldozer, front end loader, two tip trucks and up to two light vehicles will be required.

This project will be undertaken with adherence to relevant legislation and best practice management.

It is expected that a contractor and/or WSC staff will travel to the site each day (up to two light vehicles) between 6.30am and 7.30am. There may be up to 25 truck movements per day and the contractor/WSC staff will leave the site between 4pm and 6pm each evening. The impact of these additional short-term vehicle movements will not impact the existing traffic mix, consisting of local landholders, travellers and stock carting transport.

4.14.1 Mitigation measures

- Staff shall be trained in fire fighting techniques in the event of a bushfire, or fire on plant or equipment
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015).

4.15 Noise and vibration

The main source of noise may arise from the use of heavy machinery to extract and load borrow material; and trucks to cart the material between sites. Considering the distance of the project area from the nearest residence (receptor) is over 1km away; and the hours of operation (7am to 6pm Monday to Friday and 8am to 12noon Saturday), any noise created will not cause a significant detrimental impact on the surrounding land users.

Table 10 is adapted from Bassett Acoustics (2007) in the Northern Expressway Noise and Vibration Technical Paper, which predicts noise levels without mitigation in urban environments. In rural environments, 50dB is acceptable. Noise decreases with distance, so with the nearest receptor 1km away the predicted dB will be well below acceptable limits.

Table 10: Predicted dB(A) noise levels at various distances

Plant type	7m	25m	50m	100m	200m
Front end loader	88	77	71	65	59
Large Bulldozer	92	81	75	69	63
Road truck	83	72	66	60	54
Crushing plant	91	80	74	68	62

Major sources of ground vibration include bulldozers (ripping), front end loaders and truck movements during work. Vibrations generated from construction and earthmoving activities are expected to be similar in magnitude as those generated from the operation of similar equipment to be used.

Ground vibration impacts at specific levels of magnitude may either:

- disturb occupants of buildings
- disturb contents of buildings by rattling, shaking or movements

- affect structural integrity of a building.

Table 11 indicates the approximate vibration levels that may be expected for various vibration sources (Bassett Acoustics, 2007). Due to the nearest receptor being over 1km away, no vibration is expected due to the large distance between activity and receptor.

Table 11: Approximate generated ground vibration levels (mm/s) for various sources

Activity	Typical levels of ground vibration
Hydraulic rock breakers	4.5mm/s @5m 1.30mm/s @10m 0.4mm/s @20m 0.10mm/s @50m
Bulldozer	1-2mm/s @5m (approx.) 2mm/s @15m >0.3mm/s@<30m
Truck traffic (irregular surfaces)	0.1-2.0mm/s at footings of buildings 10-20m from a road way

4.15.1 Mitigation measures

- Plant and equipment serviced and using manufacturers specified mufflers
- Borrowing operations to occur on site only during business hours (7am-6pm Monday to Friday and 8am -12pm Saturday).

4.16 Bushfire hazards

Due to the nature of the proposal and the composition of vegetation species at the site, it is highly unlikely that the vegetation would carry a fire. The wide spacing of individual trees and the limited amount of dry matter of grass species present (due to the arid climate and grazing) would not be conducive to the spread of fire.

No bushfires are known to have spread through the area in the last 25 years.

4.16.1 Mitigation measures

- No burning of timber or other combustible materials will occur on site
- All plant and equipment will be equipped with fire extinguishers
- Staff shall be trained in firefighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles and plant will be regularly serviced, be in good working order and emissions to be kept within manufacturers standards
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015).

4.17 Chemical and hazardous substance management

No hazardous substances will be stored on site. Limited hazardous substances will be brought on site, in particular fuels and lubricants, eg. oil, grease and distillate, as the fuel for heavy equipment will be transported as required on utility, trailer or fuel truck. Best management practices will be followed when these substances are transferred and in use as stipulated by WSC work practices. Empty containers will be taken off the site and suitably disposed of to landfill or for recycling.

4.17.1 Mitigation measures

- Staff trained in best practice in chemical and hazardous substance management
- All vehicles and machinery to be regularly serviced, be in good working order and emissions to be kept within manufacturers standards
- Staff shall be trained in fire fighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles serviced off-site
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- No fuels or lubricants to be stored on site
- In the event of unexpected breakdown of heavy machinery on the site, the spill kit will be used to prevent leakage of petroleum products to the soil - should soil contamination occur, soil will be removed to a licensed facility as per EPA guidelines
- Any discarded oils, worn machinery parts, damaged tyres, broken hoses or empty containers will be removed to a waste storage area on the day they are generated.

4.18 Waste minimisation and management

The work site will operate in a tidy, rubbish-free state. Any wastes generated will be contained and removed from the site for recycling or safe disposal. No environmental problems are anticipated with the disposal of potential waste.

4.18.1 Mitigation measures

- Staff will be trained in best practice in all areas of earthworks.

4.19 Stormwater management

The WSC has a stormwater management plan in place, which will be implemented throughout the life of the project. The aim of this plan is to ensure that all stormwater is retained on-site and there are no off-site impacts. The plan includes measures for maintaining current roads and borrow areas. Due to the porous nature of the loamy soil, stormwater infiltrates quickly through the soil profile and rarely causes a problem.

4.19.1 Mitigation measures

- Maintain current stormwater management plan
- Install cut-off drains as required
- Install silt fences and erosion control as required
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015).

4.20 Cumulative environmental impacts

The cumulative environmental impacts of the proposal will be minimal. As stated throughout Section 4, each identified impact has been assessed for its potential threat to the environment. Mitigation measures will help minimise the impact on the proposed project area, as well as off-site impacts.

4.21 Summary of mitigation measures

A range of mitigation measures will be put in place to ensure the proposal has minimal impact on the environment, both on site and off site, including:

- Daily pre-start machinery checks for leaks of oil, fuel or other liquids
- Contingency plans will be in place to deal with spills, adhering to relevant Australian Standards and Guidelines and conforming to leading practice
- The development will be staged, removal of trees and stripping of topsoil will only occur as required based on the demand level for cover material
- No machinery, fuels, oils, chemicals, hazardous substances or other earthmoving equipment will be stored within the borrow site when not in use
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- Adhere to the Buronga Landfill – Landfill Environmental Management Plan (WSC, 2015)
- Staff to be trained in best practice management in soil conservation and management
- Staff inducted on refuelling procedures, which will be stored with refuelling equipment
- A spill kit will be permanently attached to the portable fuel cart, which is brought on to site each day
- All machinery to be serviced off-site
- Supervision of earthworks will be undertaken by a suitably qualified/experienced person as per WSC policies
- Borrow material will only be extracted and used as required
- Borrowing will only occur during suitable conditions e.g not on days of rain, high wind or flooding
- Borrowing site to be marked out using permanent markers indicating 'no go zones'
- Species profiles to be kept on-site of threatened species that have potential to inhabit the site
- Prior to removal of vegetation, trees shall be checked for fauna that may be present and if found, individuals shall be relocated by suitably trained and accredited persons.
- Machinery will be washed down off-site prior to entering the proposed borrow areas to ensure it is weed free
- The WSC weeds officer to monitor the area regularly
- Borrow pits and stockpiles are to be examined prior to work starting each day to remove any reptiles or other fauna that may be within the work site
- Profiles of threatened species that have potential to inhabit the site will be kept on site.

- A three step tree removal process should be undertaken where:
 - 1. the tree is hit with a hard object (ie sledge hammer or excavator bucket), five minutes before the tree is brought to the ground
 - 2. The tree is felled and left to remain in place overnight to allow any animals to escape
 - 3. The felled tree is removed to the stockpile location for rehabilitation at a later date.
- Follow the contingency plan outlined in Appendix E
- If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking earthwork activities, the proponent must:
 - 1. Not further harm the object
 - 2. Immediately cease all work at the particular location
 - 3. Secure the area so as to avoid further harm to the Aboriginal object
 - 4. Notify OEH as soon as practical on 131555, providing any details of the Aboriginal object and its location
 - 5. Not recommence any work at the particular location unless authorised in writing by OEH
- No burning of timber or other combustible materials will occur on-site
- All plant and equipment will be equipped with fire extinguishers
- Staff shall be trained in fire fighting techniques in the event of a bushfire, or fire on plant or equipment
- All vehicles and plant will be regularly serviced, be in good working order and emissions will be kept within manufacturers standards
- Roads between the borrow pit and landfill will be maintained to the WSC quality standards allowing efficient and safe operation
- Borrowing/carting operations will cease if severe wind conditions are present.
- Appropriate signage as required under legislation and adherence with best practice management
- Plant and equipment serviced and using manufacturers specified mufflers
- Borrowing operations to occur on site only during business hours (7am-6pm Monday to Friday and 8am -12pm Saturday).
- Maintain current stormwater management plan
- Install cut-off drains as required
- Install silt fences and erosion control as required
- Staff trained in best practice in chemical and hazardous substance management
- No fuels or lubricants to be stored on site
- In the event of unexpected breakdown of heavy machinery on the site, the spill kit will be used to prevent leakage of petroleum products to the soil - should soil contamination occur, soil will be removed to a licensed facility as per EPA guidelines
- Any discarded oils, worn machinery parts, damaged tyres, broken hoses or empty containers will be removed to a waste storage area on the day they are generated.

5.0 Risk Management

Table 12 provides an overview of the risks associated with the proposed project. The table should be read down the left hand side column to identify the issues at the site and then the activities, processes or facilities are listed across the top of the table.

The table has been completed using a risk assessment of low (L), medium (M) and high (H) and not applicable (n/a).

Table 12: Environmental Risk Identification Matrix

Issue	Activity, Process or Facility													
	Land preparation, vegetation & topsoil	All quarrying activities including earth moving	Mine development and mining, surface &	Use/maintenance of roads, tracks and	Waste rock emplacement management	Mineral processing facilities and operations	Ore/product stockpiling and handling	Tailings impoundment management	water management including storm event	Hazardous materials & fuel, handling/spills	Sewerage	Other infrastructure use and operation	Rubbish disposal	Rehabilitation activities
Natural resources use	M	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Hydrology and geomorphology	L	L	L	L	L	L	L	n/a	M	L	n/a	L	L	M
Floodplain and riparian habitat	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Erosion and sedimentation	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Surface water	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Groundwater	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Soils	M	M	M	M	L	L	L	n/a	L	L	n/a	L	L	L
Flora	M	L	M	L	L	L	L	n/a	L	L	n/a	L	L	L
Fauna	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Weeds and pests	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L
Heritage	M	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L

	Activity, Process or Facility															
Issue	Land preparation, vegetation & topsoil	All construction activities including earth moving	Mine development and mining, surface &	Use/maintenance of roads, tracks and	Waste rock emplacement management	Mineral processing facilities and operations	Ore/product stockpiling and handling	Tailings impoundment management	water management including storm event	Hazardous materials & fuel, handling/spills	Sewerage	Other infrastructure use and operation	Rubbish disposal	Rehabilitation activities	Rehabilitation maintenance, pending	Rehabilitated land and remaining features
Air quality	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Socio and economic	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Transport	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Noise and vibration	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Bushfire hazards	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Chemical and hazardous substance management	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Waste minimisation and mgt	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L
Stormwater management	L	L	L	L	L	L	L	n/a	L	L	n/a	L	L	L	L	L

Legend – L=Low, M=medium, n/a not applicable

6.0 Summary of impacts and conclusions

Table 13 summarises the potential impact of the project, following a thorough on site assessment and various database searches on threatened species and cultural heritage. Overall, the level of impact is expected to be low and this is further reduced through the implementation of mitigation measures summarised in Section 4.

Table 13: Summary of potential impacts

Section	Potential Impact	Summary of Impacts
4.1	Natural resource use	Removal of borrow material
4.2	Hydrology and geomorphology	No impact
4.3	Erosion and sedimentation	No impact
4.4	Surface water	No impact
4.5	Groundwater	No impact
4.6	Soils	Removal and stockpile of topsoil for respreading, borrow material for landfill cover
4.7	Matters of NES	No impact
4.8	Flora	Removal of vegetation, no impact on threatened species
4.9	Fauna	No impact on critical habitat for threatened species
4.10	Weeds and pests	No impact
4.11	Heritage	Unlikely impacts to unknown sites and objects based on desktop and on site assessment. AHIP will be gained for the open site located as part of the due diligence process.
4.12	Air quality	Some vehicle emissions and dust from borrowing activity, will not cause problems due to low population density
4.13	Socio and economic	No adverse impacts
4.14	Transport	No public roads to be used for carting activities
4.15	Noise and vibration	Use of machinery to extract, load and cart borrow material
4.16	Bushfire hazards	No impacts
4.17	Chemical and Hazardous Substance	No impacts, none stored on site, oils, grease, fuel
4.18	Waste Minimisation	No impacts
4.19	Stormwater Management	No off-site impacts

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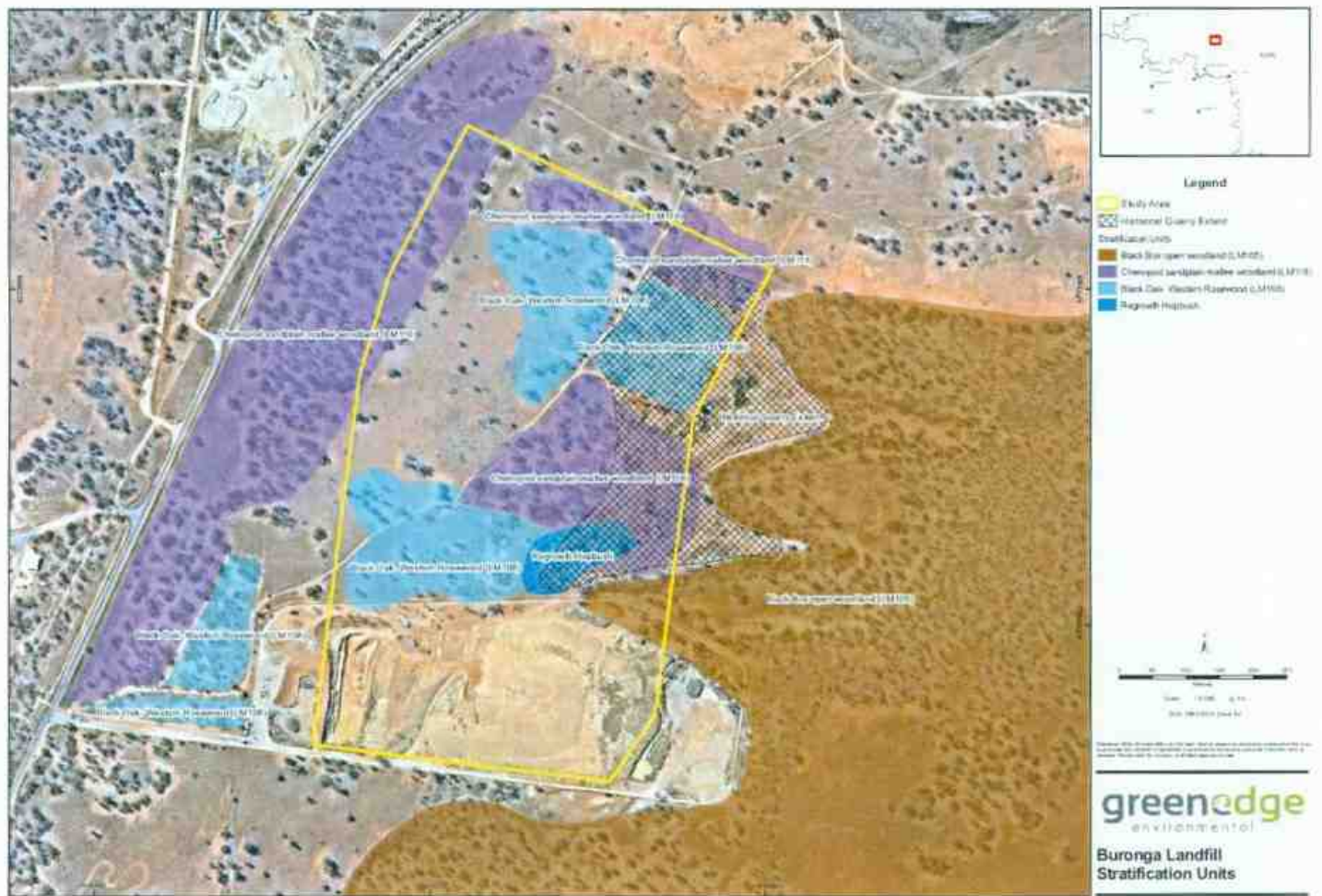
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Appendix B: Assessment of significance and threatened species searches

Assessment of significance for borrow pit development adjacent to Buronga Landfill

Introduction

This assessment of significance is part of the review of environmental factors, 28km west of Wentworth, NSW. The proposed borrow pit location is located north of the existing licence landfill known as Buronga Landfill.

The objective of this proposal is to secure a source of borrow material (soil) to be used for daily cover as required under the landfills environmental protection licence. The proposal is to extract borrow material up to 13m deep across up to five (5) new cells. The proponent is the Wentworth Shire Council (WSC).

In respect to terrestrial biodiversity values, the area has been modified (grazing, vegetation clearing, and quarrying) and contains the species commonly found in such environments, including native grasses, rangeland groundcover and introduced species.

The proposed works occur within the WSC municipal area and within the Local Lands Service - Western. The proposed borrow site is located in the Murray Darling Depression Bioregion.

According to the NSW Native Vegetation Classification and Assessment Project (NSWVCA), the vegetation at the site is classified as:

- Black Oak - Western Rosewood open woodland on deep sandy loams of Murray-Darling Depression and Riverina Bioregions (Benson 58 or plant community type LM108)
- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (Benson 170 or plant community type LM116).

A database search was undertaken on 9 February 2016 of the NSW Environment and Heritage (BioNet Atlas of NSW Wildlife) and the Department of the Environment websites to identify threatened species that may be found within the proposed quarrying site as listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environmental Protection and Biodiversity Act 1999* (EPBC Act).

A desktop search of the online databases was undertaken as follows:

- NSW Environment and Heritage BioNet Atlas of NSW Wildlife
- Department of the Environment, Environmental Protection and Biodiversity Conservation (EPBC) Protected Matters Report

The following threatened species have potential to occupy the site and have triggered a seven part assessment of significance:

- Spotted Harrier (*Circus assimilis*)
- Little Eagle (*Hieraaetus morphnoides*)
- Square tailed-kite (*Lophoictinia isura*)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)
- Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*)

Spotted Harrier (*Circus assimilis*) (Vulnerable – NSW)

(a) In the case of a threatened species, state whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Due to the large habitat range of the species, the lifecycle is not likely to be disrupted such that a viable local population is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A – The Spotted Harrier is not considered an endangered population at this location.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A – Spotted Harrier is not considered an endangered ecological community, but a single species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Due to the small nature of the proposal and no habitat observed on site, the proposal is not cause fragmentation or isolations from other foraging/hunting habitats. The habitat proposed to be modified is not critical to the long term survival of the species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat was observed on site, therefore will not have an adverse effect on critical habitat (either directly or indirectly).

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has not been developed for this species but recovery actions are outlined under the Saving Our Species program.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The action constitutes part of the following key threatening processes as listed in the *TSC Act 1995* Schedule 3:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Little Eagle (*Hieraaetus morphnoides*) (Vulnerable – NSW)

(a) In the case of a threatened species, state whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. The species occupies open eucalypt forest, woodland or open woodland. Due to the large habitat range of the species, the lifecycle is not likely to be disrupted such that a viable local population is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A – The Little Eagle is not considered an endangered population at this location.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A – The Little Eagle is not considered an endangered ecological community, but a single species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Due to the small nature of the proposal and no habitat observed on site, the proposal is not cause fragmentation or isolations from other foraging/hunting habitats. The habitat proposed to be modified is not critical to the long term survival of the species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat was observed on site, therefore will not have an adverse effect on critical habitat (either directly or indirectly).

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has not been developed for this species but recovery actions are outlined under the Saving Our Species program.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The action constitutes part of the following key threatening processes as listed in the *TSC Act 1995* Schedule 3:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Square tailed-kite (*Lophoictinia isura*) (Vulnerable- NSW)

(a) In the case of a threatened species, state whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Due to the large habitat range of the species, the lifecycle is not likely to be disrupted such that a viable local population is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A – The Square tailed-kite is not considered an endangered population at this location.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A – The Square tailed-kite is not considered an endangered ecological community, but a single species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Due to the small nature of the proposal and no habitat observed on site, the proposal is not cause fragmentation or isolations from other foraging/hunting habitats. The habitat proposed to be modified is not critical to the long term survival of the species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat was observed on site, therefore will not have an adverse effect on critical habitat (either directly or indirectly).

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has not been developed for this species but recovery actions are outlined under the Saving Our Species program.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The action constitutes part of the following key threatening processes as listed in the *TSC Act* 1995 Schedule 3:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) (Vulnerable - NSW)

(a) In the case of a threatened species, state whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Major Mitchell's Cockatoo is found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Due to the large habitat range of the species, the lifecycle is not likely to be disrupted such that a viable local population is likely to be placed at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A – The Major Mitchell's Cockatoo is not considered an endangered population at this location.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A – The Major Mitchell's Cockatoo is not considered an endangered ecological community, but a single species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Due to the small nature of the proposal and no habitat observed on site, the proposal is not cause fragmentation or isolations from other foraging/hunting habitats. The habitat proposed to be modified is not critical to the long term survival of the species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat was observed on site, therefore will not have an adverse effect on critical habitat (either directly or indirectly).

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has not been developed for this species but recovery actions are outlined under the Saving Our Species program.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The action constitutes part of the following key threatening processes as listed in the *TSC Act 1995* Schedule 3:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*) (Vulnerable - NSW)

(a) In the case of a threatened species, state whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction.

The Purple-crowned Lorikeet occurs across the southern parts of the continent from Victoria to south-west Western Australia. It is uncommon in NSW, with records scattered across the box-ironbark woodlands of the Riverina and south west slopes, the River Red Gum forests and mallee of the Murray Valley as far west as the South Australian border, and, more rarely, the forests of the South Coast. The species is nomadic and most, if not all, records from NSW are associated with flowering events. Found in open forests and woodlands, particularly where there are large flowering eucalypts. Also recorded from mallee habitats. Feed primarily on nectar and pollen of flowering Eucalypts, including planted trees in urban areas. Due to the large habitat range of the species, the lifecycle is not likely to be disrupted such that a viable local population is likely to be place at risk of extinction.

(b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

N/A – The Purple-crowned Lorikeet is not considered an endangered population at this location.

(c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

N/A – The Purple-crowned Lorikeet is not considered an endangered ecological community, but a single species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

Due to the small nature of the proposal and no habitat observed on site, the proposal is not cause fragmentation or isolations from other foraging/hunting habitats. The habitat proposed to be modified is not critical to the long term survival of the species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat was observed on site, therefore will not have an adverse effect on critical habitat (either directly or indirectly).

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A recovery plan has not been developed for this species but recovery actions are outlined under the Saving Our Species program.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The action constitutes part of the following key threatening processes as listed in the *TSC Act 1995* Schedule 3:

- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)

Conclusions

The assessment of significance for:

- Spotted Harrier (*Circus assimilis*)
- Little Eagle (*Hieraaetus morphnoides*)
- Square tailed-kite (*Lophoictinia isura*)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)
- Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*)

revealed that the potential impacts of the proposal on these threatened species are extremely unlikely and where there could be potential impacts they will be very low. Potential minor impacts resulting from the proposed quarry are not expected to increase the likelihood of a threatened or endangered species becoming extinct.

The assessment of significance for these threatened species does not trigger the requirement for a species impact statement (SIS). The proposal is deemed to be non-significant for the assessed

species. In determining the significance of the proposed works on threatened species, the following matters were taken into consideration:

- implementation of the proposed works, including pre construction, construction, operation and maintenance phases
- activities to be undertaken in the area following the proposed works
- all direct and indirect impacts, on and off site impacts through all phases
- the frequency and duration of each known or likely impact/action
- the total impact which can be attributed to that action over the entire geographic area affected initially and over time
- the sensitivity of the receiving environment
- the degree of confidence with which the impacts of the action are known and understood.

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Australian Government
Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/02/16 21:47:15

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

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[Buffer: 5.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	16
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	24
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name		Proximity
Banrock station wetland complex		150 - 200km upstream
Riverland		100 - 150km upstream
The coorong, and lakes alexandrina and albert wetland		200 - 300km upstream

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea	Approval Disallowed	Community may occur within area

Listed Threatened Species		[Resource Information]
---------------------------	--	--------------------------

Name	Status	Type of Presence
Birds		
Botaurus poeciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Manorina melanotis Black-eared Miner [449]	Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis anthoepus monarchoides Regent Parrot (eastern) [59612]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Craterocephalus fluviatilis Murray Hardyhead [56791]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascogaleus cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Plants		
Lepidium monophlooides Winged Pepper-creep [9190]	Endangered	Species or species habitat likely to occur within area
Solanum karsense Menindee Nightshade [7776]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species	[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.	

Name	Status	Type of Presence
Birds		
<i>Acridotheres tristis</i> Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
<i>Anas platyrhynchos</i> Mallard [974]		Species or species habitat likely to occur within area
<i>Carduelis carduelis</i> European Goldfinch [403]		Species or species habitat likely to occur within area
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Passer domesticus</i> House Sparrow [405]		Species or species habitat likely to occur within area
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur within area
<i>Turdus merula</i> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area
<i>Capra hircus</i> Goat [2]		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<i>Lepus capensis</i> Brown Hare [127]		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Oryctolagus cuniculus</i> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<i>Rattus rattus</i> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<i>Sus scrofa</i> Pig [6]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<i>Asparagus asparagoides</i> Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
<i>Cabomba caroliniana</i> Cabomba, Fanwort, Carolina Watershield, Fish		Species or species

Name	Status	Type of Presence
Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		habitat may occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.12239-142.20254

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Parks and Wildlife Commission NT, Northern Territory Government](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix E: Cultural Heritage Contingency Plan

Appendix D: Artefact Scatter 1 – site card

STILL BEING PROCESSED NOT YET AVAILABLE



AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buringa Landfill 2
Client Service ID : 220235

SiteID	SiteName	State	Zone	Easting	Northing	Contact	Site Status	Site Category	Site Types	Records
46-3-0092	Buringa Loose Pit 1	GDA	S4	611120	6223710	Open site	Valid	Artefact : 1		
	Contact Searle					Recorders Time Capsule Earth			Permits 2442	
46-3-0093	Buringa Loose Pit 2	GDA	S4	611900	6223670	Open site	Valid	Artefact : 1		
	Contact Searle					Recorders Time Capsule Earth			Permits 2495	

Report generated by AHIMS Web Service on 12/04/2016 for Chris Allecton for the following area of Lot : 1, DP/DP1037045 with a buffer of 1000 meters. Additional Info : REF: Number of Aboriginal sites and Aboriginal objects found is 2

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (OEH) and its employees disclaim liability for any act done or omission made on the information and consequences of such act or omission.

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette](http://www.nsw.gov.au/gazette) (<http://www.nsw.gov.au/gazette>) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.



Office of
Environment
& Heritage

AHIMS Web Services (AWS) Search Result

Purchase Order/Reference : Buronga Landfill 2

Client Service ID : 220335

Chris Alderton

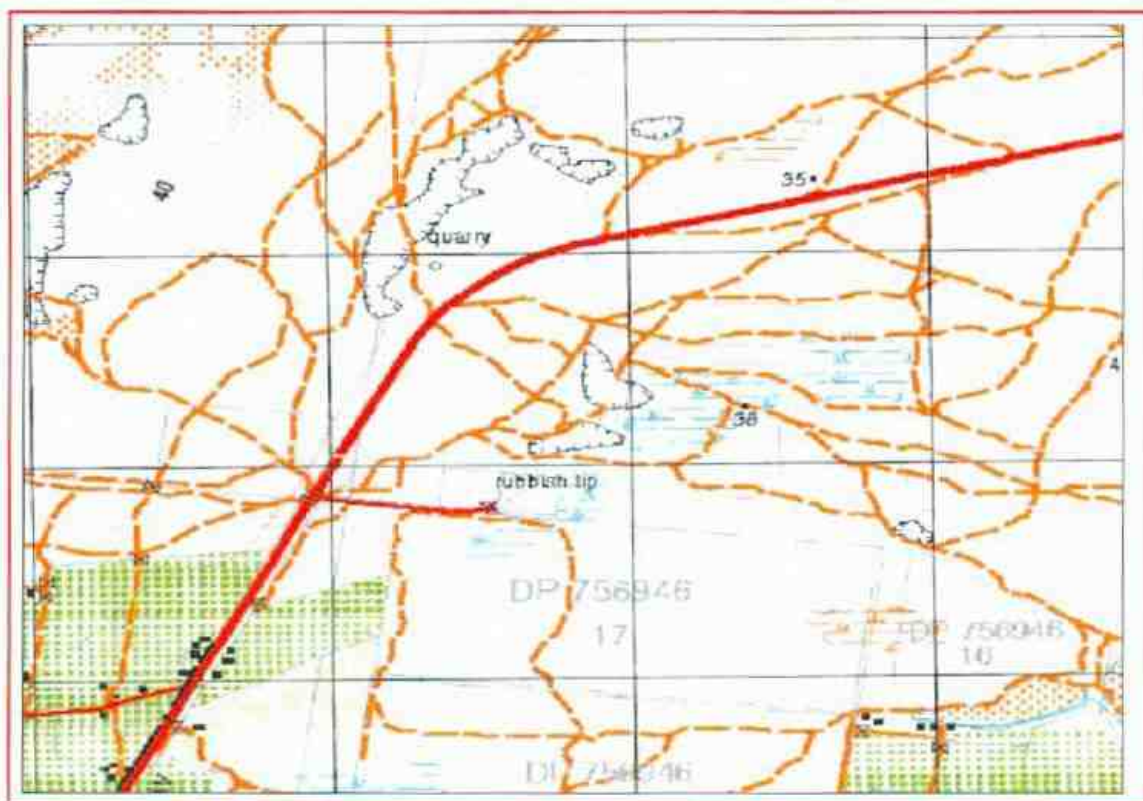
Date: 12 April 2016

c/o Springton Post Office
Springton South Australia 5235
Attention: Chris Alderton
Email: chris_alderton@hotmail.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP1037845 with a Buffer of 1000 meters, conducted by Chris Alderton on 12 April 2016.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:




2	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

Appendix C: AHIMS Database Search

NSW Endangered Ecological Communities

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (* rounded to 0.1°, ** rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Communities in selected area [North: -34.05 West: 142.14 East: 142.24 South: -34.15] returned 0 records for 3 entities.

Report generated on 9/02/2016 9:57 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Community				<i>Acacia loderi</i> shrublands		Acacia loderi shrublands	E3		P	
Community				<i>Acacia melvillei</i> Shrubland in the Riverina and Murray-Darling Depression bioregions		Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	E3		K	
Community				Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions		Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E3		P	

NSW threatened and endangered fauna

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are *only* indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°, ^^ rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Animals in selected area [North: -34.05 West: 142.14 East: 142.24 South: -34.15] returned a total of 1,096 records of 177 species.

Report generated on 9/02/2016 9:54 PM

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Hylidae	3207	<i>Litoria raniformis</i>	Southern Bell Frog	E1,P	V	1
Animalia	Aves	Anatidae	0214	<i>Stictonetta naevosa</i>	Freckled Duck	V,P		1
Animalia	Aves	Accipitridae	0218	<i>Circus assimilis</i>	Spotted Harrier	V,P		3
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		2
Animalia	Aves	Accipitridae	0230	^^ <i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		1
Animalia	Aves	Rostratulidae	0170	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	4
Animalia	Aves	Scolopacidae	0163	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	C,J,K	1
Animalia	Aves	Scolopacidae	0161	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	1
Animalia	Aves	Cacatuidae	0270	^ <i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V,P,2		2
Animalia	Aves	Psittacidae	0259	^^ <i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	V,P,3		1
Animalia	Aves	Meliphagidae	8303	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		8
Animalia	Aves	Pachycephalidae	0403	<i>Pachycephala inornata</i>	Gilbert's Whistler	V,P		5
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	1

Contingency plan in the event of Aboriginal material being found

Aboriginal object is discovered and/or harmed in, or under the land, while undertaking earthwork activities, the proponent must:

1. Not further harm the object;
2. Immediately cease all work at the particular location;
3. Secure the area so as to avoid further harm to the Aboriginal object;
4. Notify OEH as soon as practical on 131555, providing any details of the Aboriginal object and its location; and
5. Not recommence any work at the particular location unless authorised in writing by OEH.

Appendix F: Site Photos



Photo 1: Typical Black-oak woodland community on site



Photo 2: Typical mallee community on site



Photo 3: On top of the existing landfill looking north towards to borrow pit area.



Photo 4: Regrowth on historical quarrying areas.



Photo 5: Historical quarrying amongst Black oak trees



Photo 6: Buronga Landfill Artefact scatter 1.



REVIEW OF ENVIRONMENTAL FACTORS

Name of Project: Buronga Landfill Borrow Pits

Plan Registration Numbers:

Lot 1, DP1037845



Document Prepared by Ece (Izzy) Tunali

Plan Registration Numbers: Lot1, DP1037845

Description of Activity

1. Location of activity: (include planning control / zoning of site)

Wentworth Shire Council, NSW

Arumpo Road, Gol Gol, Wentworth, NSW. Lot 1, DP1037845

Planning Zone SP2, Special Purpose Zone 2-Infrastructure (Waste or Resource Management Facility) adjacent to Lots 197 & 212 DP 756946

2. Description of activity (including all temporary and ancillary works)

(a). Use of proposed waste cells as borrow pits to supply cover material for the Buronga Landfill Waste Operations

3. Have environmental safeguards and mitigation measures been developed for the activity?

No impacts on environment is expected

4. List the attached plans, maps, photographs and diagrams of the site.

Buronga Landfill Proposed Site Layout showing waste cells which will be used as borrow pits, which is the subject of this DA.

5. Estimated cost of activity and planned time of commencement:

- \$200,000+ GST
- Works are scheduled to commence November 2015

6. Reasons for the activity:

Buronga Landfill is running out of covering material so we need to adopt the proposed waste cells as a burrow pits to maintain cover material.

It is an EPA requirement to daily cover the waste, disposed at the landfill as well as interim cover.

Are there any alternatives other than the preferred option?

No

Does the current LEP and/or REP affect the activity?

No

Please select the relevant approval bodies that have been consulted through this process or those that require consultation.

- Wentworth Shire Council
- NSW EPA

7. Site Conditions (include existing road conditions, present traffic and forecast traffic)

The subject site is located approximately 5 km from Victorian/ New South Wales border. It is located about 2.5 km North on the Arumpo Road from the Silver City Highway turnoff. The subject land is adjacent to the existing waste management facility, located within the existing Special Purpose Zone 2 (SP2)-Infrastructure (Waste or Resource Management Facility), and is separated from sensitive land uses. The surrounding road system has the capacity to cater for the traffic movements associated with the development

8. Project Design

See attached plans

9. Access

Access will be via the Service Road from the Arumpo Road

Existing Environment

10. Site Description:

The subject area has been purchased by Council, which is around 117 hectares of land to the north of the existing Landfill site, as future expansion. This Land is zoned SP2 under Wentworth Local Environmental Plan 2011 (Wentworth LEP) which allows for landfill and waste management uses.

The site also consists of a former mining site located to the east of the proposed borrow pits.

The proposed borrow pits site is set within a rural landscape predominantly comprising of agricultural land uses and scattered remnant native vegetation. Land surrounding the subject site is not developed and currently acts as a buffer between the site and surrounding uses and activities.

The nearest farmland is located approximately 500 m to the south-west of the site, Lake Gol Gol is located approximately 1.5 km to the east and an industrial site is approximately 450 m to the west. There are a few residential dwellings along Arumpo Road with the nearest residence being located over 800 m to the south-west of the subject site.

Arumpo Road adjoins the western boundary of the subject site. A small unsealed road runs along the northern boundary of the subject site beginning at Arumpo Road travelling north before turning east and then running south within the eastern boundary of the subject site

11. Surrounding Land Use:

- Buronga Landfill- Crown Lands

12. Soil Type:

Sandy loam and clay

13. Climate:

- Temperate, Semi-arid.

14. Flora and Fauna:

- The proposed development area includes some native and non-native vegetation which are classified as Black Box and Chenopod Mallee. During excavation activities these will be removed and transported to landfill.
- None of the threatened species identified in EPBC Protected Matters Search are expected to occur within the work zone as activities will be restricted to the areas already classified as SP2

15. Cultural Heritage within or adjacent to property (including Aboriginal Heritage);

- Please see attached records of heritage search. Works will immediately cease if an item of Cultural Heritage is found.

16. Is the activity to be carried out on / near a wetland community or bushfire prone.

- No. Buronga Landfill is not an identified wetland community and is not listed on the Directory of Important Wetlands.
- Bushfire prone zone area coverage ratio is 51%. Please see attached map.

Impact Assessment

Physical and Chemical Impacts:

- **Is the activity likely to impact on soil quality or land stability?**
No
- **Is the activity likely to affect a water body, watercourse or wetland or natural drainage system?**
No
- **Is the activity likely to change flood regimes, or be affected by flooding?**
No
- **Does the proposal involve the use, storage, or transport of hazardous substances, or the use or generation of chemicals which may build up residues in the environment?**
No
- **Does the activity involve the generation, or disposal of gaseous, liquid or solid wastes or emissions?**
No
- **Will the activity involve the emission of dust, odours, noise, vibration, or radiation in the proximity of residential / urban areas or other sensitive locations?**
Yes – noise and vibrations will be produced at the site, however, it will be contained within normal construction tolerances.
- **Will the activity increase the erosion hazard at the site?**
No

Biological Impacts

- **Is any vegetation to be cleared or modified?**
Vegetation to be cleared in association with excavation works for the soil provision from the proposed waste cells. It will include clearing of a mix of non-native and native species. Vegetation removal associated with works will be predominately introduced species, being black box tress and Chenopod Mallee shrubs. There will also be the removal of some shrubs and dead trees.
- **Is there potential for any known threatened flora and/or fauna species to occur in close proximity to the site or the locality?**
None known
- **Is the activity consistent with any applicable recovery plans or threat abatement plans?**
N/A
- **Is the activity likely to affect any conservation agreement entered into under the *National Parks and Wildlife Act 1974* applied to the land in which the activity relates?**
No
- **Has the activity considered the effect on any wilderness area (see *Wilderness Act 1987*) in the locality?**
No known impacts / no known wilderness area

Community Impacts:

- **Is the activity likely to affect existing community services or infrastructure?**
No
- **Does the activity affect sites of importance to the local or broader community for their recreational or other values of access to these sites?**
No
- **Is the activity likely to have an impact on economic factors, including impacts on employment, industry and property value?**
No
- **Is the activity likely to have an impact on the safety of the community?**
No
- **Is the activity likely to cause a bushfire risk?**
No
- **Does the activity affect the visual or scenic landscape?**
No
- **Is the activity likely to cause noise, pollution, visual impacts, and loss of privacy, glare or overshadowing to members of the community?**

Yes, noise – within construction tolerances.
- **Is the activity likely to affect the use of, or the community's ability to use, natural resources?**
No

Natural Resources Impacts

- **Is the activity likely to result in the degradation of any NPWS conservation area?**
No

Note: Refer to the Plan of Management for that conservation area if the activity will impact it.

Aboriginal Cultural Heritage Impacts

IF AN ABORIGINAL SITE OF SIGNIFICANCE IS IDENTIFIED, PLEASE STOP WORK IMMEDIATELY AND CONSULT THE LOCAL LALC AND OFFICE OF ENVIRONMENT AND HERITAGE

- **Does the proposal affect areas subject to Native Title Claims?**
None Known

Other Cultural Heritage Impacts

- **Is there an impact on places, buildings, landscapes or moveable heritage items?**
No
- **Is any vegetation or cultural landscape value likely to be affected (e.g. gardens and settings, introduced exotic species, or evidence of broader remnant land uses)?**
No

IF THE PROPOSED ACTIVITY IS LIKELY TO AFFECT AQUATIC SPECIES AND THEIR HABITATS PLEASE FILL IN THE DETAILS BELOW.

- **What is the name of the adjacent watercourse(s)?**

Lake Gol Gol is located approximately 1.5 km to the east of the subject site

Description of works to be undertaken including methods of construction, and timing and duration of works:

- **Please identify the obstructions to fish passage – temporary and permanent.**

N/A

- **Please describe the aquatic habitat conditions at the site particularly riparian and aquatic vegetation, water depth, permanence of water flow and snags in the vicinity of the proposed works.**

N/A

- **Please identify the potential impacts upon aquatic and riparian habitats (both temporary and permanent)**

N/A

- **What are the proposals to mitigate the impacts upon riparian and aquatic vegetation and aquatic habitat?**

N/A

- **What are the potential impacts upon water quality of the proposed works?**

N/A.

- **What are the proposals to mitigate the impacts upon water quality?**

N/A

- **What aquatic species (including threatened species, populations and ecological communities) are known to occur within the locality?**

N/A

Summary of Impacts

- **Please summarise the main impacts of the activity**

The proposal results in no unacceptable impacts. There will be positive impacts as a result of this development.

1-Environmentally, capping is essential for the degeneration of the waste disposed at Buronga Landfill. Therefore proposal would contribute to the sustainable development of the site.

2-Financially, Council does not need to pay to import soil to Buronga Landfill for their waste procedures.

3-Proposal is consistent with relevant planning instruments and policies

- **What are the benefits of such an activity?**

The proposed modifications would improve the function and operation of the Buronga Waste Management Facilities therefore considered to maintain the public interest.

Declarations

The environmental impact of the proposed activity has been examined, considered and assessed in accordance with the requirements of the *Environmental Planning and Assessment Act 1979*

- No significant impact on the existing environment
- No significant impact pending further information
- REF refused as impact on environment is significant

Comments

Lce (122y) Tinali
Waste Project Manager

Name of Assessing Officer



Signature of Assessing Officer

Appendix A: Buronga Landfill and Proposed Borrow Pits Concept Drawing



Legend

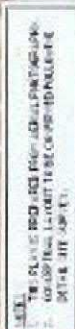
- Cadastre
- Zone Boundary
- Subject Lands

SP2
RU1

Infrastructure Zone
Primary Production Zone

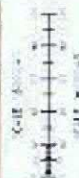
LOCALITY & ZONING
Buronga, NSW

aurecon



PROPOSED BURROW PITS

NOT FOR CONSTRUCTION



CONCEPTUAL SITE PLAN		DATE		A.D.	
OWNER	NO.	DATE	NO.	DATE	NO.
214455	01C	01C	01C	01C	01C
SUBJECT OF THE					

GEOLYSE
ORANGE
100 YEARS OF INNOVATION
1918-2018
www.geolyse.com
info@geolyse.com
1-800-855-5555

4207	WENTWORTH SHIRE COUNCIL
10407	BURONGA WASTE MANAGEMENT CENTRE

APPROVAL AUTHORITY
WENTWORTH SHIRE COUNCIL

Year	Rate	Number of cases
1970	1.0	10
1971	1.0	10
1972	1.0	10
1973	1.0	10
1974	1.0	10
1975	1.0	10
1976	1.0	10
1977	1.0	10
1978	1.0	10
1979	1.0	10
1980	1.0	10
1981	1.0	10
1982	1.0	10
1983	1.0	10
1984	1.0	10
1985	1.0	10
1986	1.0	10
1987	1.0	10
1988	1.0	10
1989	1.0	10
1990	1.0	10
1991	1.0	10
1992	1.0	10
1993	1.0	10
1994	1.0	10
1995	1.0	10
1996	1.0	10
1997	1.0	10
1998	1.0	10
1999	1.0	10
2000	1.0	10
2001	1.0	10
2002	1.0	10
2003	1.0	10
2004	1.0	10
2005	1.0	10
2006	1.0	10
2007	1.0	10
2008	1.0	10
2009	1.0	10
2010	1.0	10
2011	1.0	10
2012	1.0	10
2013	1.0	10
2014	1.0	10
2015	1.0	10
2016	1.0	10
2017	1.0	10
2018	1.0	10
2019	1.0	10
2020	1.0	10
2021	1.0	10
2022	1.0	10
2023	1.0	10
2024	1.0	10
2025	1.0	10
2026	1.0	10
2027	1.0	10
2028	1.0	10
2029	1.0	10
2030	1.0	10
2031	1.0	10
2032	1.0	10
2033	1.0	10
2034	1.0	10
2035	1.0	10
2036	1.0	10
2037	1.0	10
2038	1.0	10
2039	1.0	10
2040	1.0	10
2041	1.0	10
2042	1.0	10
2043	1.0	10
2044	1.0	10
2045	1.0	10
2046	1.0	10
2047	1.0	10
2048	1.0	10
2049	1.0	10
2050	1.0	10
2051	1.0	10
2052	1.0	10
2053	1.0	10
2054	1.0	10
2055	1.0	10
2056	1.0	10
2057	1.0	10
2058	1.0	10
2059	1.0	10
2060	1.0	10
2061	1.0	10
2062	1.0	10
2063	1.0	10
2064	1.0	10
2065	1.0	10
2066	1.0	10
2067	1.0	10
2068	1.0	10
2069	1.0	10
2070	1.0	10
2071	1.0	10
2072	1.0	10
2073	1.0	10
2074	1.0	10
2075	1.0	10
2076	1.0	10
2077	1.0	10
2078	1.0	10
2079	1.0	10
2080	1.0	10
2081	1.0	10
2082	1.0	10
2083	1.0	10
2084	1.0	10
2085	1.0	10
2086	1.0	10
2087	1.0	10
2088	1.0	10

Q	Q1	Q2	Q3	Q4
1	1.0	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0
4	1.0	1.0	1.0	1.0
5	1.0	1.0	1.0	1.0
6	1.0	1.0	1.0	1.0
7	1.0	1.0	1.0	1.0
8	1.0	1.0	1.0	1.0
9	1.0	1.0	1.0	1.0
10	1.0	1.0	1.0	1.0
11	1.0	1.0	1.0	1.0
12	1.0	1.0	1.0	1.0
13	1.0	1.0	1.0	1.0
14	1.0	1.0	1.0	1.0
15	1.0	1.0	1.0	1.0
16	1.0	1.0	1.0	1.0
17	1.0	1.0	1.0	1.0
18	1.0	1.0	1.0	1.0
19	1.0	1.0	1.0	1.0
20	1.0	1.0	1.0	1.0
21	1.0	1.0	1.0	1.0
22	1.0	1.0	1.0	1.0
23	1.0	1.0	1.0	1.0
24	1.0	1.0	1.0	1.0
25	1.0	1.0	1.0	1.0
26	1.0	1.0	1.0	1.0
27	1.0	1.0	1.0	1.0
28	1.0	1.0	1.0	1.0
29	1.0	1.0	1.0	1.0
30	1.0	1.0	1.0	1.0
31	1.0	1.0	1.0	1.0
32	1.0	1.0	1.0	1.0
33	1.0	1.0	1.0	1.0
34	1.0	1.0	1.0	1.0
35	1.0	1.0	1.0	1.0
36	1.0	1.0	1.0	1.0
37	1.0	1.0	1.0	1.0
38	1.0	1.0	1.0	1.0
39	1.0	1.0	1.0	1.0
40	1.0	1.0	1.0	1.0
41	1.0	1.0	1.0	1.0
42	1.0	1.0	1.0	1.0
43	1.0	1.0	1.0	1.0
44	1.0	1.0	1.0	1.0
45	1.0	1.0	1.0	1.0
46	1.0	1.0	1.0	1.0
47	1.0	1.0	1.0	1.0
48	1.0	1.0	1.0	1.0
49	1.0	1.0	1.0	1.0
50	1.0	1.0	1.0	1.0
51	1.0	1.0	1.0	1.0
52	1.0	1.0	1.0	1.0
53	1.0	1.0	1.0	1.0
54	1.0	1.0	1.0	1.0
55	1.0	1.0	1.0	1.0
56	1.0	1.0	1.0	1.0
57	1.0	1.0	1.0	1.0
58	1.0	1.0	1.0	1.0
59	1.0	1.0	1.0	1.0
60	1.0	1.0	1.0	1.0
61	1.0	1.0	1.0	1.0
62	1.0	1.0	1.0	1.0
63	1.0	1.0	1.0	1.0
64	1.0	1.0	1.0	1.0
65	1.0	1.0	1.0	1.0
66	1.0	1.0	1.0	1.0
67	1.0	1.0	1.0	1.0
68	1.0	1.0	1.0	1.0
69	1.0	1.0	1.0	1.0
70	1.0	1.0	1.0	1.0
71	1.0	1.0	1.0	1.0
72	1.0	1.0	1.0	1.0
73	1.0	1.0	1.0	1.0
74	1.0	1.0	1.0	1.0
75	1.0	1.0	1.0	1.0
76	1.0	1.0	1.0	1.0
77	1.0	1.0	1.0	1.0
78	1.0	1.0	1.0	1.0
79	1.0	1.0	1.0	1.0
80	1			

Appendix B: AHIMS Search Results Buronga Landfill and Proposed Borrow Pits



Ece Tunali

Date: 27 August 2015

26-28 Adelaide Street

Wentworth 2648

Attention: Ece Tunali

Email: waste.officer1@wentworth.nsw.gov.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 1, DP:DP1037845 with a Buffer of 50 meters, conducted by Ece Tunali on 27 August 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. "

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (<http://www.nsw.gov.au/gazette>) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Appendix C: Vegetation Removal Map



BURONGA LANDFILL AND PROPOSED BORROW VEGETATION REMOVAL MAP

NTS

Appendix D: BURONGA LANDFILL AND PROPOSED BORROW PITS-BUSH FIRE ZONING MAP



- A1 Lot Text
- A2 Lot Text Small Lots
- A3 Lot Text Large Lots
- Road Text
- Boundaries
- LGA
- Property
- Bushfire Prone
- Buffer
- Vegetation Category 1
- Vegetation Category 2
- LEP 2011
- Land Zoning
- Enterprise Corridor
- DE
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- IN1 General Industrial
- IN2 Light Industrial
- RS Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU3 Forestry
- RU5 Village
- SP1 Special Activities
- SP2 Infrastructure
- SP3 Towns
- UV1 Natural Vegetation
- UV2 Recreational Vegetation

BURONGA LANDFILL AND PROPOSED BORROW PITS-BUSH FIRE ZONING

NTS

Appendix C: BAM Field Sheets

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation	
TM, SE, HR	8/4/21		15	1	a	
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function	
Species Name	Foliage	Abund.	Within 20 x 50 m plot			
Eucalyptus laevis	8	10	TG	Tree DBH	Count	
Rododendron	5	300	FG	80+ cm		
Dioscorea	1	40	SG	50 - 79 cm		
Atriplex	1	40	SG	30 - 49 cm		
Endoloma	0.5	20	SG	20 - 29 cm		
Rosa Poly	0.2	20	SG	10 - 19 cm		
Scholaria	0.1	20	SG	5 - 9 cm		
Sclerocarya	0.2	40	SG	Tree Regeneration <5 cm	X	
Chenopodium	0.1	10	SG	Hollow Bearing Trees	X	
Logs						
Within 20 x 50 m plot						
Total Length >10cm diam.						
SG	3.1	190		7.5m	Count	
SG	3.1	7				
TG	8	1				
FG	5	1				
Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover.						
- Decimals (0.1, 0.2, 0.3...)						
- Whole Numbers (1, 2, 3...)						
- Nearest 5% (5, 10, 15...)						
Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10.						
- Counts (1, 2, 3...)						
- Estimates (10, 20, 30...)						
- Estimates 'Intervals' (100, 200, 300...)						
Vegetation Integrity - Function						
Within five 1m2 plots		Plot Number				Average Sum
		1	2	3	4	5
	Litter Cover	50	10	70	40	10
	Bare Ground Cover	35	35	20	45	65
	Cryptogam Cover	10	50	2	10	20
	Rock Cover	0	0	0	0	0
Weeds		Foliage	Abund.	Weeds	Foliage	Abund.
0						

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation				
TM SE HA	8/4/21		15	1	8				
Within 20 x 20 m plot			Species Name	Foliage	Abund.	Function			
Species Name	Foliage	Abund.				Within 20 x 50 m plot			
Eucalyptus larg.	10	2	TG			Tree DBH	Count	<input type="checkbox"/>	
Enchlyma tonka	5	100	SG			80+ cm			
Dioscorea bifl	1	20	SG			50 - 79 cm			
Sclerodena diacantha	1	50	SG			30 - 49 cm	11	2	
Roly Poly	0.1	20	SG			20 - 29 cm	11	2	
Chenopodium spp	0.1	3	SG			10 - 19 cm	111	3	
Solanum esuriale	0.1	10	FG			5 - 9 cm	1	1	
						Tree Regeneration <5 cm		X	
SG	7.2	193				Hollow Bearing Trees		✓	
SG	7.2	5				Logs			
TG	10	1				Within 20 x 50 m plot			
FG	0.1	1				Total Length >10cm diam.			
						14 m Count			
						2.5, 7, 2, 2, 0.5			
						Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...)			
			Vegetation Integrity - Function						
			Within five 1m2 plots	Plot Number					Average Sum
				1	2	3	4	5	
			Litter Cover	1	70	5	15	60	30.2
			Bare Ground Cover	99	20	95	80	5	59.8
			Cryptogam Cover	0	0	0	5	3	1.6
			Rock Cover	0	0	0	0	0	0
			Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
			Arabian Grass	0.5	100				
			Living Wom-fl	0.1	5	HT			

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation				
TM, SE, HR	8/4/21		15	1	C				
Within 20 x 20 m plot			Species Name	Foliage	Abund.	Function			
Species Name	Foliage	Abund.				Within 20 x 50 m plot			
Eucalyptus largiflo	5	1	TG			Tree DBH	Count	<input type="checkbox"/>	
Endellium toment	1	30	SG			80+ cm			
Sclerolaena port	2	300	SG			50 - 79 cm	1	1	
Sclerolaena diar	0.5	50	SG			30 - 49 cm	1	1	
Dissocarpus bifl	0.5	20	SG			20 - 29 cm	1	1	
Raepem apic	0.1	5	FG			10 - 19 cm	1	1	
Afraplex stipitata	0.1	15	SG			5 - 9 cm			
Maireana brevifolia	0.3	15	SG			Tree Regeneration <5 cm		X	
						Hollow Bearing Trees		X	
SG	4.4	430				Logs			
SG	4.4	6	SG-6			Within 20 x 50 m plot			
TG	5	1	16-1			Total Length >10cm diam.			
FG	0.1	1	16-1			33m	Count		
						10, 16, 2, 3, 2			
						Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...)			
						Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...)			
			Vegetation Integrity - Function						
			Within five 1m2 plots	Plot Number					Average Sum
				1	2	3	4	5	
			Litter Cover	65	30	70	90	90	69
			Bare Ground Cover	30	60	10	2	5	21.4
			Cryptogam Cover	0	5	0	0	0	1
			Rock Cover	0	0	0	0	0	0
			Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
			Wing Noun-fl	0.1	5	HT			

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation			
TM, SE, HR	8/4/21		15	1	d			
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function			
Species Name	Foliage	Abund.			Within 20 x 50 m plot			
Eucalyptus largefl	25	2	TG		Tree DBH	Count		
Maireana brevifl	5	50	SG		80+ cm			
Enchlasia toment	5	100	SG		50 - 79 cm	11	2	
Rondeletia apic	5	300	FG		30 - 49 cm	1	1	
Alnus s. p. p. p.	1	50	SG		20 - 29 cm	1	1	
Dioscorea bifl.	1	50	SG		10 - 19 cm			
Rosa p. p.	1	50	SG		5 - 9 cm			
Sclerolaena p. p.	1	100	SG		Tree Regeneration <5 cm		X	
Sclerolaena disc	0.5	50	SG		Hollow Bearing Trees		✓	
Chenopodium spp	0.1	10	SG		Logs			
Rhagoletia sp. p. p.	0.1	1	SG		Within 20 x 50 m plot			
					Total Length >10cm diam.			
SG	14.7	461			25 m Count			
SG	14.7	9	SG - 9		1, 6, 1, 2, 6, 5, 4			
TG	25	1	TG - 1					
FG	5	1	FG - 1					
					Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) 			
					Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 			
Vegetation Integrity - Function								
		Within five 1m2 plots					Average Sum	
		Plot Number						
		1	2	3	4	5		
		Litter Cover	10	85	3	45	5	29.6
		Bare Ground Cover	80	10	20	40	75	45
		Cryptogam Cover	8	0	75	5	15	20.6
		Rock Cover	0	0	0	0	0	0
		Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
		Wing Noddy	3	100	HT			

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation				
TM, SE	4/5/21		15	1	E				
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function				
Species Name	Foliage	Abund.	Within 20 x 50 m plot						
Rhagodia spinesc	8	80	SG		Tree DBH	Count			
Dioscorea	3	200	SG		80+ cm	1			
Enchylaena	1	50	SG		50 - 79 cm				
Sclerolaena diacantha	0.5	30	SG		30 - 49 cm	11111			
Rol. Pol.	0.1	10	SG		20 - 29 cm	11111			
Chenopodium	0.1	5	SG		10 - 19 cm	111			
Alaria brevifolia	0.1	10	SG		5 - 9 cm				
Eucalyptus larrea	15	9	TG		Tree Regeneration < 5 cm	X			
Melaleuca lanceolata	1	2	SG		Hollow Bearing Trees	✓			
Exocarpus aphyllus	1	1	SG		Logs				
Austroanthodia	0.1	20	GG		Within 20 x 50 m plot				
Sclerolaena pend	0.3	20	SG		Total Length > 10cm diam.				
Vittadinia	0.1	1	FG		29				
Austrolija	0.1	1	GG		3, 1.5, 2, 1.5, 1, 6, 2, 5 2, 5				
TG	15	1			Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if > 5% cover. - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...)				
SG	15.1	10							
GG	0.2	2							
FG	0.1	1							
					Abundance: Recorded as either Counts if less than 10, or estimated in intervals when > 10. - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...)				
Vegetation Integrity - Function									
Within five 1m2 plots			Plot Number					Average Sum	
			1	2	3	4	5		
			Litter Cover	70	70	60	80	20	60
			Bare Ground Cover	20	20	20	15	75	30
			Cryptogam Cover	0	0	0	0	0	0
			Rock Cover	0	0	0	0	0	0
			Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
			Schinus molle	0.1	30				
			Wing amaranth	3	200	HT			
			Chickweed	0.1	20				
			Mediterranean Turnip	0.1	50				

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation					
TM, SE, DB, HR	06/04/21		58	3	a					
Within 20 x 20 m plot			Species Name	Foliage	Abund.	Function				
Species Name	Foliage	Abund.				Within 20 x 50 m plot				
Caesalpinia pauciflora	2	0	TG			Tree DBH	Count			
Ropora Alpiculata	.1	1	FG			80+ cm				
Dissocarpus paradoxus	20	1000	SG			50 - 79 cm	1			
Scleroloma latitocarpus	20	2000	SG			30 - 49 cm	1	✓		
Maerianthus Brew	.2	6	SG			20 - 29 cm				
Scleroloma dicranthum	.4	100	SG			10 - 19 cm				
Tomentosa	.2	10	SG			5 - 9 cm				
Roly Polu	.1	1	SG			Tree Regeneration <5 cm		✗		
Atriplex stipitata	.1	12	SG			Hollow Bearing Trees		✓		
		7				Logs				
SG	41	3129				Within 20 x 50 m plot				
FG	0.1	1				Total Length >10cm diam.				
TG	2	0				HT 1	6			
						<p>Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover.</p> <ul style="list-style-type: none">- Decimals (0.1, 0.2, 0.3...)- Whole Numbers (1, 2, 3...)- Nearest 5% (5, 10, 15...) <p>Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10.</p> <ul style="list-style-type: none">- Counts (1, 2, 3...)- Estimates (10, 20, 30...)- Estimates 'Intervals' (100, 200, 300...)				
			Vegetation Integrity - Function							
			Within five 1m2 plots					Average Sum		
			Plot Number							
			1	2	3	4	5			
			Litter Cover	90	5	30	5	10	5	11
			Bare Ground Cover	60	50	35	45	70	52	
			Cryptogam Cover	20	8	35	5	2	13.4	
			Rock Cover	0	0	0	0	0	0	
			Weeds	Foliage	Abund.	Weeds		Foliage	Abund.	
			W.4 Moon	.1	20	HT				

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation			
TM, SE, HR	7/4/21		58	3	D			
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function			
Species Name	Foliage	Abund.	Within 20 x 50 m plot					
Sclero palawii	30	2000	SG		Tree DBH	Count		
Sclero diacanth	5	200	SG		80+ cm			
Roepora apic	0.1	2	FG		50 - 79 cm	1	1	
Dissocarpus para	20	500	SG		30 - 49 cm	4	1	
		3			20 - 29 cm			
SG	55	2700			10 - 19 cm			
FG	0.1	1			5 - 9 cm			
			SG-3		Tree Regeneration <5 cm			0
			FG-1		Hollow Bearing Trees			0
Logs								
Within 20 x 50 m plot								
Total Length >10cm diam.								
17 Count								
2, 2.5, 4.5, 5, 1, 2								
Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) 								
Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 								
Vegetation Integrity - Function								
Within five 1m2 plots		Plot Number					Average Sum	
		1	2	3	4	5		
Litter Cover		10	5	2	5	70	18.4	
Bare Ground Cover		80	60	30	65	5	48	
Cryptogam Cover		0.1	20	60	20	0	20.02	
Rock Cover		0	0	0		1	0.2	
Weeds	Foliage	Abund.	Weeds	Foliage	Abund.			
Sage	0.1	1						

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation				
TM, SE, DB, HK	06/04/21		58	3	C				
Within 20 x 20 m plot			Species Name	Foliage	Abund.	Function			
Species Name	Foliage	Abund.	Within 20 x 50 m plot						
Sclerolena latentic	20	2000	SG			Tree DBH	Count	<input type="checkbox"/>	
D.35carput	10	1000	SG			80+ cm			
Tomenpasa	1	1	SG			50 - 79 cm			
						30 - 49 cm			
SG	30.1	3				20 - 29 cm			
						10 - 19 cm			
						5 - 9 cm			
						Tree Regeneration <5 cm		<input checked="" type="checkbox"/>	
						Hollow Bearing Trees		<input checked="" type="checkbox"/>	
Logs									
Within 20 x 50 m plot									
Total Length >10cm diam.									
Cont									
<p>Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover.</p> <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) <p>Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10.</p> <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 									
Vegetation Integrity - Function									
Within five 1m2 plots			Plot Number					Average Sum	
			1	2	3	4	5		
			Litter Cover	10	5	5	10	5	7
			Bare Ground Cover	70	78	80	60	70	71.6
			Cryptogam Cover	1	1	3	3	1	1.8
			Rock Cover	1	0	0	0	6	0.2
			Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
			Arabian grass	0.1	10				
			Sage	10	2000				
			onion weed	4	500				
			Camel melon	0.1	1				
			Barley grass	0.1	1				

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation	
TM SE HR	7/4/21		58	4	a	
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function	
Species Name	Foliage	Abund.	Within 20 x 50 m plot			
Maireana brevifolia	15	15	SG	Tree DBH	Count	
Dioscorea	3	50	SG	80+ cm		
Endymium	2	10	SG	50 - 79 cm		
Sclerolaena	5	200	SG	30 - 49 cm		
Koeleria	0.1	2	FG	20 - 29 cm		
Austrostipa	0.1	5	GG	10 - 19 cm		
Elatine	0.1	10		5 - 9 cm		
Rohr. Poly	0.1	2	SG	Tree Regeneration <5 cm	X	
Vittadina	0.1	10	FG	Hollow Bearing Trees	X	
Sclerolaena	0.2	30	SG	Logs		
		307		Within 20 x 50 m plot		
SG	25.3	3076		Total Length >10cm diam.		
FG	0.2	122		Count		
GG	0.1	1				
			SG - 6			
			FG - 2			
			GG - 1			
<p>Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover.</p> <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) <p>Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10.</p> <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 						
Vegetation Integrity - Function						
Within five 1m2 plots			Plot Number			Average Sum
	1	2	3	4	5	
Litter Cover	40	2	60	1	25	25.6
Bare Ground Cover	40	80	10	98	70	59.6
Cryptogam Cover	5	10	0	0	0	3
Rock Cover	0	1	0	0	0	0.2
Weeds	Foliage	Abund.	Weeds	Foliage	Abund.	
Onion Weed	1	150				
Star Thistle	3	300				
Wild sage	0.3	100				
Arabian Grass	0.3	100				
Maltese Cocksfoot	0.1	10				

[illegible]

[illegible]

[illegible]

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation		
TM SE HR	7/4/21		Miller 170	5	C		
Within 20 x 20 m plot			Species Name	Foliage	Abund.		
Species Name	Foliage	Abund.	Function				
			Within 20 x 50 m plot				
Dioscarpos bifl	3	150	SG	Tree DBH	Count		
Euraphia oleosa	5	10	TG	80+ cm			
Schefflera pect	1	50	SG	50 - 79 cm			
Roly Poly	0.1	5	SG	30 - 49 cm	1/11 4		
Encyphaa torn	0.3	10	SG	20 - 29 cm	1/1 3		
				10 - 19 cm	1/1/1/1 5		
SG	4.4	284		5 - 9 cm	1/1 2		
TG	5	1	SG - 4	Tree Regeneration <5 cm	X		
			TG - 1	Hollow Bearing Trees	✓		
Logs							
Within 20 x 50 m plot							
Total Length >10cm diam.							
34 m Count							
17, 8, 1, 5, 3							
Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) 							
Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 							
Vegetation Integrity - Function							
Within five 1m2 plots		Plot Number					Average Sum
		1	2	3	4	5	
Litter Cover		40	84	95	80	80	75.8
Bare Ground Cover		50	15	5	15	10	19
Cryptogam Cover		0	0	0	0	0	0
Rock Cover		0	0	0	0	0	0
Weeds	Foliage	Abund.	Weeds	Foliage	Abund.		
Wing Nodiflor	1	30	HT				

[illegible]

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation		
TM, SE, HR	8/4/21		252	6	a		
Within 20 x 20 m plot		Species Name	Foliage	Abund.	Function		
Species Name	Foliage	Abund.	Within 20 x 50 m plot				
Dioscarpus bifl	6	500	SG	Tree DBH	Count	<input type="checkbox"/>	
Sclerophyllum pend	15	1000	SG	80+ cm			
Enchylasma torrens	0.5	10	SG	50 - 79 cm	1	1	
Marrubium brevif	0.1	1	SG	30 - 49 cm			
Myoporum platyrrh	1	0	TG	20 - 29 cm			
				10 - 19 cm			
SG	21.6	1541	4	5 - 9 cm			
TG	1	1		Tree Regeneration <5 cm		<input checked="" type="checkbox"/>	
			SG 4	Hollow Bearing Trees		<input checked="" type="checkbox"/>	
			TG 1	Logs			
				Within 20 x 50 m plot			
				Total Length >10cm diam.			
				9 m Count			
				9			
				Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover. - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...)			
				Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10. - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...)			
Vegetation Integrity - Function							
Within five 1m2 plots			Plot Number				
			1	2	3	4	5
Litter Cover			10	30	20	15	20
Bare Ground Cover			70	60	50	70	70
Cryptogam Cover			10	1	1	5	2
Rock Cover			0	0	0	0	0
Average Sum			19				
Weeds			Foliage	Abund.	Weeds	Foliage	Abund.
Arabian Grass			1	300			
Onion Weed			0.1	2			

Pine stump

Assessor(s) Initials	Date	Area (ha)	PCT Number	Zone Number	Plot Abbreviation			
TM, SE, HR	8/4/21		252	6	6			
Within 20 x 20 m plot			Species Name	Foliage	Abund.			
Species Name	Foliage	Abund.	Within 20 x 50 m plot					
Dioscorea bift	10	500	SG	Tree DBH	Count			
Sclerolaena pent	30	2000	SG	80+ cm				
Austro stipe suber	1	50	GG	50 - 79 cm				
				30 - 49 cm				
SG	40	2500 2		20 - 29 cm				
GG	1	1	SG = 2	10 - 19 cm				
			GG = 1	5 - 9 cm				
				Tree Regeneration <5 cm	X			
				Hollow Bearing Trees	X			
				Logs				
				Within 20 x 50 m plot				
				Total Length >10cm diam.				
				X Count				
				<p>Foliage Cover: Recorded as either Decimals if less than 1%, Whole Numbers up to 5%, or to the nearest 5% if >5% cover.</p> <ul style="list-style-type: none"> - Decimals (0.1, 0.2, 0.3...) - Whole Numbers (1, 2, 3...) - Nearest 5% (5, 10, 15...) <p>Abundance: Recorded as either Counts if less than 10, or estimated in intervals when >10.</p> <ul style="list-style-type: none"> - Counts (1, 2, 3...) - Estimates (10, 20, 30...) - Estimates 'Intervals' (100, 200, 300...) 				
			Vegetation Integrity - Function					
			Within five 1m2 plots					
			Plot Number					
			1	2	3	4	5	
			Average Sum					
			Litter Cover	10	20	5	5	10
			Bare Ground Cover	65	55	65	65	50
			Cryptogam Cover	20	20	25	25	35
			Rock Cover	0	0	0	0	0
			Weeds	Foliage	Abund.	Weeds	Foliage	Abund.
			Arabian Grass	1	200			
			Onion Weed	1	100			

Trees
-
pine
stumps
x2

Appendix D: Threatened species observation sheets

Targeted species surveys are proposed for completion in October of 2021, until such a time as when the surveys are completed; Appendix D: Threatened species observation sheets will not be appended to this BDAR.

Appendix E: BAM-C Credit Sheets

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00024826/BAAS18175/21/00024930	Buronga Landfill Expansion Inside Previous Consent Area	10/06/2021
Assessor Name	Report Created	BAM Data version *
Troy Muster	23/07/2021	45
Assessor Number	BAM Case Status	Date Finalised
BAAS18175	Open	To be finalised
Assessment Revision	Assessment Type	
0	Major Projects	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAI	Ecosystem credits
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)											
4	15_Zone_1_CA	Not a TEC	57.1	57.1	0.57			High Sensitivity to Potential Gain	1.75		14
										Subtotal	14

BAM Credit Summary Report

Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion									
2	58_Zone_3_CA	Not a TEC	24.2	24.2	7		High Sensitivity to Potential Gain	1.75	74
3	58_Zone_4_CA	Not a TEC	40.8	40.8	3.4		High Sensitivity to Potential Gain	1.75	60
								Subtotal	134
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones									
1	170_Zone_5_CA	Not a TEC	49.5	49.5	4.5		High Sensitivity to Potential Gain	1.50	83
								Subtotal	83
								Total	231

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Species credits
<i>Austrostipa metatoris</i> / A spear-grass (Flora)								
170_Zone_5_CA	49.5	49.5	0	Vulnerable	Vulnerable	2	False	0
58_Zone_3_CA	24.2	24.2	0	Vulnerable	Vulnerable	2	False	0
58_Zone_4_CA	40.8	40.8	0	Vulnerable	Vulnerable	2	False	0
15_Zone_1_CA	57.1	57.1	0	Vulnerable	Vulnerable	2	False	0
							Subtotal	0
<i>Burhinus grallarius</i> / Bush Stone-curlew (Fauna)								
170_Zone_5_CA	49.5	49.5	0	Endangered	Not Listed	2	False	0
58_Zone_3_CA	24.2	24.2	0	Endangered	Not Listed	2	False	0
58_Zone_4_CA	40.8	40.8	0	Endangered	Not Listed	2	False	0

BAM Credit Summary Report

15_Zone_1_CA	57.1	57.1	0	Endangered	Not Listed	2	False	0
							Subtotal	0
<i>Eucalyptus leucoxylon subsp. pruinosa / Yellow Gum (Flora)</i>								
170_Zone_5_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
58_Zone_3_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
15_Zone_1_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0
<i>Hieraaetus morphnoides / Little Eagle (Fauna)</i>								
170_Zone_5_CA	49.5	49.5	0	Vulnerable	Not Listed	1.5	False	0
58_Zone_3_CA	24.2	24.2	0	Vulnerable	Not Listed	1.5	False	0
58_Zone_4_CA	40.8	40.8	0	Vulnerable	Not Listed	1.5	False	0
15_Zone_1_CA	57.1	57.1	0	Vulnerable	Not Listed	1.5	False	0
							Subtotal	0
<i>Lophochroa leadbeateri / Major Mitchell's Cockatoo (Fauna)</i>								
170_Zone_5_CA	49.5	49.5	0	Vulnerable	Not Listed	2	False	0
58_Zone_3_CA	24.2	24.2	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_CA	40.8	40.8	0	Vulnerable	Not Listed	2	False	0
15_Zone_1_CA	57.1	57.1	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0
<i>Lophoictinia isura / Square-tailed Kite (Fauna)</i>								
170_Zone_5_CA	49.5	49.5	0	Vulnerable	Not Listed	1.5	False	0
58_Zone_3_CA	24.2	24.2	0	Vulnerable	Not Listed	1.5	False	0

BAM Credit Summary Report

58_Zone_4_CA	40.8	40.8	0	Vulnerable	Not Listed	1.5	False	0
15_Zone_1_CA	57.1	57.1	0	Vulnerable	Not Listed	1.5	False	0
							Subtotal	0
<i>Ninox connivens / Barking Owl (Fauna)</i>								
170_Zone_5_CA	49.5	49.5	0	Vulnerable	Not Listed	2	False	0
58_Zone_3_CA	24.2	24.2	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_CA	40.8	40.8	0	Vulnerable	Not Listed	2	False	0
15_Zone_1_CA	57.1	57.1	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0
<i>Pimelea serpyllifolia subsp. serpyllifolia / Thyme Rice-Flower (Flora)</i>								
170_Zone_5_CA	49.5	49.5	0	Endangered	Not Listed	3	True	0
58_Zone_3_CA	24.2	24.2	0	Endangered	Not Listed	3	True	0
58_Zone_4_CA	40.8	40.8	0	Endangered	Not Listed	3	True	0
15_Zone_1_CA	57.1	57.1	0	Endangered	Not Listed	3	True	0
							Subtotal	0

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00024826/BAAS18175/21/00025590	Buronga Landfill Expansion Outside Previous Consent Area	10/06/2021
Assessor Name	Report Created	BAM Data version *
Troy Muster	23/07/2021	45
Assessor Number	BAM Case Status	Date Finalised
BAAS18175	Open	To be finalised
Assessment Revision	Assessment Type	
0	Major Projects	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	BC Act Listing status	EPBC Act listing status	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAI	Ecosystem credits
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)											
1	15_Zone_1_Outside_CA	Not a TEC	57.1	57.1	19.2			High Sensitivity to Potential Gain	1.75		479
										Subtotal	479

BAM Credit Summary Report

Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion									
3	58_Zone_4_Outside_CA	Not a TEC	40.8	40.8	0.12		High Sensitivity to Potential Gain	1.75	2
								Subtotal	2
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones									
2	170_Zone_5_Outside_CA	Not a TEC	49.5	49.5	0.05		High Sensitivity to Potential Gain	1.50	1
								Subtotal	1
Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion									
4	252_Zone_6_Outside_CA	Not a TEC	14.2	14.2	1.7		High Sensitivity to Potential Gain	1.75	0
								Subtotal	0
								Total	482

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAI	Species credits
<i>Austrostipa metatoris</i> / <i>A spear-grass</i> (<i>Flora</i>)								
15_Zone_1_Outside_CA	57.1	57.1	0	Vulnerable	Vulnerable	2	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Vulnerable	Vulnerable	2	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Vulnerable	Vulnerable	2	False	0

BAM Credit Summary Report

252_Zone_6_Outside_CA	14.2	14.2	0	Vulnerable	Vulnerable	2	False	0
							Subtotal	0
<i>Burhinus grallarius / Bush Stone-curlew (Fauna)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Endangered	Not Listed	2	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Endangered	Not Listed	2	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Endangered	Not Listed	2	False	0
252_Zone_6_Outside_CA	14.2	14.2	0	Endangered	Not Listed	2	False	0
							Subtotal	0
<i>Eucalyptus leucoxylon subsp. pruinosa / Yellow Gum (Flora)</i>								
15_Zone_1_Outside_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
170_Zone_5_Outside_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_Outside_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
252_Zone_6_Outside_CA	N/A	N/A	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0

BAM Credit Summary Report

<i>Hieraaetus morphnoides / Little Eagle (Fauna)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Vulnerable	Not Listed	1.5	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Vulnerable	Not Listed	1.5	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Vulnerable	Not Listed	1.5	False	0
252_Zone_6_Outside_CA	14.2	14.2	0	Vulnerable	Not Listed	1.5	False	0
							Subtotal	0
<i>Lophochroa leadbeateri / Major Mitchell's Cockatoo (Fauna)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Vulnerable	Not Listed	2	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Vulnerable	Not Listed	2	False	0
252_Zone_6_Outside_CA	14.2	14.2	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0
<i>Lophoictinia isura / Square-tailed Kite (Fauna)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Vulnerable	Not Listed	1.5	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Vulnerable	Not Listed	1.5	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Vulnerable	Not Listed	1.5	False	0

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252_Zone_6_Outside_CA	14.2	14.2	0	Vulnerable	Not Listed	1.5	False	0
							Subtotal	0
<i>Ninox connivens / Barking Owl (Fauna)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Vulnerable	Not Listed	2	False	0
170_Zone_5_Outside_CA	49.5	49.5	0	Vulnerable	Not Listed	2	False	0
58_Zone_4_Outside_CA	40.8	40.8	0	Vulnerable	Not Listed	2	False	0
252_Zone_6_Outside_CA	14.2	14.2	0	Vulnerable	Not Listed	2	False	0
							Subtotal	0
<i>Pimelea serpyllifolia subsp. serpyllifolia / Thyme Rice-Flower (Flora)</i>								
15_Zone_1_Outside_CA	57.1	57.1	0	Endangered	Not Listed	3	True	0
170_Zone_5_Outside_CA	49.5	49.5	0	Endangered	Not Listed	3	True	0
58_Zone_4_Outside_CA	40.8	40.8	0	Endangered	Not Listed	3	True	0
252_Zone_6_Outside_CA	14.2	14.2	0	Endangered	Not Listed	3	True	0
							Subtotal	0

Appendix F: Risk Matrix

Risk Matrix						
Risk Criteria	Consequences	Negligible (NE)	Minor (MI)	Moderate (MO)	Significant (SI)	Major (MA)
Likelihood		Environmental impacts or local, low significance, temporary, and reversible. Negligible impact on flora and fauna	Minor effects on the biological or physical environment. Easily rehabilitated, temporary, and short-term effect. Minor impact on flora and fauna.	Moderate short-term effects but no long-lasting effects on ecosystem function. A significant change, rehabilitated with difficulty. Moderate impact on flora and fauna.	Serious long-term environmental effects. Likely to result in a regulatory investigation, permanent environmental harm requires immediate attention. Significant impact on flora and fauna.	Very serious long term environmental impairment of the ecosystem function. Destruction of sensitive features, severe impact, irreversible, or widespread. Major impact on flora and fauna.
Almost Certain (A)	Event is expected to occur in most circumstances. [At least once per month]	M	H	VH	E	E
Likely (B)	The event will probably occur in most circumstances. [At least once a year]	M	H	H	VH	E
Possible (C)	The event should occur at some time. [At least once in 5 years]	L	M	H	H	VH
Unlikely (D)	The event could occur at some time. [At least once in 25 years]	L	M	M	H	H
Rare (E)	The event may occur only in exceptional circumstances. [Less than once in 25 years]	L	L	L	M	M



Appendix M. Aboriginal Cultural Heritage Assessment (Landskape, 2021)

Buronga Landfill Expansion

Aboriginal Cultural Heritage Assessment



Report to Wentworth Shire Council
18 September 2021

Landskape

a division of ML Copper Pty Ltd
ABN 48 107 932 918

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tel: 0408 006 690

Wentworth Shire Council

Buronga Landfill Expansion

Aboriginal Cultural Heritage Assessment

Local Government Area: Wentworth

Nearest Town: Buronga



Landscape

Natural and Cultural Heritage Management

a division of M.L. Copper Pty Ltd

ABN: 48 107 932 918

Author: Dr Matt Cupper

Date: 18 September 2021

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EXECUTIVE SUMMARY

Wentworth Shire Council operates the Buronga Landfill, which is located at Lot 197 and 212 DP756946 and Lot 1 DP1037845 258 Arumpo Road, Buronga, approximately 25 km east of Wentworth and 5 km north of Buronga in western New South Wales (NSW) (Figure 1).

Wentworth Shire Council is planning to apply for an approval under Part 4 Division 4.7 (State Significant Development) of the *Environmental Planning and Assessment Act 1979* to expand the municipal landfill at Lot 197 and 212 DP756946 and Lot 1 DP1037845 258 Arumpo Road, Buronga. Works include excavation of new landfill cells, modified internal infrastructure and hardstands and stormwater and leachate drainage works.

Wentworth Shire Council commissioned Landsape to undertake an Aboriginal Cultural Heritage Assessment for the Buronga Landfill Expansion. This report presents an assessment of the potential Aboriginal cultural heritage related issues for the Buronga Landfill Expansion in accordance with the general requirements of the following guidelines and documents:

- *Aboriginal cultural heritage consultation requirements for proponents 2010 (Part 6 National Parks and Wildlife Act 1974)* (NSW Department of Environment, Climate Change and Water [DECCW], 2010a).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (NSW Office of Environment and Heritage [OEH], 2011).
- The Australia International Council on Monuments and Sites (ICOMOS) *Burra Charter* (Australia ICOMOS, 2013).
- NSW National Parks and Wildlife Service *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (NSW National Parks and Wildlife Service, 1997).
- *Ask First; A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission, 2002).

The specific objectives of the cultural heritage assessment were to:

- Consult the local Aboriginal community (consultation with the Aboriginal community followed *Aboriginal cultural heritage community consultation requirements for proponents* [DECCW, 2010a]), including in relation to cultural values of the Buronga Landfill Expansion area.
- Conduct a desktop assessment to delineate areas of known and predicted cultural heritage potential within the Buronga Landfill Expansion area.

- Undertake an archaeological survey of known and predicted Aboriginal cultural heritage potential areas identified in the desktop assessment, with representatives of the local Aboriginal community.
- Record any Aboriginal cultural heritage sites within the Buronga Landfill Expansion area and assess their significance.
- Identify the nature and extent of any potential impacts of the Buronga Landfill on Aboriginal cultural heritage.
- Devise options in consultation with the community to avoid or mitigate potential impacts of the development on Aboriginal cultural heritage sites and items.

One Aboriginal cultural heritage site has previously been recorded in the Buronga Landfill Expansion area. This is an isolated find of a stone artefact (AHIMS site number 46-3-0192). Wentworth Shire Council has previously obtained an Aboriginal Heritage Impact Permit to harm this object located within a proposed additional borrow pit. The present survey encountered three additional isolated finds of stone artefacts (Buronga Landfill Artefact 1-3; AHIMS site numbers 46-3-0203, 46-3-0204, 46-3-0205) at the Buronga Landfill Expansion area. These Aboriginal objects are outside proposed disturbance areas.

Based on the results of this cultural heritage investigation and consultation with representatives of the Registered Aboriginal Parties the following is recommended:

- Wentworth Shire Council avoid harm to the three isolated finds of stone artefacts (Buronga Landfill Artefact 1-3) near the proposed disturbance areas. This requires erection of permanent protective barriers around the Aboriginal objects.
- If any previously unidentified Aboriginal objects are encountered during construction of the proposal all works likely to affect the material must cease immediately and Heritage NSW and the RAPs consulted about an appropriate course of action prior to recommencement of work.
- In the unlikely event that human skeletal remains are encountered during construction the proposal, all work with the potential to impact the remains must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, Wentworth Shire Council should contact the Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the local Aboriginal community.
- Wentworth Shire Council should provide training to all on-site personnel regarding the Aboriginal cultural heritage management activities strategies relevant to their employment tasks.
- Wentworth Shire Council should continue to involve the registered Aboriginal parties and any other relevant Aboriginal community groups or members in matters pertaining to the proposal.

- Wentworth Shire Council should co-ordinate and implement these recommendations by integrating them into a single programme and document them in the form of a Heritage Management Plan (HMP). The HMP should remain active for the entire Project life and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities.

CONTENTS

EXECUTIVE SUMMARY	i
CONTENTS.....	iv
1 INTRODUCTION.....	1
1.1 The Proponent.....	1
1.2 The expansion.....	1
1.3 Aim and Objectives of the Assessment.....	1
FIGURE 1. LOCATION OF THE BURONGA LANDFILL.....	3
FIGURE 2. LAYOUT OF THE PROPOSED BURONGA LANDFILL EXPANSION	4
1.4 Structure of this Report.....	5
2 INVESTIGATORS.....	6
3 DESCRIPTION OF THE BURONGA LANDFILL EXPANSION	7
4 ABORIGINAL COMMUNITY CONSULTATION.....	8
4.1 INTRODUCTION	8
4.2 ABORIGINAL COMMUNITY PARTICIPATION	8
4.2.1 Identification of Registered Aboriginal Parties	8
4.2.2 Presentation of Information about the Proposed Buronga Landfill	9
4.2.3 Aboriginal Community Involvement during the Field Assessment.....	10
4.3 Aboriginal Community Information about Cultural Significance	10
4.4 Review of the Draft ACHA	10
5 ENVIRONMENTAL CONTEXT.....	11
5.1 Introduction	11
5.2 Geology.....	11
5.3 Landforms and vegetation	11
5.4 Land-use History.....	12
6 ABORIGINAL CULTURAL HERITAGE CONTEXT	13
6.1 Ethno-Historic Context.....	13
6.2 Prehistoric Context.....	13
6.3 Types of Aboriginal Cultural Heritage Sites in the Region	14
6.3.1 Stone Artefact Scatters.....	14
6.3.2 Hearths	14
6.3.3 Freshwater Shell Middens	15
6.3.4 Earth Mounds	15
6.3.5 Quarry Sites.....	15

6.3.6	Modified Trees	15
6.3.7	Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites	15
6.3.8	Burials.....	16
6.4	Previously Recorded Aboriginal Cultural Heritage Sites in the Buronga Landfill..	16
7	CULTURAL HERITAGE FIELD INVESTIGATION.....	17
7.1	Overview of Previous Archaeological Investigations	17
7.2	Cultural Heritage Site Predictive Model.....	19
7.3	Field Methodology	20
7.3.1	Personnel.....	20
7.3.2	Survey Methods.....	20
7.4	Survey Coverage Data.....	21
7.4.1	Conditions of Visibility.....	21
7.4.2	Coverage Analysis.....	23
8	RESULTS AND DISCUSSION	25
8.1	Previously Identified Aboriginal Cultural Heritage	25
8.2	Newly Identified Aboriginal Cultural Heritage.....	25
9	ABORIGINAL CULTURAL HERITAGE VALUES.....	29
9.1	Background	29
9.2	Assessment of Aboriginal Cultural Heritage Significance	30
9.3	Assessment of Scientific Significance	31
9.3.1	Site Integrity.....	31
9.3.2	Site Structure	32
9.3.3	Site Contents	32
9.3.4	Site Representativeness and Rarity	33
9.3.5	Educational Value.....	33
9.4	Aesthetic Significance.....	33
9.5	Historic Significance	33
9.6	Summary of Archaeological Significance	34
10	IMPACT ASSESSMENT	35
10.1	Potential Direct Impacts	35
10.2	Potential Indirect Impacts	35
10.3	Cultural Heritage Potentially Impacted by the Proposal	36
10.4	Potential For Previously Unidentified Aboriginal Cultural Heritage To Occur In The Study Area	36

10.5	Potential Cumulative Impacts of the Proposal.....	37
10.6	Flexibility of the Design of the Proposal	37
11	MANAGEMENT STRATEGIES FOR CULTURAL HERITAGE.....	39
11.1	Introduction	39
11.2	Management of Cultural Heritage NEAR the Disturbance Areas	39
11.3	Heritage Management Plan	40
11.4	General Recommendations	40
11.4.1	Introduction	40
11.4.2	Role of the Local Aboriginal Community.....	40
11.4.3	Site Management and Cultural Awareness Training	41
11.5	Summary Recommendations	41
12	REFERENCES	42
	APPENDICES	46

Figures

Figure 1.	Location of the Buronga Landfill.....	3
Figure 2.	Layout of the proposed Buronga Landfill Expansion.....	4
Figure 3.	Central part of the Buronga Landfill Expansion area, previously quarried for sand...12	
Figure 4.	Northern part of the Buronga Landfill Expansion area, previously quarried for sand.12	
Figure 5.	Southern part of the Buronga Landfill Expansion area, previously quarried for sand.	12
Figure 6.	Southern part of the Buronga Landfill Expansion area.	12
Figure 7.	Survey Team Members Inspecting the Buronga Landfill Expansion area.	20
Figure 8.	Survey Team Members Inspecting the Buronga Landfill Expansion area.	20
Figure 9.	Survey units at the Buronga Landfill Expansion Area.....	22
Figure 10.	Example of Surface Exposure in the Buronga Landfill Expansion area.....	23
Figure 11.	Example of Surface Exposure in the Buronga Landfill Expansion area.....	23
Figure 12.	Example of Surface Exposure in the Buronga Landfill Expansion area.....	23
Figure 13.	Example of Surface Exposure in the Buronga Landfill Expansion area.....	23
Figure 14.	Aboriginal cultural heritage (isolated finds of stone artefacts) at the Buronga Landfill	26
Figure 15.	Buronga Landfill Artefact Scatter 1 (AHIMS site number 46-3-0192).	28
Figure 16.	Buronga Landfill Artefact 1 silcrete flake (AHIMS site number 46-3-0203).....	28

Figure 17. Buronga Landfill Artefact 2 broken sandstone muller/grindstone (AHIMS site number 46-3-0204).....	28
Figure 18. Buronga Landfill Artefact 3 silcrete angular fragment (AHIMS site number 46-3-0205).	28
Figure 19. Locations of Aboriginal cultural heritage sites near project components	38

Tables

Table 1. Visibility Conditions in the Buronga Landfill Expansion area.....	21
Table 2. Survey Coverage of the Buronga Landfill Expansion area.....	24
Table 3. Landform Summary of Sampled Areas of the Buronga Landfill Expansion area.	24
Table 4. Summary data of Aboriginal cultural heritage place in the proposed work areas.	25
Table 5. Summary data of Aboriginal cultural heritage places near the proposed work areas.	27
Table 6. Significance Ratings for Aboriginal objects	34
Table 7. Impacts on Aboriginal objects	36

Appendices

Appendix 1. Glossary	47
Appendix 2. Consultation Log	49
Appendix 3. Correspondence to Aboriginal Community Stakeholders	53
Appendix 4. Correspondence from Aboriginal Community Stakeholders	55
Appendix 5. AHIMS Register Search.....	57

1 INTRODUCTION

1.1 THE PROPONENT

Wentworth Shire Council operates the Buronga Landfill at Lot 197 and 212 DP756946 and Lot 1 DP1037845 258 Arumpo Road, Buronga (Figure 1).

1.2 THE EXPANSION

The Buronga Landfill is located approximately 5 kilometres (km) north of Buronga and approximately 25 km east of Wentworth in western New South Wales (NSW) (Figure 1). Landfill operations commenced in 1934 and are currently contained in the south of the site with borrow pits for cell construction to the north in the proposed expansion area.

The proposed development is to expand the waste management services provided by Wentworth Shire Council at the Buronga Landfill. The development is proposed to include:

- upgrading the existing recycling infrastructure to provide a dedicated zero waste shed, community recycling station and bulking up areas to improve recycling rates and economics of recycling;
- constructing new landfill cells to the north of the existing landfill area, increasing the landfill footprint from 19 ha to approximately 40 ha. The expansion is proposed to be undertaken in eleven stages with each stage providing 3-5 landfill cells; and,
- increasing maximum waste volumes from 30,000 tonnes per annum to 100,000 tonnes per annum. Current waste acceptance from within WSC is nearing the limit of 30,000 tonnes per annum. It is also proposed to offer these services to the surrounding local government areas, such as Balranald, Central Darling and Murray River and potentially interstate.

This development is proposed to be staged and is anticipated to result in the life of the landfill site extending for over 100 years.

Approval for the Buronga Landfill Expansion is sought under Part 4 Division 4.7 (State Significant Development) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.3 AIM AND OBJECTIVES OF THE ASSESSMENT

The objective of this assessment is to provide Wentworth Shire Council with an Aboriginal Cultural Heritage Assessment (ACHA) to support an application for development approval for the Buronga Landfill Expansion.

This investigation involves a description of the context of the Buronga Landfill Expansion area and surrounds, identification of Aboriginal cultural heritage sites, items and values within the Buronga Landfill Expansion area, an assessment of the potential impacts to Aboriginal cultural heritage as a result of construction of the planned landfill cells and modified internal infrastructure and drainage works and development of recommendations to minimise, manage and mitigate any potential impacts.

This assessment has been undertaken in accordance with the relevant requirements of the various advisory documents and guidelines. These guidelines and documents include:

- *Aboriginal cultural heritage consultation requirements for proponents 2010 (Part 6 National Parks and Wildlife Act 1974) (Consultation Guidelines) (NSW Department of Environment, Climate Change and Water [DECCW], 2010a).*
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010b).*
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (NSW Office of Environment and Heritage [OEH], 2011).*
- *The Australia International Council on Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS, 2013).*

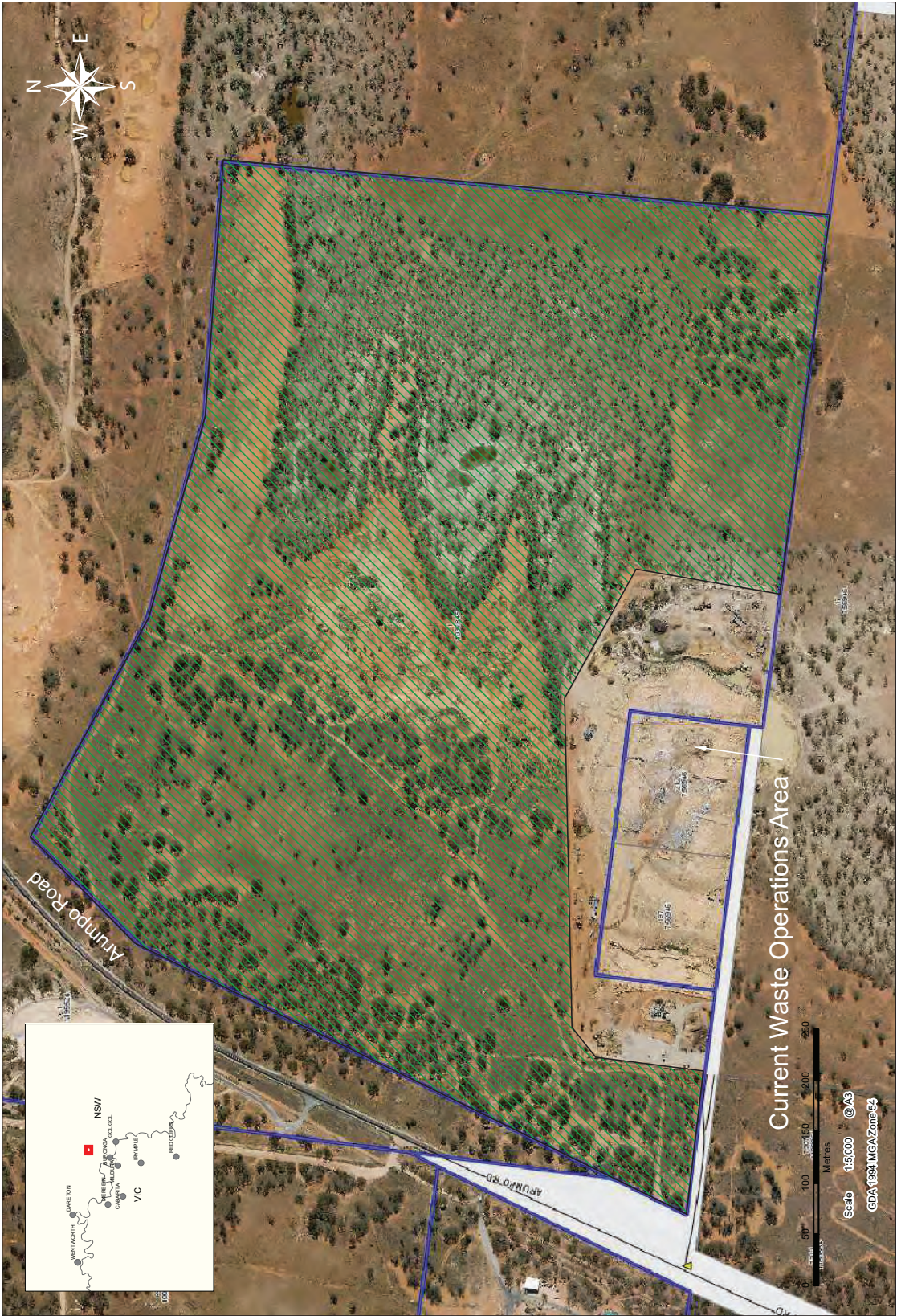
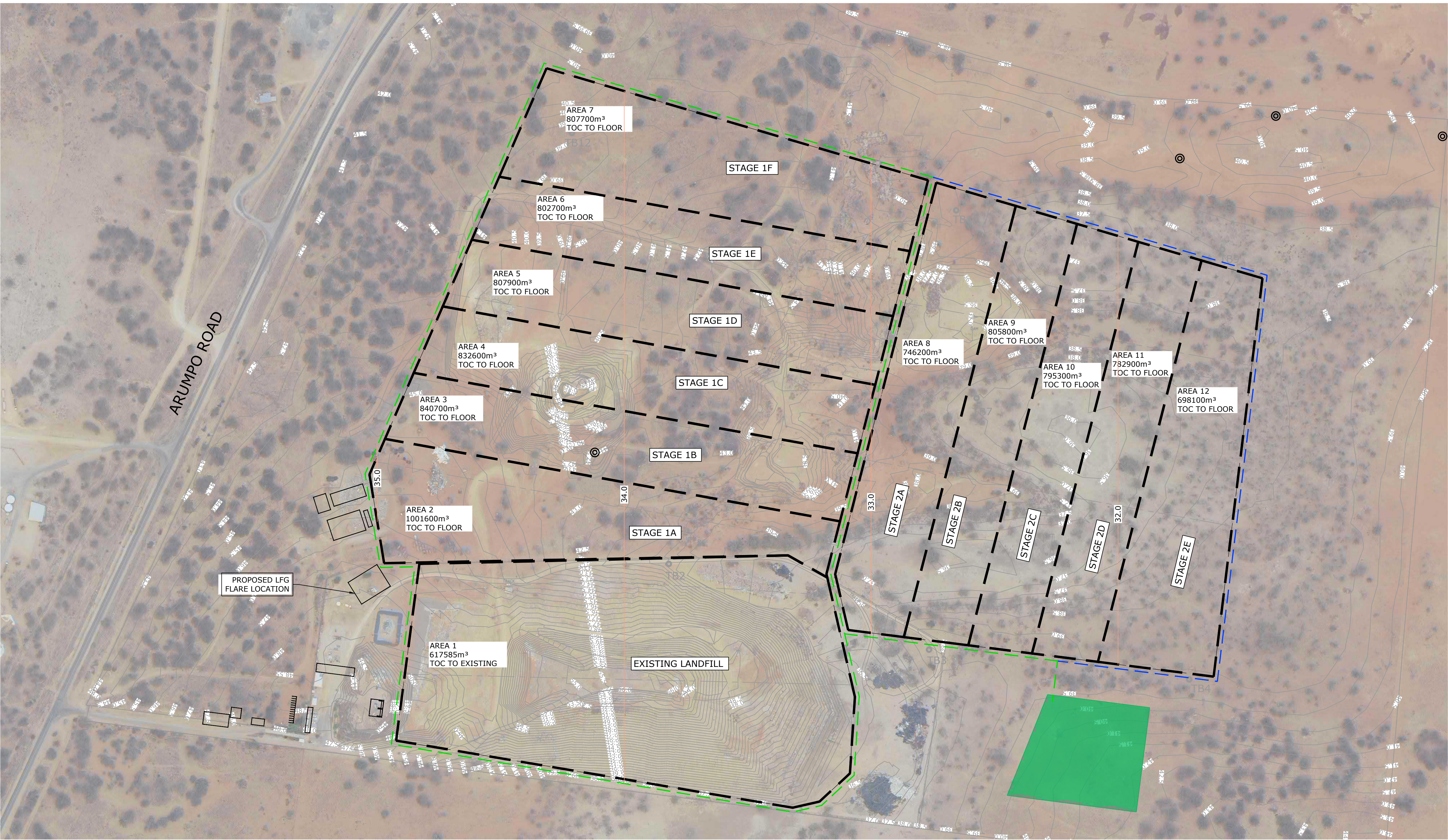


Figure 1. Location of the Buronga Landfill



LEGEND

40.0 ——— EXISTING CONTOUR (0.5m INTERVAL)

— — — STAGE BOUNDARY

— — — CELL BOUNDARY

— — — STAGE 1 SERVICE ALIGNMENT

— — — STAGE 2 SERVICE ALIGNMENT

33.0 ——— PROPOSED FLOOR CONTOURS

LEACHATE POND

ABORIGINAL ARTIFACT SITE

THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.

0 25 50 100 150

1:2500 (A1); 1:5000 (A3)

100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING

SHEET SIZE

A1

COORDS: MGA94 ZONE 54

DATUM: ALL LEVELS TO A.H.D.

SCALE: AS SHOWN

SURVEYED:PRICEMERRET

SURVEY DATE:03.03.21

APPROVED / PROJECT LEADER

A FOR INFORMATION

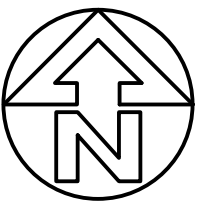
REV AMENDMENT / REASON FOR ISSUE

14.09.21

DATE

DES.

DWN.



PUBLIC UTILITIES:
THE SERVICES SHOWN ARE DERIVED FROM PLANS OBTAINED FROM THE RELEVANT SERVICE AUTHORITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ARRANGE WITH THE RELEVANT SERVICE AUTHORITIES FOR CONFIRMATION OF SERVICES AND THEIR LOCATION BEFORE EXCAVATION WORK COMMENCES.

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WENTWORTH SHIRE COUNCIL

BURONGA LANDFILL EXPANSION

FIGURE 2

PROPOSED CELL LAYOUT

FILENAME: 202597 CONCEPT DESIGN.DWG

PROJECT NUMBER 202597

DRAWING NUMBER 011

REVISION A

- *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (NSW National Parks and Wildlife Service, 1997).
- *Ask First; A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission, 2002).

1.4 STRUCTURE OF THIS REPORT

This ACHA has been prepared in consideration of the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and as such includes the following specific information:

- Section 1: Outlines the Buronga Landfill and the objectives and structure of this report.
- Section 2: Lists the investigators and contributors involved with this report.
- Section 3: Provides a summary description of the development proposal.
- Section 4: Details the consultation and partnership with Indigenous communities.
- Section 5: Outlines the landscape context and includes descriptions of land use history, geology and vegetation within the Buronga Landfill Expansion area.
- Section 6: Provides background information relevant to previous archaeological works including relevant ethno-history, the regional archaeological context and previous predictive models for the Buronga Landfill Expansion area.
- Section 7: Describes predictions for the Buronga Landfill Expansion area and documents the archaeological survey and data collection, and includes information regarding the method of the survey and a description of the areas surveyed.
- Section 8: Lists the results of the survey and provides a discussion and analysis of these results.
- Section 9: Assesses the cultural heritage significance of the Buronga Landfill Expansion area.
- Section 10: Assesses the impact of the Buronga Landfill Expansion on Aboriginal cultural heritage.
- Section 11: Lists the management, mitigation measures and recommendations.
- Section 12: Lists the references cited in this report.

A glossary of commonly used terms in the report is provided in Appendix 1.

2 INVESTIGATORS

Landskape was commissioned by Wentworth Shire Council in March 2021 to complete the ACHA for the Buronga Landfill Expansion and to prepare this report.

Dr Matt Cupper, a qualified archaeologist and geoscientist with 21 years' experience as a cultural heritage advisor, was Landskape's project archaeologist.

3 DESCRIPTION OF THE BURONGA LANDFILL EXPANSION

Wentworth Shire Council has conducted a review of waste planning for the remaining life of the Buronga Landfill to identify options to maximise waste storage capacity and to improve operational efficiency.

The review identified suitable land to the north and east of the existing/approved Buronga Landfill area. The additional landfill cells are required to allow for additional waste disposal as well as modifications and upgrades to access roads, hardstands, stormwater and leachate drainage and other supporting infrastructure.

The general proposed arrangement of the Buronga Landfill Expansion is presented on Figure 2.

4 ABORIGINAL COMMUNITY CONSULTATION

4.1 INTRODUCTION

In accordance with the Consultation Guidelines (DECCW, 2010a), this assessment has been prepared in consultation with the Aboriginal community (via the Registered Aboriginal Parties [RAPs]).

The following sections describe involvement by the RAPs and demonstrate that the input of the Aboriginal community has been considered when determining and assessing impacts, developing management measures, and making final recommendations relevant to Aboriginal cultural heritage within the Buronga Landfill Expansion area.

4.2 ABORIGINAL COMMUNITY PARTICIPATION

The RAPs were consulted throughout the preparation of this assessment, including:

- review and comment on the Proposed Methodology;
- during the field survey with the representatives of the RAPs;
- during the review period for the draft ACHA; and,
- encouraged to provide feedback and input throughout the assessment process.

The following sections outline the process and outcomes of the community consultation undertaken during preparation of the assessment to ascertain and manage the Aboriginal cultural heritage values of the Buronga Landfill Expansion area.

4.2.1 Identification of Registered Aboriginal Parties

In accordance with Section 4.1.2 of the Consultation Guidelines (DECCW, 2010a), notifications regarding the Buronga Landfill were sent on 3 May 2021 to the following organisations:

- Heritage NSW;
- Wentworth Shire Council;
- National Native Title Tribunal (NNTT);
- Native Title Services Corporation Limited (NTSCORP);
- Dareton Local Aboriginal Land Council (Dareton LALC);
- Western Local Land Services; and,
- Office of the Registrar, *Aboriginal Land Rights Act* 1983.

Responses to the Buronga Landfill notifications were received from the following organisations:

- Heritage NSW (4 May 2021);
- Dareton Local Aboriginal Land Council (4 May 2021);

- NTSCORP (6 May 2021); and,
- Wentworth Shire Council (7 May 2021).

A full record of all correspondence received from and sent to the Aboriginal community and the abovementioned organisations is presented in Appendices 2, 3 and 4.

In accordance with Sections 4.1 and 4.2 of the Consultation Guidelines (DECCW, 2010a), all individuals and organisations identified through the above correspondence were contacted in writing on 5 May 2021 and were invited to register an interest in the Buronga Landfill Expansion.

An advertisement inviting the registration of Aboriginal persons or groups who hold cultural knowledge relevant to, or who have a right or interest in, determining the cultural heritage significance of Aboriginal object(s) and/or place(s) in the Buronga Landfill Expansion area was published in the Sunraysia Daily newspaper on 5 May 2021 (Appendix 3).

Additionally, Aboriginal stakeholders with an interest in Aboriginal cultural heritage at the Buronga Landfill have been previously identified and Wentworth Shire Council has maintained ongoing consultation and engagement with these groups. These Aboriginal stakeholders included Barkandji Elder Mr Noel Johnson and Mr Rodney Lawson involved in the Buronga Landfill Project Due Diligence Assessment in 2016 (Watts, 2016) and Barkandji Native Title Group Aboriginal Corporation (represented by Mr Warwick Clark and Ms Tracey Kerwin) involved in the Buronga Landfill Upgrade Aboriginal Cultural Heritage Assessment in 2016 (Cupper, 2016)

The Barkandji Native Title Group Aboriginal Corporation, Dareton Local Aboriginal Land Council and Ta-Ru Board of Management/Mauraura Barkindji Traditional Owners nominated as RAPs for the Buronga Landfill Expansion.

A copy of the list of the RAPs for the Buronga Landfill Expansion was provided to Heritage NSW and Dareton LALC on 13 June 2021, in accordance with Section 4.1.6 of the Consultation Guidelines (DECCW, 2010a).

4.2.2 Presentation of Information about the Proposed Buronga Landfill Expansion

Information regarding the Buronga Landfill Expansion was provided in writing to the RAPs on 23 May 2021. The correspondence included an invitation to attend the field survey for the Buronga Landfill and a copy of the Proposed Methodology was provided for review and comment.

Input was sought in regards to the following aspects:

- The nature of the Proposed Methodology.
- Any Aboriginal objects or places of cultural value within the Buronga Landfill Expansion area, or issues of cultural significance.
- Any restrictions or protocols considered necessary in relation to any information of sensitivity that may be provided.
- Any other factors considered to be relevant to the heritage assessment.

The period for commenting on the Proposed Methodology was open between 23 May 2021 and 21 June 2021. No comments on the Proposed Methodology were received from the RAPs.

4.2.3 Aboriginal Community Involvement during the Field Assessment

All RAPs were invited to provide a representative for involvement in the field survey for the Buronga Landfill. The following RAPs participated in the survey:

- Dareton Local Aboriginal Land Council (represented by Mr Jason Smith); and,
- Ta-Ru Board of Management/Mauraura Barkindji Traditional Owners (represented by Mr Rex Smith Jnr).

The Aboriginal cultural heritage field survey was completed on 23 June 2021. Further details regarding the survey and survey coverage are provided in Section 7.

No comments on the Proposed Methodology were received so the survey was completed according to the strategy outlined in the Proposed Methodology and described in Section 7.

4.3 ABORIGINAL COMMUNITY INFORMATION ABOUT CULTURAL SIGNIFICANCE

As part of the review of the Proposed Methodology and during the field survey, the RAPs were asked to contribute their knowledge on the Buronga Landfill Expansion area and surrounds. This information contributed to the assessment of the cultural heritage significance of the Buronga Landfill Expansion area and is discussed further in Section 9.

4.4 REVIEW OF THE DRAFT ACHA

A draft of this report (i.e. the draft ACHA) was provided to all RAPs for their review and comment on 7 July 2021, in accordance with Sections 4.3 and 4.4 of the Consultation Guidelines (DECCW, 2010a). No comments were provided within the minimum 28 day response period closing 4 August 2021.

5 ENVIRONMENTAL CONTEXT

5.1 INTRODUCTION

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) requires a review of the environmental context to assist in the determination or prediction of the potential of a landscape to have accumulated or preserved Aboriginal cultural heritage items, the ways Aboriginal people may have used the landscape in the past, with regard to identifiable resources or focal points for activities, and the likely distribution of the material traces of Aboriginal land use based on these factors.

Detailing the landscape context is an integral procedure in modelling potential past Aboriginal land use practices and/or predicting site distribution patterns. The natural environment of an area influences the availability of local resources such as food and raw materials for artefacts, rock platforms for engravings and axe sharpening, and rock outcrops that may provide shelter. The landscape also provides the sediments that may bury objects and archaeological features, as well as the erosive processes that might expose or disperse them.

Geomorphic (land formative) processes may impact upon the type and frequency of archaeological remains. Past climate may also influence the location and types of resources available, which in turn shapes settlement and mobility patterns of past Aboriginal groups in the area. The location of different site-types (such as middens, stone artefact scatters, etc.) are strongly influenced by factors such as these along with a range of other associated features, which are specific to different land systems.

5.2 GEOLOGY

The Buronga Landfill Expansion area is located in the Lower Darling region of the Murray Basin. It lies within an area bounded to the west by the Lower Darling River and to the south by the Murray River. The surface geology of the region is mostly aeolian (wind-blown) sediments, while underlying sequences within the basin were deposited by shallow seas and lakes over the past 60 million years (Brown and Stephenson, 1991).

5.3 LANDFORMS AND VEGETATION

The Buronga Landfill Expansion area is located in sandplains, which are typical of the main landform in the region (Figures 3-6). These aeolian features comprise low, undulating regions of irregular sandy hummocks. Sandplains are vegetated by mosaics of Black and Pearl Bluebush (*Maireana pyramidata* — *Maireana sedifolia*) low-open shrublands or Belah (*Casuarina pauper*) — Rosewood (*Alectryon oleifolius*) — Wilga (*Geijera parvifolia*) low-open woodlands. Mallee (*Eucalyptus* spp.) tall shrublands also occur on the sandier hummocks. Lower-lying land to the east has been flooded from Gol Gol Lake and has supported populations of Black Box (*E. largiflorens*) woodland.

5.4 LAND-USE HISTORY

Overall, the environments of the Buronga Landfill Expansion area have been modified by past European land use practices to varying extents (Figures 3-6). The entire area has been used for sheep and cattle grazing following European settlement in the second half of the nineteenth century. Extensive earthworks have occurred in the southern, central and northern parts of the proposed borrow pit areas during past soil stripping and quarrying for previous sand extraction.



Figure 3. Central part of the Buronga Landfill Expansion area, previously quarried for sand.



Figure 4. Northern part of the Buronga Landfill Expansion area, previously quarried for sand.



Figure 5. Southern part of the Buronga Landfill Expansion area, previously quarried for sand.



Figure 6. Southern part of the Buronga Landfill Expansion area.

6 ABORIGINAL CULTURAL HERITAGE CONTEXT

Some of the earliest evidence of human occupation of Australia comes from southwestern NSW (Bowler *et al.*, 1970, 2003; Johnston and Clark, 1998; Thorne *et al.*, 1999; Pardoe, 2003; Cupper and Duncan, 2006; Olley *et al.*, 2006). Stone artefacts found at Lake Mungo, about 75 km to the northeast of the Buronga Landfill, have been dated to between 46,000 to 50,000 years ago (Bowler *et al.*, 2003). The burials of a male and female at Lake Mungo are 42,000 years old (Olley *et al.*, 2006, cf. Thorne *et al.*, 1999). People were also at nearby Lake Menindee from 45,000 years ago (Cupper and Duncan, 2006) and at Lake Victoria on the Murray River by around 21,000 years ago (Gill, 1973).

6.1 ETHNO-HISTORIC CONTEXT

Aboriginal people of the Barkindji, Kureinji, Latje Latje, Maraura, and Yerre Yerre language groups appear to have occupied the Murray River near its junction with the lower Darling River at the time of first contact with Europeans (Sturt, 1882 [1833]; 1884 [1844-6]; Mitchell, 1839; Eyre, 1885 [1842]; Krefft, 1865; Allen, 1974; Tindale, 1974; Hardy, 1976; Hercus, 1982, 1993). These tribes shared similar language and kinship systems, notably the division of members into matrilineal moieties (two-part social classification) (Tindale, 1974; Hercus, 1982, 1993; Blows, 1995).

At the time of European contact the Aboriginal people of the Murray-Darling Junction were hunter-fisher-gatherers and appear to have had a semi-sedentary lifestyle. Early accounts from the 1850s by the German naturalist Gerard Krefft (1865) suggest that these people lived along the Lower Darling and Murray Rivers during the warmest months of the year, with people moving away from the rivers into the dunefields to collect food after winter rains.

Aspects of the initial interaction between Europeans and Aboriginal people led to violent conflict. Aboriginal people were shot, poisoned and displaced from their land by pastoral settlers and, in retaliation, sheep and shepherds were speared. Within a decade of the first contact many of the Aboriginal people were living adjacent to pastoral homesteads, often working as shepherds or engaged in other labouring activities (Lans *et al.*, 1988; Withers, 1989). At the turn of the nineteenth century many Aboriginal people resided on both sides of the Murray River near Gol Gol.

6.2 PREHISTORIC CONTEXT

Accounts of Aboriginal land use of the Lower Darling during the late nineteenth and early twentieth centuries provide an insight into possible settlement patterns in the prehistoric period. Allen (1974), using these historical ethnographies and the archaeological record, invoked a subsistence model for the region based on the relationship between occupation of the riverine corridors and dunefields. Large populations of people congregated at the rivers during spring and summer and whenever the systems were high. Following seasonal rains smaller, mobile bands dispersed over the plains exploiting ephemeral resources (Allen, 1974).

The material record of this occupation is preserved in the archaeological sites of the Lower Darling region, most of which date to the period since the last Ice Age (after around 18,000 years ago) (Hope, 1981; Balme and Hope, 1990; Balme, 1995). All that remains at many of these sites are flakes of stone debris from the making and resharpening of stone tools. These were made both at Aboriginal open habitation areas (camp sites) or special activity areas such as stone knapping sites. As well as being the sites of manufacture and maintenance of stone implements, open habitation areas usually contain evidence of domestic and other activities such as cooking and food preparation. Campfires or oven hearths are common, marked by calcrete, baked clay, ferricrete, sandstone and silcrete heat retaining stones or hearthstones and charcoal. Organic remains consist of burnt animal bones, Emu and aquatic bird eggshell and freshwater mussel shell.

6.3 TYPES OF ABORIGINAL CULTURAL HERITAGE SITES IN THE REGION

Based on the results and analytical conclusions of previous archaeological surveys in similar landscape contexts in the Lower Darling region it is possible to predict the types and topographic contexts of Aboriginal cultural heritage sites in the Buronga Landfill Expansion area. The occurrence and survival of archaeological sites is, however, dependent on many factors including micro-topography and the degree of land surface disturbance.

The types of Aboriginal cultural heritage site previously recorded in the Lower Darling region are described in Sections 6.3.1-6.3.8.

6.3.1 Stone Artefact Scatters

Scatters of stone artefacts exposed at the ground surface are one of the most commonly occurring types of Aboriginal cultural heritage site in the region (Hope, 1982). The remains of fire hearths may also be associated with the artefacts. In rare instances, sites that were used over a long period of time may accumulate sediments and become stratified. That is, there may be several layers of occupation buried one on top of another.

Stone artefact scatters are almost invariably located near permanent or semi-permanent water sources. Local topography is also important in that open campsites tend to occur on level, well-drained ground elevated above the local water source. In the Lower Darling region they are commonly located on river terraces and along creek-lines and also around the margins of lakes, swamps and claypans.

6.3.2 Hearths

Hearths consist of lumps of burnt clay or stone cobble hearthstones. Sometimes ash and charcoal are preserved. Other materials found in hearths include animal bone, freshwater mussel shell, Emu eggshell and stone artefacts. Hearths probably represent the remains of cooking ovens, similar to those described in ethnographic accounts by Major Thomas Mitchell (1839) and Peter Beveridge (1869) (see also Coutts *et al.*, 1979). These were lined with baked clay nodules and stone cobbles, possibly to retain heat. Hearths may be isolated or occur in clusters and may be associated with open campsites or middens. They are often located in dune swales, particularly on claypans, near soaks and on floodplain terraces.

6.3.3 Freshwater Shell Middens

Shell middens are deposits of shell and other food remains accumulated by Aboriginal people as food refuse. In inland NSW these middens typically comprise shells of the freshwater lacustrine mussel *Velesunio ambiguus* or the freshwater riverine mussel *Alathyria jacksoni*. Freshwater middens are most frequently found as thin layers or small patches of shell and often contain stone or bone artefacts and evidence of cooking. Such sites are relatively common along the Darling River and its associated lakes and tributaries.

6.3.4 Earth Mounds

Earth mounds may have been used by Aboriginal people as cooking ovens or as campsites. They are common on the plains of southwestern NSW. Originally they appear to have ranged from 3 to 35 metres in diameter and from 0.5 to 2 metres in height. Today, however, they may be difficult to recognize because of the effects of ploughing, grazing and burrowing rabbits. Earth oven material, stone artefacts, food refuse and the remains of hut foundations have been exposed in excavated earth mounds.

6.3.5 Quarry Sites

Quarries are locations where Aboriginal people obtained raw material for their stone tools or ochre for their art and decoration. Materials commonly used for making flaked stone tools include chert, silcrete, quartz and quartzite. In the Lower Darling region stone sources are particularly scarce. Silcrete outcrops occur at a number of locations in southwestern NSW and chert is found exposed in cliffs incised by the Murray River in South Australia. Most other stone in the Lower Darling region was probably sourced via long-distance trade links with the Barrier Ranges and the southeastern Australian Highlands.

6.3.6 Modified Trees

Slabs of bark were cut from trees by Aboriginal people and used for a variety of purposes including roofing shelters and constructing canoes, shields and containers. Scars also resulted from the cutting of toeholds for climbing trees to obtain honey or to capture animals such as possums. In the Lower Darling region River Red Gums and Black Box are the most commonly scarred species. The classification of scarred trees as natural, European or Aboriginal is often problematic. However, if the scar is Aboriginal the tree must now be more than ~150 years old.

6.3.7 Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites

Stone arrangements range from cairns or piles of rock to more elaborate arrangements such as stone circles or standing slabs of rock held upright by stones around the base. Some stone arrangements were used in ceremonial activities whilst others may represent sacred or totemic sites. Other features associated with the spiritual aspects of Aboriginal life are those now called 'ceremony and dreaming' sites. These can be either stone arrangements or natural features such as rock outcrops, which may be associated with initiation ceremonies or the activities of ancestral creators.

6.3.8 Burials

Aboriginal burial grounds may consist of a single interment or a suite of burials. Burials tend to be in areas of sandy soil that were easy to dig and above floodwaters. Burials are frequently located in source-bordering sand dunes, sand ridges, lunettes and levees along watercourses (Bonhomme, 1990; Hope, 1993). Knowledge of Aboriginal burial grounds is best sought from local Aboriginal communities.

6.4 PREVIOUSLY RECORDED ABORIGINAL CULTURAL HERITAGE SITES IN THE BURONGA LANDFILL EXPANSION AREA

There is one previously recorded Aboriginal cultural heritage site recorded within the Buronga Landfill Expansion area registered on the NSW OEH Aboriginal Heritage Information Management System (AHIMS) database (AHIMS search 603490, 4 July 2021).

Watts (2016) identified an isolated find of a broken sandstone core (AHIMS site number 46-3-0192) during a Due Diligence Assessment of the Buronga Landfill Expansion area. This is located in a borrow pit work area, immediately north of the existing Buronga Landfill operations area. This Aboriginal object could not be reidentified by Cupper (2016). Wentworth Shire Council subsequently obtained an Aboriginal Heritage Impact Permit (AHIP Number 4081) (an AHIP issued under the NSW *National Parks and Wildlife Act, 1974*) to harm the site and the area was disturbed by construction of a borrow pit.

Gilding (2006) recorded two isolated finds of silcrete artefacts in the sandplain hinterland between at a loam pit immediately northeast of the Buronga Landfill (AHIMS site numbers 46-3-0092 and 46-3-0093). These sites are approximately 500 m northeast of the Buronga Landfill Expansion area. The isolated artefacts were collected by Gilding under AHIP Number 2495 issued to salvage Aboriginal objects.

A copy of the AHIMS search results is provided in Appendix 5.

7 CULTURAL HERITAGE FIELD INVESTIGATION

In accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in New South Wales* (OEH, 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b), an archaeological design and survey methodology was prepared as a key component of the cultural heritage field assessment. Details of the archaeological design and survey methodology are presented in the following sections.

7.1 OVERVIEW OF PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

An understanding of the Aboriginal archaeology of southwestern NSW has begun to emerge from a number of studies including some undertaken in the Buronga area. A study by Craib (1992) is among the most comprehensive and provides a summary of the regional archaeological record. Craib (1992) documented the distribution of Aboriginal archaeological sites around the margins of Gol Gol Lake to the immediate east of the Buronga Landfill Expansion area and made predictions about site distribution based on observations of the landforms of the region. Other studies at Gol Gol Lake include an investigation of possible culturally modified trees on the western shore by Thomas (1964), recording of Aboriginal archaeological sites on the southeastern lake margin by McIntyre (1981) and an assessment of work areas for groundwater drawdown by Cupper (2009a, 2009b). Craib (1992) also inspected the eastern shoreline and parts of the western shoreline of Mourquong Swamp to the immediate west of the Buronga Landfill Expansion area and Gilding (2006) archaeologically surveyed an area on the southwestern margin of Mourquong Swamp.

Thomas (1964) made descriptions of 93 river red gum and black box trees bearing scars at Gol Gol Lake (AHIMS site number 46-3-0006). Thomas (1964) speculated that few if any of the scars involved the removal of bark for utilitarian purposes such as dishes or covers for shelters. Instead he suggested the site had some ceremonial purpose, although there is no ethnographic evidence to support this theory (Thomas 1964).

McIntyre (1981) inspected the corridor of a high voltage electricity transmission line, locating three midden sites on the southeastern lunette of Gol Gol Lake. They consisted of small concentrations of shell restricted to thin, single horizons scattered over areas of less than 3 m diameter.

Craib's (1992) investigation involved a ground surface survey of the perimeter of Gol Gol Lake. He recorded 19 Aboriginal archaeological sites, many of which were complexes comprising shell middens, stone artefacts and hearths.

Six of the site complexes recorded by Craib (1992) contained midden shell, stone artefacts and hearths. Midden material at most of these sites also had non-human animal bone preserved. The 93 possible modified trees recorded by Thomas (1964) occurred at one of these sites and another had five modified trees. One of the site complexes also had a single human burial. There were two human burial sites that contained small amounts of shell, five sites with only shell, four sites with stone artefacts and hearths (one of which also had a single human burial), one shell midden and stone artefact site complex with two modified trees and a single modified tree.

Craib (1992) noted that midden shell extended along the entire western shore of Gol Gol Lake. Mainly silcrete stone artefacts became more abundant towards the southwestern end. Aboriginal archaeological sites were smaller on the eastern lunette, consisting of small numbers of ground and flaked stone, scattered baked clay heat retainers from hearths and discrete lenses of freshwater mussel shell (Craib 1992). The four human burials, all single interments, occurred in these eastern areas. Modified trees occurred on the lakeshore.

Cupper (2009a, b) re-identified some of the cultural heritage sites previously recorded at Gol Gol Lake and his archaeological survey of groundwater extraction infrastructure encountered an additional three shell midden sites at the lake.

Much less abundant cultural heritage has been identified at Mourquong Swamp to the west of the Buronga Landfill Expansion area, or in the area between Mourquong Swamp and Gol Gol Lake, including the present study area. Craib (1992) encountered two isolated stone artefacts on the eastern lunette of Mourquong Swamp: a silcrete core measuring approximately 20 x 20 x 20 mm and a quartz flake less than 10 mm in length. He also noted five fragments of mussel shell on an exposure between the playa and Gol Gol Lake (Craib 1992). A possible culturally modified Black Box tree also occurred in this hinterland area (Craib 1992).

Gilding (2006) located an isolated stone artefact (AHIMS site number 46-3-0095), a brown chert distal flake, on the southwestern margin of Mourquong Swamp. He also recorded two isolated finds of silcrete artefacts in the sandplain hinterland between Mourquong Swamp and Gol Gol Lake (AHIMS site numbers 46-3-0092 and 46-3-0093).

Watts (2016) completed a Due Diligence Assessment of the Buronga Landfill Expansion area. She identified an isolated find of a broken sandstone core (AHIMS site number 46-3-0192) in the southern part of the proposed borrow pit work area, immediately north of the existing Buronga Landfill borrow pit.

Cupper (2016) archaeologically surveyed the Buronga Landfill Expansion area during an Aboriginal cultural heritage assessment. No Aboriginal objects were identified during the assessment, which Cupper (2016) attributed to the extensive surface disturbance across the area.

7.2 CULTURAL HERITAGE SITE PREDICTIVE MODEL

Previous archaeological studies indicate that dunefields and sandplains of the Lower Darling have a low density of Aboriginal cultural heritage sites. Occupation sites are almost invariably located at small ephemeral water sources such as swamps and claypans (McIntyre, 1981; Clark, 1983). The most frequently recorded Aboriginal sites in the dunefields and sandplains are stone artefact scatters and hearths (AHIMS site database). Isolated finds of stone artefacts and hearthstones are also represented in the archaeological record. Other Aboriginal cultural heritage site types previously identified in the Lower Darling region are shell middens, stone quarries, ceremonial and dreaming sites, trees scarred by Aboriginal people, burials, earth mounds and stone arrangements (AHIMS site database).

Based on these observations of archaeological site types and their distribution and landscape setting, the following predictive model of site types and locations within the Buronga Landfill Expansion area was developed prior to the survey:

- **Stone artefact scatters, hearth and mound sites and isolated finds of stone artefacts or hearthstones** have the potential to occur within the Buronga Landfill Expansion area. The density of these types of sites was predicted to be low, given the absence of nearby permanent sources of water. Open occupation sites are typically found within 500 metres of water sources, so such sites are most likely to be encountered on level ground adjacent in dune swales that may intermittently retain surface water following rain.
- **Stone quarry** sites are unlikely to occur in the Buronga Landfill Expansion area, as there are no rock outcrops suitable for knapping.
- **Scars made by Aboriginal people** may occur on the Black Box trees that grow in the Buronga Landfill Expansion area.
- The chance of encountering **shell middens** was predicted to be low, as they are usually found near permanent water sources, as are **burial** sites. Source-bordering dunes adjacent to waterways are the landforms most likely to contain human skeletal remains.
- Although **stone arrangements** have been recorded in the Lower Darling region, they are not common and were considered unlikely to be encountered in the Buronga Landfill Expansion area. Stone arrangements tend to occur on level ground, often on elevated landforms.

While predictive studies such as this can be expected to identify areas in which sites associated with economic or subsistence activities may be present, notably open habitation areas, other sites may fall outside such a predictive framework.

For example, places associated with spiritual aspects of traditional Aboriginal society such as ceremony and dreaming sites are often located at topographically distinct or unique features, which cannot be identified from an examination of maps or other records. For this reason, it was essential that local Aboriginal communities be consulted so that sites of significance to them can be identified.

7.3 FIELD METHODOLOGY

The archaeological field survey was based on the sampling strategy developed in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and Requirement 5a of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and outlined in Section 7.3.2.

The objective of the field survey was to identify sites of Aboriginal cultural significance within the Buronga Landfill.

7.3.1 Personnel

The survey was conducted over a period of one day on 23 June 2021. The participants of the field surveys were project archaeologist Dr Matt Cupper of Landscape, together with the representatives from the RAPs listed in Section 4.2.3 (Figures 7 and 8).



Figure 7. Survey Team Members Inspecting the Buronga Landfill Expansion area.



Figure 8. Survey Team Members Inspecting the Buronga Landfill Expansion area.

7.3.2 Survey Methods

The Buronga Landfill Expansion area was inspected on foot by the project archaeologist and Aboriginal community representatives. The field team examined the ground surface for any archaeological traces such as stone artefacts, hearths, hearthstones, shells, bones and mounds. All mature trees in the areas of proposed disturbance were inspected for scarring or carving by Aboriginal people.

Particular attention was paid to areas with high ground surface visibility such as along stock and vehicle tracks and in scalds, gullies and other eroded areas.

The team members walked abreast across the surveyed areas in a series of closely spaced transects. These were evenly distributed over the areas of proposed disturbance and approximately 10 metres apart. Due to the general openness of the landscape it was usually possible to identify likely site locations from at least 10 metres and deviate from the transects to make closer inspections.

Survey units and descriptions of the visibility conditions for each survey unit are provided in Table 1.

Table 1. Visibility Conditions in the Buronga Landfill Expansion area.

Survey Unit	Landforms	Vegetation	Visibility	Exposures	Exposure	Survey Method
1	Sandplain	Mallee Eucalypt tall shrubland, Bluebush low shrubland	80 %	Quarrying, animal tracks, vehicle tracks, gullies, scalds	80 %	Pedestrian
2	Swale	Black Box woodland, Bluebush low shrubland	70 %	Animal tracks, vehicle tracks, gullies, scalds	70 %	Pedestrian
3	Sandplain	Mallee Eucalypt tall shrubland, Bluebush low shrubland	80 %	Quarrying, animal tracks, vehicle tracks, gullies, scalds	80 %	Pedestrian

% - percentage.

7.4 SURVEY COVERAGE DATA

7.4.1 Conditions of Visibility

Conditions of ground surface visibility affect how many sites are located. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between different environments, then this would be reflected in the numbers of sites reported for each area. The area with the best visibility may be reported as having the most sites (because they are visible on the ground) while another area with less visibility but perhaps more sites would be reported as having very little occupation. It is important therefore to consider the nature of ground surface visibility as part of any archaeological investigation.

Survey units and descriptions of the visibility conditions for each survey unit are provided in Table 1 and mapped in Figure 9.

Conditions of ground surface visibility were typically around 70-80 % (Table 1). Grass and herbaceous plant growth was very low and the ground surface was exposed by erosion through quarrying, scalding and gullying and stock and vehicular traffic (Figures 10-13).



Figure 9. Survey units at the Buronga Landfill Expansion Area



Figure 10. Example of Surface Exposure in the Buronga Landfill Expansion area.



Figure 11. Example of Surface Exposure in the Buronga Landfill Expansion area.



Figure 12. Example of Surface Exposure in the Buronga Landfill Expansion area.



Figure 13. Example of Surface Exposure in the Buronga Landfill Expansion area.

7.4.2 Coverage Analysis

Coverage analysis is a useful measurement to allow cultural resource managers to assess surveys from adjacent areas and it also allows some meaningful calculation of the actual sample size surveyed. The *actual* or *effective* area surveyed by a study depends on the conditions of ground surface visibility. Conditions of surface visibility are affected by vegetation cover, geomorphic processes such as sedimentation and erosion rates and the abundance of natural rock that may obscure the remains of cultural activities.

All of the Buronga Landfill Expansion area was inspected on foot. The areas covered during the survey are outlined in Table 2 and Figure 9 and summarised by landform in Table 3. Survey coverage was high, given the intensive nature of the survey and the generally excellent conditions of visibility.

Table 2. Survey Coverage of the Buronga Landfill Expansion area.

Survey Unit	Landform	Survey Unit Area (ha)	Visibility (%)	Exposure (%)	Effective Cover (ha)	Effective Cover (%)	Sites
1	Sandplain	64.9	80	80	20.8	32	4
2	Swale	23.5	70	70	6.6	28	-
3	Sandplain	30.0	80	80	9.6	32	-
Total		118.4			37.0	31	4

ha – hectares.

Table 3. Landform Summary of Sampled Areas of the Buronga Landfill Expansion area.

Landform	Landform Area (ha)	Area Effectively Covered (ha)	Landform Effectively Surveyed (%)	Sites
Sandplain	94.9	30.4	32	4
Swale	23.5	6.6	28	-

ha – hectares.

8 RESULTS AND DISCUSSION

8.1 PREVIOUSLY IDENTIFIED ABORIGINAL CULTURAL HERITAGE

There is one previously recorded Aboriginal object in the proposed works area for the Buronga Landfill Expansion (Table 4; Figure 14). This is AHIMS site number 46-3-0192 (Buronga Landfill Artefact Scatter 1), an isolated find of a broken sandstone core, which had been identified during the Buronga Landfill Project Due Diligence Assessment in 2016 (Watts, 2016) (Figure 15). This Aboriginal object was identified immediately north of the existing Buronga Landfill borrow pit. The Aboriginal object could not be re-identified during the survey of Cupper (2016).

Wentworth Shire Council has previously obtained an Aboriginal Heritage Impact Permit (AHIP Number 4081) (an AHIP issued under the NSW *National Parks and Wildlife Act, 1974*) to harm the site and the area was disturbed by construction of a borrow pit.

A summary description of this feature is contained in Table 4 and mapped in Figure 14.

Table 4. Summary data of Aboriginal cultural heritage place in the proposed work areas.

AHIMS Site Number	Site Name	GDA94 Zone 54 (mE)	GDA94 Zone 54 (mN)	Site size (m)	Landform	Contents
46-3-0192	Buronga Landfill Artefact Scatter 1	610565	6223164	na	Sandplain	Broken sandstone core

8.2 NEWLY IDENTIFIED ABORIGINAL CULTURAL HERITAGE

Three Aboriginal cultural heritage sites were newly identified in the Buronga Landfill Expansion area. These are all isolated finds of stone artefacts and comprise:

Buronga Landfill Artefact 1 (AHIMS site number 46-3-0203) – a silcrete flake on a sandplain in the northeast of the Buronga Landfill Expansion area (Figure 16).

Buronga Landfill Artefact 2 (AHIMS site number 46-3-0204) – a broken sandstone muller (grindstone) on a sandplain in the northeast of the Buronga Landfill Expansion area (Figure 17).

Buronga Landfill Artefact 3 (AHIMS site number 46-3-0205) – a silcrete angular fragment on a sandplain in the northeast of the Buronga Landfill Expansion area (Figure 18).

Summary descriptions of these features are contained in Table 5 and a map of their locations is depicted in Figure 14.



Figure 14. Aboriginal cultural heritage (isolated finds of stone artefacts) at the Buronga Landfill

Table 5. Summary data of Aboriginal cultural heritage places near the proposed work areas.

AHIMS Site Number	Site Name	GDA94 Zone 54 (mE)	GDA94 Zone 54 (mN)	Site size (m)	Landform	Contents
46-3-0203	Buronga Landfill Artefact 1	611253	6223510	na	Sandplain	Silcrete flake
46-3-0204	Buronga Landfill Artefact 2	611366	6223560	na	Sandplain	Broken sandstone muller
46-3-0205	Buronga Landfill Artefact 3	611562	6223536	na	Sandplain	Silcrete angular fragment

No additional Aboriginal cultural heritage sites beyond those described above were identified across the remainder of the Buronga Landfill Expansion area, despite the intensive nature of the survey. This negative result is despite the excellent conditions of surface visibility and high survey coverage. It is attributable to both the landscape setting of the Buronga Landfill Expansion area, which is not near permanent water and therefore unlikely to contain abundant Aboriginal cultural heritage sites, and previous disturbance of this area by sand quarrying, which may have destroyed Aboriginal cultural heritage sites, had they occurred in this area in the past.

Modified trees were not identified despite inspection of all mature trees in the Buronga Landfill Expansion area. Quarry sites are also definitely not represented in the Buronga Landfill Expansion area as rock outcrop is lacking. Landforms such as lunettes or source-bordering sand dunes that might contain sensitive sub-surface archaeological material such as burials do not occur in the Buronga Landfill Expansion area. The sediments of the Buronga Landfill Expansion area had been well enough exposed by past sand quarrying, pastoral activities, vehicular traffic and wind and water erosion to determine that no additional archaeological material was present on the surface nor is likely to be buried beneath the soil.



Figure 15. Buronga Landfill Artefact Scatter 1 (AHIMS site number 46-3-0192).



Figure 16. Buronga Landfill Artefact 1 silcrete flake (AHIMS site number 46-3-0203).



Figure 17. Buronga Landfill Artefact 2 broken sandstone muller/grindstone (AHIMS site number 46-3-0204).



Figure 18. Buronga Landfill Artefact 3 silcrete angular fragment (AHIMS site number 46-3-0205).

9 ABORIGINAL CULTURAL HERITAGE VALUES

9.1 BACKGROUND

All Aboriginal objects are afforded protection under the NP&W Act, but decisions about appropriate management of individual cultural heritage items or sites are usually based on their assessed significance (archaeological and cultural) as well as the likely impact of the proposed development and the benefits of the development. The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) requires significance assessment in accordance with the processes set out in the Burra Charter (Australia ICOMOS, 1988, 1999, 2013).

The process of significance assessment has received considerable attention since the early 1980s and criteria for assessing these values have been developed and adapted to deal specifically with Aboriginal cultural heritage. The significance of Aboriginal archaeological sites such as those found during this study are usually assessed in terms of their importance to archaeologists (i.e. their scientific or research significance), their importance to contemporary Aboriginal people and their importance to the general public. Once the significance of a site has been assessed, it can be ranked against others and specific recommendations formulated. Criteria for assessing scientific significance are set out below.

Under the Burra Charter (Australia ICOMOS, 1988, 1999, 2013), cultural significance means aesthetic, historic, scientific, or social value for past, present or future generations. Cultural significance is a concept that helps in estimating the value of places. The places that are likely to be of significance are those that help an understanding of the past, enrich the present, and may be of value to future generations. Cultural significance is embodied in the place itself, its “*fabric, setting, use, associations, meanings, records, related places and related objects*” (Australia ICOMOS 1999). The components of significance - aesthetic, historic, scientific, social and spiritual - are described below.

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric, the smells and sounds associated with the place and its use (Australia ICOMOS 1988).

A place may have historic value because it has influenced, or has been influenced by, a historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place, the significance will be greater where evidence of the association or event survives in-situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS 1988).

The scientific or research value of a place will depend on the importance of the data involved, on its rarity, quality (integrity) or representativeness, and on the degree to which the place may contribute further substantial information (Australia ICOMOS 1988). Scientific or archaeological

significance may be assessed by placing a site, feature or landscape in a broader regional context and by assessing its individual merits in the context of current archaeological discourse.

Social value is broadly defined as *the qualities for which a place has become a focus of spiritual, political, natural or other cultural sentimental to a majority or minority group* (Australia ICOMOS 1988: 30). Johnston (1994) explains “*Social value is about collective attachment to places that embody meaning important to a community, these places are usually community owned or publicly accessible or in some other way “appropriated” into people’s daily lives. Such meanings are in addition to other values, such as the evidence of valued aspects of history or beauty, and these meanings may not be apparent in the fabric of the place, and may not be apparent to the disinterested observer*” (Johnston 1994: 10).

Although encompassed within the criterion of social value, the spiritual value of a place was added to The Burra Charter in 1999 (Australia ICOMOS 1999: 1). Spiritual value is predominantly used to assess places of cultural significance to Aboriginal Australians.

9.2 ASSESSMENT OF ABORIGINAL CULTURAL HERITAGE SIGNIFICANCE

Aboriginal cultural heritage significance indicates the importance of a site or feature to Aboriginal communities. This category may include sites, items and landscapes that people may have traditional ties with, as well as areas that may have contemporary importance to Aboriginal communities. The perceptions of Aboriginal people on the significance of archaeological sites usually stem from traditional, cultural and educational beliefs although most local Aboriginal communities also value the scientific information that archaeological sites may be able to provide.

Places of cultural value may have social significance to Aboriginal communities, they may have historic value through association with historic themes (e.g. missions or massacres), or they may take on value because of their rarity or because a place may be able to contribute new information about the past. Places may have aesthetic significance, being natural features with symbolic values, dramatic presence or tranquil qualities. Such Aboriginal cultural significance may not be in accord with the interpretations made by archaeologists – a site may have low archaeological significance but high Aboriginal significance, or vice versa (Australia ICOMOS 1988).

Archaeological sites provide connections to the past for the present Aboriginal community and for future generations. Aboriginal cultural heritage sites such as those identified during this survey can also provide information about past lifestyles and strengthen the links between Aboriginal people and the land.

The level of significance attributed to individual sites may vary according to a number of factors including the nature and integrity of the heritage items and the landscape in which the site is located. The views of the Aboriginal representatives on the cultural significance of recorded sites were sought during the field survey and review of the draft report. The documented opinions are based on feedback received from representatives of the registered Aboriginal parties and may not reflect the views of the Aboriginal community as a whole.

Aboriginal people of the Lower Darling region are generally concerned about any development that might impact upon Aboriginal cultural heritage and other values on land that is traditionally theirs. All land has high cultural significance for individual Aboriginal people and for the Aboriginal community collectively. It should also be noted that any development upon, or disturbance of land is contrary to principal Aboriginal beliefs regarding land, its values and its inherent cultural significance.

The Barkandji Aboriginal community is particularly concerned about the preservation of Aboriginal cultural heritage sites. However, the RAPs involved in this assessment did not have any specific information pertaining to the Buronga Landfill Expansion area regarding Aboriginal cultural heritage. In particular, representatives of the RAPs involved in the field survey thought the Buronga Landfill Expansion area was unlikely to contain abundant physical remains of past Aboriginal occupation, due to the past disturbance by sand quarrying.

9.3 ASSESSMENT OF SCIENTIFIC SIGNIFICANCE

A number of criteria are used to assess the scientific or archaeological significance of a site. These include the integrity of a site, its structure and contents. All of these criteria combine to give a site its value as a research tool for archaeologists. In addition to the above criteria, a site may also be of scientific significance because of its representativeness or rarity. It is a basic tenet of archaeology that any site which is not represented elsewhere is of great value because archaeologists are concerned with preserving a representative sample of all site types for future generations.

9.3.1 Site Integrity

Site integrity refers to its state of preservation or condition. A site can be disturbed through a number of factors including natural erosional processes, destructive land use practices or repeated use of a site in the past by both humans and animals. Sites or landscapes in good physical condition are generally able to provide information on spatial relationships between (for example) stone artefacts, other remains, chronological units if present, and landscape settings:

- The connectedness of individual sites or landscapes – is the content, site or landscape part of a complex of related sites or landscapes?
- The potential of a site or landscape to provide a relative or absolute chronology extending back into the past, i.e. stratified sequences of cultural materials and/or dateable materials such as organic remains (radiocarbon dating), or sealed or cultural deposits (optical or thermoluminescence).
- The ability of the site or landscape to provide a large sample size (large numbers of stone artefacts, art motifs, grinding grooves, etc.) about which statistically significant statements can be made.

Assessment values for site integrity are set out below:

low highly disturbed or poorly preserved with little research potential.

moderate	some disturbance but remaining cultural material allows for some research potential.
high	little or no disturbance to site, good preservation and considerable research potential.

In terms of site integrity, the Aboriginal objects would rate low. This assessment is based on the degree of disturbance noted during the investigation. The stone artefacts were identified modified contexts within cleared areas. They have also been disturbed by repeated traffic of hooved animals and vehicles, coupled with erosion by wind and water.

9.3.2 Site Structure

Site structure refers to the physical dimensions of a site (i.e. its area and depth or stratification). A large site or a site with stratified deposits usually has more research potential than a small site or surface scatter. In some instances, however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal.

low	small surface scatters with no stratified deposit.
moderate	medium to large surface scatters with or without stratification.
high	large <i>in situ</i> surface scatters, any site with stratified deposit.

The shallow soils over almost all of the study area, coupled with the degree of past disturbance from land clearing and soil stripping for quarrying and pastoralism, means that *in situ* subsurface cultural deposits are improbable and unlikely at the stone artefact site. The potential for significant sub-surface deposits that provide intact chronological sequences is assessed to be low based on the soil profiles within the extent of the study area. The one Aboriginal object found forms a lag deposit on a scalded surface. The surface of the site is degrading.

The isolated artefact sites are small in size and have a low site structure.

9.3.3 Site Contents

Site contents refers to the range and type of occupation debris found in a site. Generally, sites that contain a large and varied amount of organic and non-organic material are considered to have greater research potential than those sites with small, uniform artefacts.

low	small amount and low diversity of cultural material.
moderate	medium amount and diversity of cultural material.
high	large and diverse amount of cultural material.

The original cultural material of the sites recorded at the study area have been exposed to weathering. Only single stone artefacts remain at the open sites, with no organic materials preserved. The stone artefact assemblages are represented by a single flake, angular fragment and broken muller. Artefact densities are very low.

The isolated finds rate low by the site contents criterion.

9.3.4 Site Representativeness and Rarity

Representativeness or rarity refers to how often a particular site type occurs in an area and requires some knowledge of the background archaeology of the area in which the study is being undertaken. Sites that are representative of the local and regional archaeological record may have value for that reason and if a site is rare or unique in some way then it is *ipso facto* significant (Bowdler 1983). Whether items are of rare or common forms will depend to some extent on the variables used to distinguish them. Open sites, for example, may be distinguished from grinding grooves or scarred trees according to the general type of evidence present (e.g. stone artefacts distinguishable from trees with marks or grooves on rock platforms). To assess rarity and representativeness site type can be used initially, then this category subdivided until a satisfactory level of (dis)similarity is achieved. Within the general group “stone artefact scatters”, sites may be distinguished according to other variables, such as their content, or their landscape setting. Technically, an assessment of representativeness should identify both what is typical or common as well as what is rare.

low	many of the same site type occurring in a single area or region.
moderate	site type occurs elsewhere but not in great quantity or with good preservation.
high	site type is rare or unique.

On the basis of the results of previous archaeological investigations (e.g. Craib 1992) and information held on the AHIMS site register it is clear that stone artefacts are widespread in the region. The isolated finds located in the study area are therefore not unique and are well represented outside the study area.

9.3.5 Educational Value

The value of archaeological sites to the general public is generally assessed by their potential to educate the public about the Aboriginal past. The stone artefact sites rank low by this criterion. They are small, isolated and unlikely to attract particular interest in Aboriginal heritage.

9.4 AESTHETIC SIGNIFICANCE

Aesthetic significance relates to the scale, form, materials, texture, colour, space and relationship of the components of the place. The relationship of the place with its setting is equally important.

The stone artefacts are subdued features in the landscape and lack any appreciable aesthetic value.

9.5 HISTORIC SIGNIFICANCE

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event.

For any given place, the significance will be greater where evidence of the association or event survives *in situ*, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS 1988).

The historic value of the Aboriginal archaeological sites in the study area largely stems from their importance in providing evidence of Aboriginal peoples' association with the area. Archaeological and ethno-historical sources show that past Aboriginal people frequented specific places within the region such as the stone artefact sites in the study area for habitation and to manufacture lithic implements.

9.6 SUMMARY OF ARCHAEOLOGICAL SIGNIFICANCE

The following significance assessment is based on the scientific or research value and is not based on the insight of Aboriginal people for their cultural significance assessment of these sites. The registered Aboriginal parties have been requested to provide comment on the cultural significance of the study area and the recorded sites throughout the consultation process (Section 4). The study area has limited potential to provide archaeological information as it contains few isolated stone artefacts. The overall study area is assessed as containing low significance due to the paucity of sites present and the way in which this information contributes to the nature of Aboriginal land use in the region. Table 6 provides significance ratings for the known Aboriginal sites within the study area.

Table 6. Significance Ratings for Aboriginal objects

AHIMS Site Number	Site Name	Significance Rating for Individual Criterion				Overall Archaeological Significance Rating
		Scientific	Aesthetic	Social	Historical	
46-3-0203	Buronga Landfill Artefact 1	Low	Low	Low	Low	Low
46-3-0204	Buronga Landfill Artefact 2	Low	Low	Low	Low	Low
46-3-0205	Buronga Landfill Artefact 3	Low	Low	Low	Low	Low

10 IMPACT ASSESSMENT

In accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011), the principles of ecologically sustainable development were considered in assessing the likely harm of the Buronga Landfill Expansion to Aboriginal objects.

Four Aboriginal objects have been identified in the Buronga Landfill Expansion area. One of these Aboriginal objects has already been harmed by the previous construction of a borrow pit under a previous AHIP. The other three Aboriginal objects are outside direct disturbance areas for the proposal (Figure 19).

The potential for previously unidentified Aboriginal cultural heritage to occur in the Buronga Landfill Expansion area is also considered in Section 10.4.

10.1 POTENTIAL DIRECT IMPACTS

The landfill operation would disturb the current land surface and would directly impact archaeological material associated with the affected landforms and their landscape context. The proposal would result in the direct disturbance of approximately 35 ha of land.

Such impacts on archaeological values typically fall into three categories:

- the loss of information which could otherwise be gained by conducting research today;
- the loss of the archaeological resource for future research using methods and addressing questions not available today; and
- the permanent loss of the physical record.

These impacts can usually be mitigated to various degrees, depending on the nature and significance of the cultural heritage. Where sites are of low significance, their destruction (without salvage) may have little consequence. This could be due to the lack of useful information that could be gained from research, or the availability of many equivalent and alternative sites for study.

Sites with greater significance may be the subject of archaeological investigation prior to their disturbance. This allows for the salvage of information, and the recovery of a sample of artefactual materials according to current methods and research priorities. Sites and site groupings that are common elsewhere may not require the same degree of salvage attention as those which are rare, of high significance, and subject to active deterioration.

Salvage investigations can provide for the discovery of new knowledge about the Aboriginal occupation of an area. Despite the loss of physical evidence involved, the information gained can in turn aid the interpretation and better management of the remaining archaeological resource.

10.2 POTENTIAL INDIRECT IMPACTS

In areas where the proposed works for the proposal would not involve significant earthmoving, impacts may be limited to minor surface disturbance, limited disturbance of the associated substrates or landforms and no significant alteration of the landscape context.

Potential indirect impacts to archaeological sites could include the following:

- deposition of dust generated by earthworks and vehicular traffic;
- accidental disturbance by peripheral activities; and
- inappropriate visitation including the unauthorized removal of Aboriginal objects.

10.3 CULTURAL HERITAGE POTENTIALLY IMPACTED BY THE PROPOSAL

Four Aboriginal cultural heritage sites comprising isolated finds of stone artefacts have been identified during the field surveys of the study area. The impact of the proposal on these sites is determined by the construction of the Buronga Landfill Expansion and the degree of harm this would cause.

The three Aboriginal objects newly identified during this assessment are outside direct disturbance areas for the proposal (Figure 19).

Harm can be avoided for these three Aboriginal cultural heritage sites and therefore the consequence of harm is no loss in value (Table 7).

One isolated find of a stone artefact (AHIMS site number 46-3-0192) has already been harmed by the previous construction of a borrow pit under a previous AHIP (Table 7).

Table 7. Impacts on Aboriginal objects

AHIMS Site Number	Site Name	Type of Harm	Degree and Consequence of Harm
46-3-0192	Buronga Landfill Artefact Scatter 1	Direct (already harmed under AHIP)	Total loss of value (already harmed under AHIP)
46-3-0203	Buronga Landfill Artefact 1	None	No loss of value
46-3-0204	Buronga Landfill Artefact 2	None	No loss of value
46-3-0205	Buronga Landfill Artefact 3	None	No loss of value

10.4 POTENTIAL FOR PREVIOUSLY UNIDENTIFIED ABORIGINAL CULTURAL HERITAGE TO OCCUR IN THE STUDY AREA

All of the study area was inspected for cultural heritage sites during the field surveys. It is possible that some archaeology was obscured by grass, leaf-litter or soil. Such previously unidentified features, should they occur, would probably be additional isolated finds of stone artefacts (based on the predictive model outlined in Section 7.1 and informed by the results of the current survey, summarized in Section 8).

Further sites of a type or significance not previously encountered in the study area are improbable. This is partly attributable to the degree of land surface modification that has occurred since European settlement, as such past disturbance associated with pastoralism and sand

quarrying may have obliterated many archaeological features, had they occurred previously. For example, previous tree clearing and land levelling could have destroyed scarred trees and earthen features such as mounds and hearths and stone arrangements including ceremonial rings. Shell middens were not encountered because most occur within 100 m of sources of permanent freshwater, absent from the study area.

None of the old growth trees present in the areas of proposed disturbance bore any evidence of having had bark or wood removed or carved by Aboriginal people.

The shallow soils of the gently undulating sandplains that comprise the study area, coupled with the degree of past disturbance from land clearing and soil stripping for pastoralism and quarrying, means that significant *in situ* subsurface cultural deposits are improbable. The isolated artefact in the study area forms a lag deposit on an eroded land surface, which is still degrading.

The study area does not contain culturally sensitive landforms such as lunettes or source-bordering sand dunes where subsurface Aboriginal cultural deposits (e.g. burials) have been recorded previously.

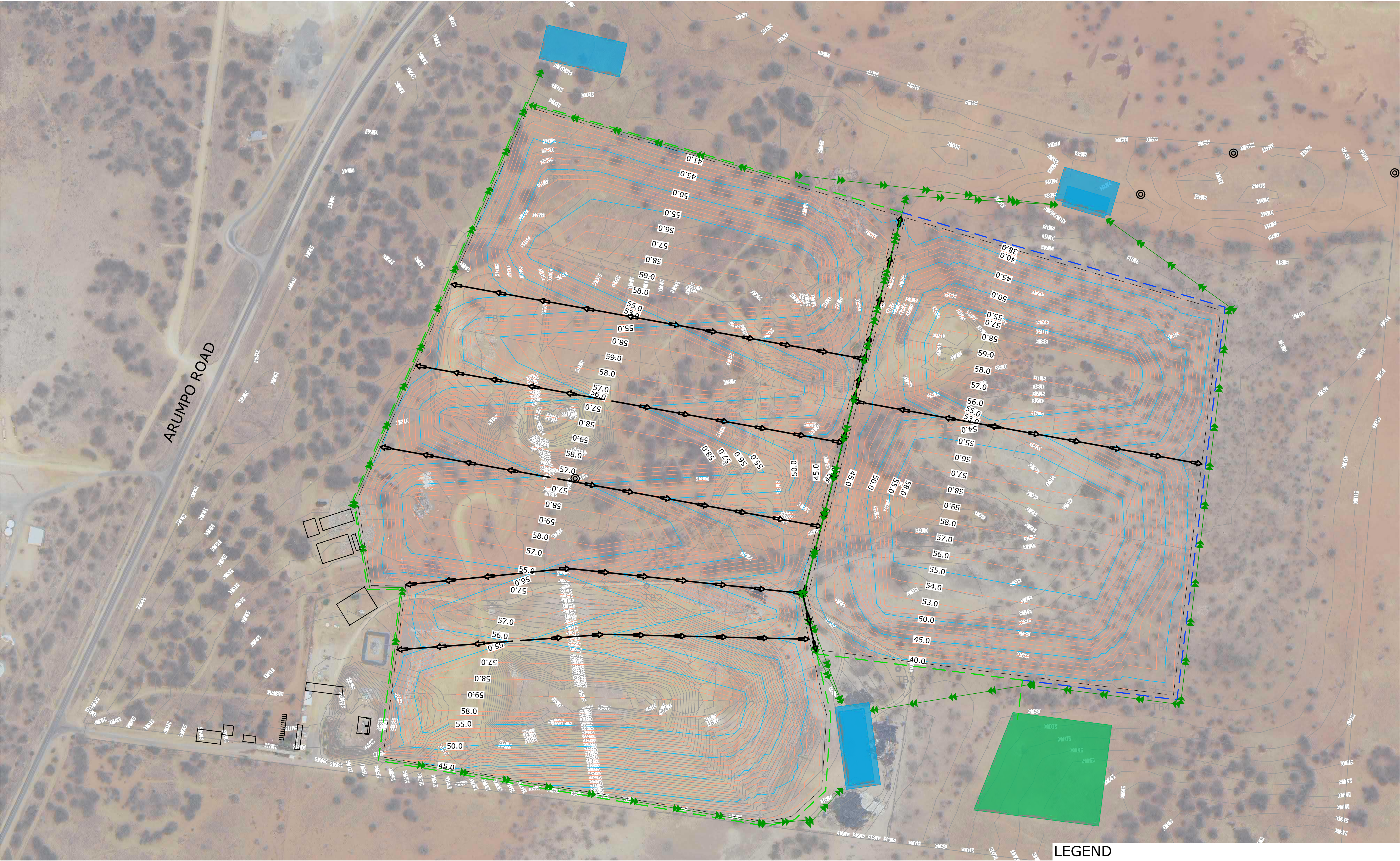
A strategy for managing any newly identified Aboriginal objects during the life of the proposal is outlined in Section 11.3.

10.5 POTENTIAL CUMULATIVE IMPACTS OF THE PROPOSAL

Considering the nature and scale of previous and ongoing land disturbance processes in the region (predominately due to past pastoral and quarrying activities), the nature and extent of identified Aboriginal heritage sites and archaeological potential in the study area and the nature and scale of impacts associated with the proposal, it is considered that the proposal would not substantially increase cumulative impacts to Aboriginal heritage in the region. Notably, harm would be avoided to the three Aboriginal cultural heritage sites newly identified during this assessment

10.6 FLEXIBILITY OF THE DESIGN OF THE PROPOSAL

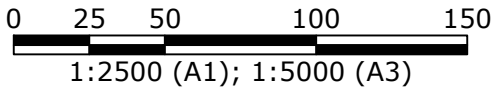
The locations of the proposed Buronga Landfill Expansion components are currently within their optimum design locations, having already been reduced in footprint to minimize disturbance to threatened ecological communities.



LEGEND

- 40.0 ——— EXISTING CONTOUR (0.5m INTERVAL)
- 51.0 ——— DESIGN CONTOUR MAJ (5.0m INTERVAL)
- 50.1 ——— DESIGN CONTOUR MIN (1.0m INTERVAL)
- STAGE BOUNDARY
- CAP CROWN
- CAP DRAIN
- STORMWATER DRAIN
- STAGE 1 SERVICE ALIGNMENT
- STAGE 2 SERVICE ALIGNMENT
- STORMWATER POND
- LEACHATE POND
- ⊙ ABORIGINAL ARTIFACT SITE

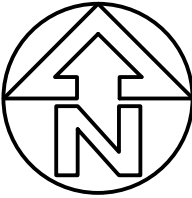
THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.



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SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: AS SHOWN
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
APPROVED / PROJECT LEADER



PUBLIC UTILITIES:
THE SERVICES SHOWN ARE DERIVED FROM PLANS OBTAINED FROM THE RELEVANT SERVICE AUTHORITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ARRANGE WITH THE RELEVANT SERVICE AUTHORITIES FOR CONFIRMATION OF SERVICES AND THEIR LOCATION BEFORE EXCAVATION WORK COMMENCES.



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WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 19
STORMWATER MANAGEMENT STAGE 2

REV	FOR INFORMATION	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
A	FOR INFORMATION		14.09.21		

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	014	A

11 MANAGEMENT STRATEGIES FOR CULTURAL HERITAGE

11.1 INTRODUCTION

This section presents proposed strategies for the management of cultural heritage values within the study area that may be subject to direct impacts by the proposal.

Based on the known and predicted Aboriginal heritage values within the study area, it is concluded that impacts to Aboriginal heritage as a result of the proposal can be effectively managed or mitigated through the following actions and strategies.

The measures presented below are considered best practice. Their effectiveness and reliability is demonstrated by their continued use and inclusion in management plans and strategies developed in consultation with the Aboriginal community and to the satisfaction of OEH.

11.2 MANAGEMENT OF CULTURAL HERITAGE NEAR THE DISTURBANCE AREAS

Based on the results of this assessment including involvement of representatives of the RAPs, it is a requirement that the following measures be undertaken to manage the impact of surface disturbance on Aboriginal object within the study area:

- Wentworth Shire Council avoid harm to the three isolated finds of stone artefacts (Buronga Landfill Artefact 1-3; AHIMS site numbers 46-3-0203, 46-3-0204, 46-3-0205) near the proposed disturbance areas. The closest of these is approximately 30 m from a proposed stormwater pond. Harm must be avoided by erecting permanent protective barrier fences around the sites and ensuring the fences are properly maintained. Personnel must be directed not to enter fenced areas except to complete appropriate land management including maintenance and weed control.

11.3 MANAGEMENT OF PREVIOUSLY UNIDENTIFIED CULTURAL HERITAGE DURING THE COURSE OF THE ACTIVITY

It is possible that some Aboriginal objects obscured by grass, leaf-litter or soil despite the intensive nature of the cultural heritage field surveys, excellent conditions of surface visibility and extensive previous disturbance. Such previously unidentified features, should they occur, would probably be additional isolated finds of stone artefacts (based on the predictive model outlined in Section 7.1 and informed by the results of the current survey, summarized in Section 8).

In the unlikely event any previously unidentified Aboriginal cultural heritage places or objects are encountered during the course of proposed works, all activities likely to affect the places or objects shall cease and management measures and/or salvage works will be developed in consultation with NSW Heritage and the RAPs cognisant of the cultural significance of the site;

11.4 HERITAGE MANAGEMENT PLAN

The optimal means of co-ordinating and implementing the proposed management strategies is to integrate them into a single program and document in the form of a *Heritage Management Plan (HMP)*. The HMP would reflect the proposed management of the cultural heritage sites within the Buronga Landfill Expansion. The HMP would cover all relevant actions and requirements to be conducted during the activity. The HMP would remain active for the Project life and define the tasks, scope and conduct of all cultural heritage management activities.

11.5 GENERAL RECOMMENDATIONS

11.5.1 Introduction

It is recommended that the following general approach be taken to manage Aboriginal cultural heritage during the life of the proposal:

- Ongoing consultation with the Aboriginal community throughout the life of the proposal. It is recommended that this comprise as a minimum an emailed annual project update.
- Wentworth Shire Council should provide opportunities for Aboriginal community members to access the known Aboriginal site located within the study area (e.g. for cultural reasons or as part of scheduled field activities) in accordance with Occupational Health and Safety requirements and with a minimum of 5 days advance notice.
- Erosion and sediment control works be undertaken in accordance with the requirements of the development consent and in consideration of other Aboriginal cultural heritage management measures.
- Any new Aboriginal heritage sites identified during the development of the proposal be registered with Heritage NSW in consultation with the Aboriginal community.
- A record of known Aboriginal heritage sites, their status and location be maintained by Wentworth Shire Council.

11.5.2 Role of the Local Aboriginal Community

Wentworth Shire Council is committed to involving the local Aboriginal community as an integral participant in the management of Aboriginal cultural heritage values in the study area. The strategies outlined in this report have incorporated the views of community representatives (Section 4.2.1).

It is recommended Wentworth Shire Council engages in ongoing consultation with the Aboriginal community throughout the life of the proposal. This should occur at least annually and comprise as a minimum an emailed project update.

11.5.3 Site Management and Cultural Awareness Training

It is recommended that Wentworth Shire Council provides training to all on-site personnel regarding the Aboriginal cultural heritage management strategies relevant to their employment tasks.

11.6 SUMMARY RECOMMENDATIONS

Based on the results of this cultural heritage investigation and consultation with representatives of the local Aboriginal community, the following recommendations are provided for Wentworth Shire Council to implement:

- Wentworth Shire Council avoid harm to the three isolated finds of stone artefacts (Buronga Landfill Artefact 1-3) near the proposed disturbance areas. This requires erection of permanent protective barriers around the Aboriginal objects.
- If any previously unidentified Aboriginal objects are encountered during construction of the proposal all works likely to affect the material must cease immediately and Heritage NSW and the RAPs consulted about an appropriate course of action prior to recommencement of work.
- In the unlikely event that human skeletal remains are encountered during construction the proposal, all work with the potential to impact the remains must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, Wentworth Shire Council should contact the Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the local Aboriginal community.
- Wentworth Shire Council should provide training to all on-site personnel regarding the Aboriginal cultural heritage management activities strategies relevant to their employment tasks.
- Wentworth Shire Council should continue to involve the registered Aboriginal parties and any other relevant Aboriginal community groups or members in matters pertaining to the proposal.
- Wentworth Shire Council should co-ordinate and implement these recommendations by integrating them into a single programme and document them in the form of a Heritage Management Plan (HMP). The HMP should remain active for the entire Project life and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities.

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APPENDICES

Appendix 1. Glossary

Appendix 2. Consultation Log

Appendix 3. Correspondence to Aboriginal Community Stakeholders

Appendix 4. Correspondence from Aboriginal Community Stakeholders

Appendix 5. AHIMS Register Search

APPENDIX 1. GLOSSARY

Archaeological site - A place with evidence of past human activity. This evidence may include Aboriginal and/or historic artefacts, features, structures or organic traces.

Artefact scatter - A surface scatter of Aboriginal or historic cultural material. Scatters of stone artefacts are a common archaeological site type. These scatters may also contain charcoal, discarded animal bones, shell and ochre.

Assemblage - A collection of artefacts from a single archaeological site.

Burial site - A place with a concentration of human remains. Ochre, stone tools, charcoal and grave goods may be associated with burials. Most burial sites are found in sand dunes but dead trees, caves and rock shelters were also used.

Ceremonial ground - Place that may be associated with initiation ceremonies, meetings or sacred rituals. Stone arrangements may be present, including cairns, stone circles or standing slabs of rock.

Chert - A fine-grained opaline rock ranging in colour from white to black, but most often grey, brown, grayish brown and light green to rusty red.

Core - A piece of stone from which flakes have been removed. They usually have negative flake scars that have resulted from the removal of flakes.

Cultural material - Any material remains or objects resulting from human activity.

Debitage - Any waste material including flakes and cores produced during the manufacture of chipped stone tools.

Flake - A piece of stone detached from a core that typically displays a striking platform, bulb of percussion and flake scars on the ventral surface.

Flaked piece - Small fragments of stone resulting from the manufacture of stone tools. A striking platform or bulb of percussion may not be evident.

Ground surface visibility - The amount of bare ground exposed, usually expressed as a percentage.

Hearth - The remains of a campfire containing charcoal, discoloured soil, and possibly, hearthstones, heat retainers or the remains of animals or shellfish cooked and consumed at the campsite.

Hearthstone – Stone cobble placed in a campfire to retain heat for cooking. The types of stone used as hearthstones in western Victoria includes calcrete and sandstone.

Heat retainer - Nodule of baked clay, thought to have been placed in campfires to retain heat for cooking.

in situ - An artefact or other feature that has not been disturbed from its original position.

Mound - Raised areas of earth ranging from 3 to 35m in diameter and from 0.5m to 2m in height. Earth oven material, stone artefacts, food refuse and the remains of hut foundations have been recovered from excavated earth mounds in the central and western parts of Victoria.

Ochre - Soft varieties of the iron oxides goethite, limonite or haematite usually coloured red or yellow and used as pigment for painting.

Quarry - An outcrop of stone or ochre where Aboriginal people have extracted the raw material for use or trade. Stone quarries are identifiable by a dense scatter of broken stone and flakes or consist of pits or hollows where material has been dug out of the ground.

Quartz – A silica mineral resistant to weathering because of its hardness. It is commonplace in the landscape as a consequence.

Quartzite - A metamorphic rock formed by the re-crystallization of quartz.

Retouch - A stone artefact with fine, secondary flaking along one or more edges.

Scarred tree - A tree with a scar on its trunk caused by bark removal.

Shell midden - A surface scatter or heap of discarded shell often with charcoal, animal bones and stone artefacts. Middens may found near coastlines, rivers, creeks, swamps and ancient lakes.

Silcrete - A hard, fine-grained rock composed of silica cement.

Stone feature - Cairns, rock wells, grinding groves, stone structures, fish traps and stone arrangements are examples of stone features.

Stratified deposit - Material that has been laid down over time forming a sequence of events.

Survey - An inspection of land either by foot or vehicle for the purpose of identifying archaeological sites.

Transect - A predetermined area or a path that directs the course of a survey.

APPENDIX 2. CONSULTATION LOG

DATE	ORGANISATION CONTACTED	ORGANISATION CONTACTED	HOW CONTACTED	CONTACTED BY	ORGANISATION REPRESENTED	NATURE OF CONSULTATION
03/05/2021	Step 1 Government Organisations	Heritage NSW, Dareton Local Aboriginal Land Council, Wentworth Shire Council, Western LLS, NTSCORP, National Native Title Tribunal, Registrar of Aboriginal Land Rights Act 1983	Email	Matt Cupper	Wentworth Shire Council	Step 1 letters sent out to relevant organisation requesting details of Aboriginal persons or groups who hold cultural knowledge relevant to, or who have a right or interest in, determining the cultural heritage significance of Aboriginal object(s) and/or place(s) in the Area of Interest for the Buronga Landfill Expansion
06/05/2021	Matt Cupper	Wentworth Shire Council	Email	Maeve Parker	NTSCORP	Response to Step 1 letter received.
04/05/2021	Matt Cupper	Wentworth Shire Council	Email	Pam Handy	Dareton Local Aboriginal Land Council	Response to Step 1 letter received.
04/05/2021	Matt Cupper	Wentworth Shire Council	Email	Daniel Clegg	Heritage NSW	Response to Step 1 letter received.
07/05/2021	Matt Cupper	Wentworth Shire Council	Email	Hillary Dye	Wentworth Shire Council	Response to Step 1 letter received.

DATE	ORGANISATION CONTACTED	ORGANISATION CONTACTED	HOW CONTACTED	CONTACTED BY	ORGANISATION REPRESENTED	NATURE OF CONSULTATION
05/05/2021	Aboriginal stakeholders identified by relevant government organisations	Barkindji Maroura Elders Council, Barkandji Native Title Group Aboriginal Corporation, Ta-Ru Board of Management/Mauraura Barkindji Traditional Owners, Dareton Local Aboriginal Land Council Willandra Lakes 2 Traditional Tribal Group Elders Council, Pappin Family Aboriginal Corporation, Gary Pappin, Wakool Aboriginal Corporation, Mary-Ann Marton,	Email/Post	Matt Cupper	Wentworth Shire Council	Step 2 letters sent out to groups/individual identified during Step 1 inviting Aboriginal persons or groups who hold cultural knowledge relevant to, or who have a right or interest in, determining the cultural heritage significance of Aboriginal object(s) and/or place(s) in the Area of Interest to register an interest in the Buronga Landfill
05/05/2021	na	na	Public Notice	Matt Cupper	Wentworth Shire Council	A public notice was published in the Sunraysia Daily on 5 May 2021, inviting Aboriginal persons or groups who hold cultural knowledge relevant to, or who have a right or interest in, determining the cultural heritage significance of Aboriginal object(s) and/or place(s) in the Area of Interest to register an interest in the Buronga Landfill.

DATE	ORGANISATION CONTACTED	ORGANISATION CONTACTED	HOW CONTACTED	CONTACTED BY	ORGANISATION REPRESENTED	NATURE OF CONSULTATION
21/05/2021	Registered Aboriginal Parties	Barkandji Native Title Group Aboriginal Corporation, Ta-Ru Board of Management/Mauraura Barkindji Traditional Owners, Dareton Local Aboriginal Land Council	Email	Matt Cupper	Wentworth Shire Council	Field survey invitation was provided to each of the RAPs and a copy of the Proposed Methodology was provided for review and comment.
13/06/2021	Daniel Clegg	Heritage NSW	Email	Matt Cupper	Wentworth Shire Council	List of RAPs provided to the OEH.
13/06/2021	Pam Handy	Dareton Local Aboriginal Land Council	Email	Matt Cupper	Wentworth Shire Council	List of RAPs provided to the Dareton LALC.
23/06/2021	Representatives of Registered Aboriginal Parties	Representatives of Registered Aboriginal Parties	Field Surveys	Matt Cupper	Landskape	Field survey held for the Buronga Landfill Expansion.
07/07/2021	Registered Aboriginal Parties	Barkandji Native Title Group Aboriginal Corporation, Ta-Ru Board of Management/Mauraura Barkindji Traditional Owners, Dareton Local Aboriginal Land Council	Email	Matt Cupper	Wentworth Shire Council	Copy of draft ACHA was provided for review and comment.

APPENDIX 3. CORRESPONDENCE TO ABORIGINAL COMMUNITY STAKEHOLDERS



3 May 2021

Dr Ken Lum
Manager, Research
NTSCORP Ltd
PO Box 2105
Strawberry Hills NSW 2012

Dear Dr Lum,

**Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845
Arumpo Road, Buronga – Notification to Register Interest**

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could NTSCORP Ltd provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

Dr Matt Cupper
Principal



3 May 2021

CEO

Western Local Land Services

PO 363

Buronga NSW 2739

Dear Sir/Madam

Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845 Arumpo Road, Buronga – Notification to Register Interest

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could Western Local Land Services provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Matt Cupper', with a long horizontal flourish extending to the right.

Dr Matt Cupper

Principal



3 May 2021

Pam Handy
CEO
Dareton Local Aboriginal Land Council
PO Box 7
Dareton NSW 2717

Dear Pam,

**Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845
Arumpo Road, Buronga – Notification to Register Interest**

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could Dareton Local Aboriginal Land Council provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

Dr Matt Cupper
Principal



3 May 2021

Daniel Clegg
Aboriginal Heritage Planning Support Officer
Heritage NSW
PO BOX 1040
Albury 2640

Dear Dan,

Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845 Arumpo Road, Buronga – Notification to Register Interest

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could Heritage NSW provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

Dr Matt Cupper
Principal



Landscape

Natural and Cultural Heritage Management

a division of M.L. Cupper Pty Ltd

ABN: 48 107 932 918

3 May 2021

Office of the Registrar

NSW *Aboriginal Land Rights Act* 1983

PO Box 112

Glebe 2037

Dear Sir/Madam,

**Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845
Arumpo Road, Buronga – Notification to Register Interest**

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could Office of the Registrar, NSW *Aboriginal Land Rights Act* 1983 provide contact details of any known Aboriginal owners relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Matt Cupper', with a long, sweeping horizontal line extending to the right.

Dr Matt Cupper

Principal



3 May 2021

Peter Kozlowski
General Manager
Wentworth Shire Council
26/24-28 Adelaide Street
Wentworth NSW 2648

Dear Peter,

**Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845
Arumpo Road, Buronga – Notification to Register Interest**

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could Wentworth Shire Council provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021p to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

Dr Matt Cupper
Principal



Landscape

Natural and Cultural Heritage Management

a division of M.L. Cupper Pty Ltd

ABN: 48 107 932 918

3 May 2021

National Native Title Tribunal

GPO Box 9973

Perth WA 6848

Dear Sir/Madam,

Re: Wentworth Shire Council Buronga Landfill Expansion, Lot 1 DP1037845 Arumpo Road, Buronga – Notification to Register Interest

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landscape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could the National Native Title Tribunal advise if there are any registered native title claimants, native title holders and registered Indigenous Land Use Agreements in the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landscape, 178 Midgen Flat Road Broken Head 2481; e-mail: landscape@telstra.com; tel: 0408 006 690.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Matt Cupper', with a long horizontal flourish extending to the right.

Dr Matt Cupper

Principal

National Parks and Wildlife Act 1974 (NSW) - Part 6

Wentworth Shire Council intends to expand the Buronga Landfill at 258 Arumpo Road, Buronga. Landskape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the project area. The purpose of the consultation is to assist Wentworth Shire Council in the preparation of an Environmental Impact Statement for the proposal.

Contact details:
Landskape, PO Box
1068, Carlton, 3053.

**Closing date for
expressions of interest
5pm, May 19, 2021.**

BURONGA LANDFILL EXPANSION

PROPOSED METHODOLOGY
FOR THE
ABORIGINAL CULTURAL HERITAGE ASSESSMENT

23 May 2021

1 INTRODUCTION

Wentworth Shire Council is planning to apply for an approval under Part 4 Division 4.7 (State Significant Development) of the *Environmental Planning and Assessment Act 1979* to upgrade the municipal landfill at Lot 1 DP1037845, 258 Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1).

Wentworth Shire Council is seeking to engage with the Aboriginal community as part of the preparation for an Aboriginal Cultural Heritage Assessment (ACHA). Consultation with Aboriginal people and communities will be guided by the Heritage NSW's *Aboriginal cultural heritage consultation requirements for proponents 2010* (NSW Department of Environment, Climate Change and Water [DECCW], 2010a).

Wentworth Shire Council has already completed an Aboriginal cultural heritage assessment with field survey for the Project (Landskape, 2016). This assessment, involving representatives of the Barkindji Native Title Group Aboriginal Corporation, encountered an Aboriginal cultural heritage site (an isolated find of a stone artefact) in the Project area.

1.2 Structure of this Document

Section 2 of this document outlines the Proposed Methodology for the cultural and archaeological assessment of Aboriginal objects, places and/or Aboriginal cultural heritage values within the Project area.

Section 3 outlines the sensitive cultural information management protocol and Section 4 provides further information on the preparation of the ACHA report. Relevant personnel for the assessment are outlined in Section 5.

2 PROPOSED ASSESSMENT METHODOLOGY

The Proposed Methodology for the cultural and archaeological assessment for the ACHA is as follows:

- Conduct a desktop assessment to delineate areas of known and predicted Aboriginal objects, places and/or Aboriginal cultural heritage values, including a detailed review of the previous assessments.
- Identify the Aboriginal cultural heritage values associated with the relevant area through consulting with Aboriginal people with cultural knowledge or responsibilities for Country in which the Project occurs, utilising written, oral research and field investigations.
- The conduct of a cultural and archaeological assessment with representatives of the local Aboriginal community, to identify Aboriginal objects, places and/or Aboriginal cultural heritage values. The field investigation would be carried out by the project archaeologist with the assistance of Aboriginal representatives.
- Record/document any Aboriginal objects, places and/or Aboriginal cultural heritage values within the relevant area and assessment of their significance with representatives of the Registered Aboriginal Parties (RAPs).
- In consultation with the RAPs, develop recommended management and mitigation measures for Aboriginal objects, places and/or Aboriginal cultural heritage values, including documentation (where relevant).
- Provide a consideration of the potential impacts of the Project on Aboriginal objects, places and/or Aboriginal cultural heritage values within the Project area.

- Describe and justify the outcomes and alternatives.
- Document the Aboriginal cultural heritage impact assessment and the recommendations to minimise potential impacts on Aboriginal cultural heritage.
- Provide a copy of the draft ACHA to the RAPs for their review and feedback.
- Documentation of feedback received as part of the cultural assessment from RAPs for presentation in the final ACHA report (subject to the sensitivity of the information provided).

In accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a), Wentworth Shire Council requests that RAPs provide, where relevant during the conduct of the ACHA, cultural information regarding:

- whether there are any Aboriginal sites/objects of cultural value to Aboriginal people in the relevant area or surrounds; and
- whether there are any places of cultural value to Aboriginal people in the relevant area or surrounds.

This may include places of social, spiritual and cultural value, historic places with cultural significance, and potential places/areas of historic, social, spiritual and/or cultural significance.

3 SENSITIVE CULTURAL INFORMATION – MANAGEMENT PROTOCOL

In the event that a RAP has sensitive or restricted public access information, it is proposed that Wentworth Shire Council would manage this information (if provided by the Aboriginal community) in accordance with a sensitive cultural information management protocol.

It is anticipated that the protocol would include making note of and managing the material in accordance with the following key limitations/requirements as advised by the relevant RAP at the time of the information being provided:

- any restrictions on access to the material;
- any restrictions on communication of the material;
- any restrictions on the location/storage of the material;
- any cultural recommendations on handling the material;
- any contextual information;
- any names and contact details of persons authorised by the relevant Aboriginal party to make decisions concerning the Aboriginal material and the degree of authorisation;
- any details of any consent given in accordance with customary law;
- the level of confidentiality to be accorded to the material; and
- any access and use by the RAP, of the cultural information in the material.

All RAPs should be aware of the mandatory requirement that all feedback provided must be documented in the final ACHA (DECCW, 2010a), including copies of any submissions received and the proponents response to the issues raised.

4 ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Following consultation on the Proposed Methodology of the cultural and archaeological assessment, and undertaking any required field components, a draft ACHA report will be prepared. The draft ACHA will be provided to all RAPs for their review and comment, and will include:

- details of the Aboriginal objects, places and/or Aboriginal cultural heritage values within the Project area and how they will be impacted by the Project;
- details of the consultation undertaken and how comments received at various times were considered; and
- management and mitigation recommendations drawing on information provided by RAPs and the results of the cultural and archaeological assessments.

5 PERSONNEL

Project Archaeologist: Dr Matt Cupper would be the project archaeologist. Matt has a wide range of experience in cultural and natural heritage management and an academic background in archaeology, geology and botany, including a PhD in the palaeoecology and early Aboriginal occupation of the Darling River. His particular area of expertise is the interaction of Aboriginal people and arid ecosystems in the interior of Australia. As a consultant archaeologist he has been engaged in many management and research-oriented studies of the Murray Darling Basin for industry and government. These have included investigation of the cultural heritage of western and central NSW for mine developments (including the CVO), and archaeological surveys of water supply and irrigation infrastructure along the Lachlan, Macquarie, Murrumbidgee, Murray and Darling Rivers.

Aboriginal Field Representatives: It is anticipated that Aboriginal field representatives would be engaged for the duration of the cultural heritage field survey (although this number may be subject to change based on the extent of the area requiring survey or due to workplace health and safety constraints). Aboriginal field personnel may be engaged on a rotational basis (e.g. a different team of representatives each day) as required.

6 REFERENCES

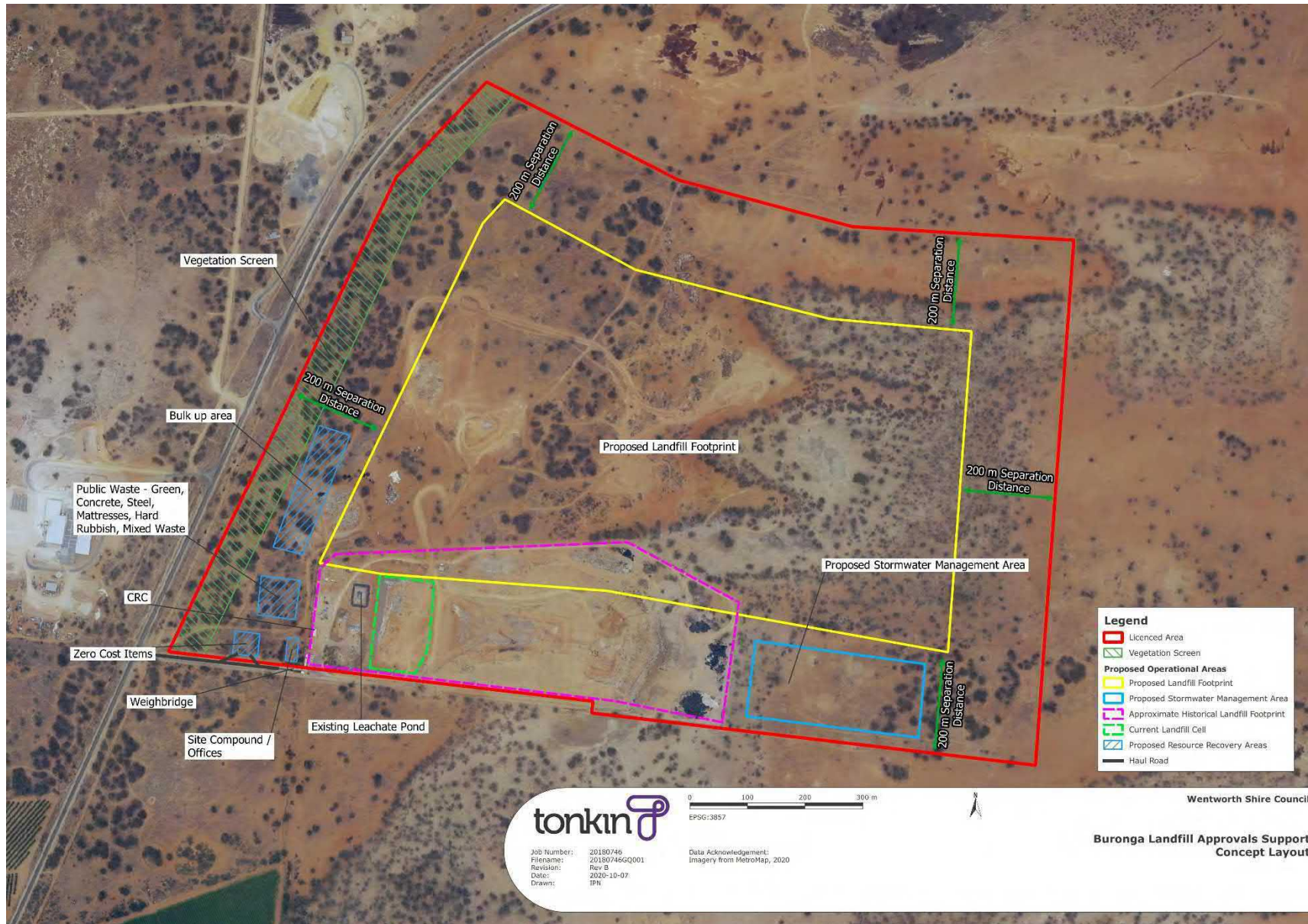
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Department of Environment, Climate Change and Water (DECCW) (2010a) *Aboriginal cultural heritage consultation requirements for proponents 2010*.

Department of Environment, Climate Change and Water (DECCW) (2010b). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. NSW Department of Environment, Climate Change and Water, Sydney.

Office of Environment and Heritage (OEH) (2011). *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*. Office of Environment and Heritage, Sydney.

FIGURES



APPENDIX 4. CORRESPONDENCE FROM ABORIGINAL COMMUNITY STAKEHOLDERS



Dr Matt Cupper
Principal
Landscape
178 Midgen Flat Road
BROKEN HEAD NSW 2481
via email: landscape@telstra.com

Our reference: DOC21/346933
Your reference:

Dear Matt

WRITTEN NOTIFICATION OF PROPOSAL AS REQUIRED UNDER DECCW ABORIGINAL CULTURAL HERITAGE CONSULTATION REQUIREMENTS FOR PROPONENTS 2010

Subject: Registration of Aboriginal Interests – Buronga Landfill Expansion, Wentworth LGA

Thank you for your correspondence dated 03 May 2021 received by Heritage NSW (Department of Premier and Cabinet) regarding the above project.

Attached is a list of known Aboriginal parties for the Wentworth local government area that Heritage NSW considers likely to have an interest in the activity. Please note this list is not necessarily an exhaustive list of all interested Aboriginal parties. Receipt of this list does not remove the requirement of a proponent/consultant to advertise in local print media and contact other bodies seeking interested Aboriginal parties, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (April 2010).

Under Section 4.1.6. of the Consultation Requirements, you must also provide a copy of the names of each Aboriginal person who registered an interest to the relevant **Heritage NSW** office and Local Aboriginal Land Council (LALC) within 28 days from the closing date for registering an interest.

Please note that the contact details in the list provided by Heritage NSW may be out of date as it relies on Aboriginal parties advising Heritage NSW when their details need changing. If individuals/companies undertaking consultation are aware that any groups contact details are out of date, or letters are returned unopened, please contact either the relevant stakeholder group (if you know their more current details) and/or Heritage NSW. AHIP applicants should make a note of any group they are unable to contact as part of their consultation record.

If you have any questions about this advice, please email:
heritagemailbox@environment.nsw.gov.au or contact (02) 9873 8500.

Yours sincerely


Dan Clegg
Aboriginal Heritage Planning Support Officer
Aboriginal Heritage Regulation Branch - South
Heritage NSW

Encl: Attachment A: Registered Aboriginal Interests - Wentworth Local Government Area

Attachment A: Registered Aboriginal Interests

Wentworth Local Government Area

Organisation/ Individual Name	Address	Contact Details
Arthur Kirby	Po box: care of Koorlong post office 3501 Phone number: 0438668089 Address: 24 th street Koorlong 3501	0438 668 089
Barkindji Maroura Elders Council	C/- BMEC Coordinator (Pamela Dunrobin) DPI Water 32 Enterprise Way BURONGA NSW 2739	Phone: 03 5021 9430 Email: pamela.dunrobin@dpi.nsw.gov.au
Ms Mary Ann Marton	11 Logan Avenue MILDURA VIC 3500	Phone: 03 5023 7867 Mobile: 0421 808 444
WLRWHA Aboriginal Advisory Group	C/-WLRWHA Executive Officer (Dan Rosendahl) & Aboriginal Projects Coordinator (Leanne Mitchell) NPWS PO Box 318 BURONGA NSW 2739	Dan Rosendahl Phone: 03 5021 8908 Mobile: 0417 204 237 Email: dan.rosendahl@environment.nsw.gov.au Leanne Mitchell Phone: 03 5021 8911 Email: leanne.mitchell@environment.nsw.gov.au
Pappin Family Aboriginal Corporation	2 Alfred Close MILDURA VIC 3500	Mobile: 0400 634 994
Gary Pappin	PO Box 243 BALRANALD NSW 2715	Mobile: 0424 625 636
Wakool Indigenous Corporation	Cynthja Pappin PO Box 243 BALRANALD NSW 2715	Mobile: 0400 634 994 Email: info@wakool.com.au
Barkandji #8 Native Title Determinants	NTSCorp PO Box 2105 STRAWBERRY HILLS NSW 2012	Phone: 02 9310 3188 Email: information@ntscorp.com.au
Ta-Ru Board of Management/Mauraua Barkintji Traditional Owners	14 Euneva Drive MILDURA VIC 3500 Ricky Mitchell (Chair) Rex Smith (Dep Chair)	Phone: 0487 160 808 Email: rickymitchell836@gmail.com

From: Derek Hardman barkandjiceo@gmail.com 
Subject: Fwd: Barkandji ACHA Identification of Aboriginal stakeholders Buronga Landfill Expansion
Date: 4 May 2021 at 9:44 am
To: landskape@telstra.com, Pam Handy pam.handy@daretonlalc.com.au, BMEET CEO ceo@bmeet.com.au, akirby@bmeet.com.au, Malcolm King mking@bmeet.com.au

DH

Hi Matt,
the 3 groups that you will need to consult are as follows and Ccd into this email
Barkandji Native title (Myself)
Dareton Local Aboriginal Land Council (Pam Handy)
BMEET (Arthur Kirby)
Thanks
Derek

----- Forwarded message -----

From: Matilda Vaughan <mvaughan@ntscorp.com.au>
Date: Tue, May 4, 2021 at 8:43 AM
Subject: Barkandji ACHA Identification of Aboriginal stakeholders Buronga Landfill Expansion
To: warrenbc53@outlook.com <warrenbc53@outlook.com>, geraldjamesquayle26@gmail.com <geraldjamesquayle26@gmail.com>, kevinknight1250@gmail.com <kevinknight1250@gmail.com>, barkandjiceo@gmail.com <barkandjiceo@gmail.com>, bilyara@live.com.au <bilyara@live.com.au>, Leroy Johnson <Leroy.Johnson@environment.nsw.gov.au>, kutjika@hotmail.com <kutjika@hotmail.com>, barkindjiwoman@gmail.com <barkindjiwoman@gmail.com>, potter.kathy.m@edumail.vic.gov.au <potter.kathy.m@edumail.vic.gov.au>
Cc: James MacLeod <jmacLeod@ntscorp.com.au>, Maeve Parker <mparker@ntscorp.com.au>

Dear Barkandji NTGAC,

Please see attached notice for an Aboriginal Cultural Heritage assessment.

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga.

Nominations are requested by Monday 17 May 2021 to:

Dr Matt Cupper,

Landskape, 178 Midgen Flat Road Broken Head 2481

landskape@telstra.com

0408 006 690.

Please contact James MacLeod jmacLeod@ntscorp.com.au or Maeve Parker mparker@ntscorp.com.au if you have any questions.

Kind regards,

Tilly

Tilly Vaughan | Law Graduate



NTSCORP proudly acknowledge that our office is situated on the country
of the Gadigal People of the Dharug Nation. We also acknowledge and
pay our respect to their Elders past and present.

-

From: Ricky Mitchell rickymitchell836@gmail.com
Subject: Re: Registration of Aboriginal stakeholders Buronga Landfill Expansion
Date: 5 May 2021 at 10:48 am
To: Matt Cupper landskape@telstra.com

RM

Hi Matt.

I would like to express interest on behalf of the Maraura Traditional Owners. I can organise 2 of our senior knowledge holders uncle Remy Smith and Rodney Mitchell.

Regards

On Wed, 5 May 2021, 10:22 am Matt Cupper, <landskape@telstra.com> wrote:

Dear Ricky,

Trust all is well.

Wentworth Shire Council is planning to apply for an approval under Part 4 Division 4.7 (State Significant Development) of the *Environmental Planning and Assessment Act 1979* to upgrade the municipal landfill at Lot 1 DP1037845, 258 Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landskape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. The purpose of the consultation is to assist Wentworth Shire Council in the preparation of an Environmental Impact Statement for the proposal. Any persons or groups who would like to be consulted are invited to contact me: Dr Matt Cupper, Landskape, 178 Midgen Flat Road Broken Head 2481; e-mail: landskape@telstra.com; tel: 0408 006 690.

Closing date for registrations of interest is 5:00 pm Wednesday 19 May 2021.

Many thanks,

Matt

Dr Matt Cupper
Principal
Landskape

Tel: 0408 006 690
landskape@telstra.com

On 3 Feb 2021, at 12:36 pm, Ricky Mitchell <rickymitchell836@gmail.com> wrote:

Hi Matt.

Thanks for your email I can organise uncle Remy Smith and uncle Rodney Mitchell our 2 senior knowledge holders.

On Wed, 3 Feb 2021, 12:16 pm Matt Cupper, <landskape@telstra.com> wrote:

Dear Ricky,

Trust all is well.

Adrian Ribarits is planning to apply for an approval under Part 5 of the Environmental Planning and Assessment Act 1979 for the installation on an irrigation pumping station and associated rising main at Lot 2 DP1035269, 6175 Sturt Highway, Trentham Cliffs (see Figure 1, attached).

Landskape on behalf of Adrian Ribarits would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. The purpose of the consultation is to assist Adrian Ribarits in the preparation of an application for an Aboriginal Heritage Impact Permit and to assist Heritage NSW in its consideration and determination of the application. Any persons or groups who would like to be consulted are invited to contact me: Dr Matt Cupper, Landskape, 178 Midgen Flat Road Broken Head 2481; e-mail: landskape@telstra.com; tel: 0408 006 690.

Closing date for registrations of interest is 5:00 pm Friday 19 February 2021.

Many thanks,

Matt

From: Maeve Parker mparker@ntscorp.com.au
Subject: FW: Barkandji ACHA Identification of Aboriginal stakeholders Buronga Landfill Expansion
Date: 6 May 2021 at 10:43 am
To: landskape@telstra.com
Cc: James MacLeod jmacLeod@ntscorp.com.au, Matilda Vaughan mvaughan@ntscorp.com.au, Derek Hardman barkandjiceo@gmail.com

MP

Dear Matt,

Could you please note Barkandji Native Title Group Aboriginal Corporation RTNBC (ICN 4740) (**Barkandji Corporation**) as a RAP for the project.

Very best,

Maeve Rose Parker | Solicitor



NTSCORP proudly acknowledge that our office is situated on the country of the Gadigal People of the Dharug Nation.

We also acknowledge and pay our respect to their Elders past and present.

t 02 8306 2708 | m 0457 855 690 | f 02 9310 4177 | Free call: 1800 111 844
e mparker@ntscorp.com.au | w www.ntscorp.com.au
Level 1, 44-70 Rosehill Street, Redfern, NSW 2016 Australia

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Aboriginal businesses where possible through
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Please consider the environment before printing this email

From: Matt Cupper [<mailto:landskape@telstra.com>]
Sent: Monday, May 3, 2021 2:51 PM
To: George Tonna
Subject: Identification of Aboriginal stakeholders Buronga Landfill Expansion

Dear George,

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landskape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could NTSCorp provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landskape, 178 Midgen Flat Road Broken Head 2481; e-mail: landskape@telstra.com; tel: 0408 006 690.

From: James MacLeod jmacLeod@ntscorp.com.au
Subject: FW: Barkandji ACHA Identification of Aboriginal stakeholders Buronga Landfill Expansion
Date: 25 May 2021 at 5:19 pm
To: landskape@telstra.com
Cc: Maeve Parker mparker@ntscorp.com.au

JM

Dear Matt

Please register Barkandji Native Title Group Aboriginal Corporation RNTBC (ICN 4740) as a RAP for this project

Kind regards

James

James MacLeod | Senior Solicitor



NTSCORP proudly acknowledge that our office is situated on the country of the Gadigal People of the Dharug Nation. We also acknowledge and pay our respect to their Elders past and present.

t 02 9310 3188 | **f** 02 9310 4177

d 02 8306 2735 | **m** 0498 980 212

e jmacLeod@ntscorp.com.au | **w** www.ntscorp.com.au

Level 1, 44-70 Rosehill Street, Redfern, NSW 2016 Australia



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Please consider the environment before printing this email

From: Matt Cupper [<mailto:landskape@telstra.com>]

Sent: Monday, May 3, 2021 2:51 PM

To: George Tonna

Subject: Identification of Aboriginal stakeholders Buronga Landfill Expansion

Dear George,

Wentworth Shire Council intends to upgrade the municipal landfill at Lot 1 DP1037845, Arumpo Road, Buronga. Works include excavation of new pits, modified internal infrastructure and hardstands and stormwater drainage works. The project area is approximately 5 km north of Buronga, NSW (see Figure 1, attached).

Landskape on behalf of Wentworth Shire Council would like to consult with all Aboriginal people who hold cultural knowledge relevant to determining the significance of Aboriginal objects and places in the proposed project area. Could NTSCorp provide contact details of any known Aboriginal groups or individuals who may hold cultural knowledge relevant to the proposed project area, please?

I would appreciate if you could provide any information regarding Aboriginal stakeholders by 5 pm Monday 17 May 2021 to me: Dr Matt Cupper, Landskape, 178 Midgen Flat Road Broken Head 2481; e-mail: landskape@telstra.com; tel: 0408 006 690.

Many thanks,

Matt

Dr Matt Cupper
Principal
Landskape

From: Hilary Dye Hilary.Dye@wentworth.nsw.gov.au
Subject: Aboriginal stakeholders Buronga Landfill Expansion
Date: 7 May 2021 at 2:48 pm
To: Matt Cupper landskape@telstra.com

HD

Dear Matt

In relation to your email received 3 May 2021, seeking the names of Aboriginal people who may be able to provide cultural heritage values / places within the project area, please see the table below.

I don't have any individual names but would envisage the contact groups below would provide this.

Group	Contact	Email	Phone
Far West Aboriginal Land Council - Dareton	Pam Handy - CEO	pam.handy@daretonlalc.com.au	03 5027 4721
Barkandji Prescribed Body Corporate - Broken Hill	Derek Hardman - CEO	barkandjiRNTBC@gmail.com	0437 832 620
Barkindji Maraura Elders Environment Team (BMEET) - Dareton	John Winch (a contact that I know)	admin@bmeet.com.au jwinch@bmeet.com.au	03 5027 4073

Lot 212 DP756946 – Reserve 86496 & Lot 197 Reserve 97154 are listed in schedule 5 Extinguished Areas of the Barkandji consent determination, see the attached diagram.

If you require any additional information, please contact me on the details below.

Kind regards
Hilary

Hilary Dye
Property & Land Tenure Officer

**WENTWORTH
SHIRE COUNCIL**

26-28 Adelaide Street | PO Box 81 WENTWORTH NSW 2648

P 03 5027 5027 | E hilary.dye@wentworth.nsw.gov.au

W: www.wentworth.nsw.gov.au

Our values: Honesty and Integrity | Accountability and Transparency | Respect | Quality | Commitment



APPENDIX 5. AHIMS REGISTER SEARCH

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
46-3-0079	Gol Gol Lake Midden;	AGD	54	613350	6222950	Open site	Valid	Burial : -	Burial/s	
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-3-0083	Burial;	AGD	54	595980	6231740	Open site	Valid	Burial : -	Burial/s	
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-3-0003	Merbein;River Road Buronga;	AGD	54	604195	6221378	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree	884
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-3-0004	Merbein;River Road Buronga;	AGD	54	605109	6221378	Open site	Valid	Artefact : -, Burial : -	Burial/s,Open Camp Site	884
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-3-0005	Merbein;River Road Buronga;	AGD	54	605109	6221378	Open site	Valid	Ceremonial Ring (Stone or Earth) : -	Bora/Ceremonial	884
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-3-0006	Gol Gol Lake;	AGD	54	614249	6224120	Open site	Valid	Modified Tree (Carved or Scarred) :	Carved Tree	484
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0078	Wentworth Level 2;East Wentworth;	AGD	54	584960	6226730	Open site	Valid	Artefact : -	Open Camp Site	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0079	Wentworth Level 3;East Wentworth;	AGD	54	585230	6226730	Open site	Valid	Artefact : -	Isolated Find	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0080	Wentworth Level 1;East Wentworth;	AGD	54	585020	6226820	Open site	Valid	Artefact : -	Open Camp Site	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0081	Wentworth Level 5;East Wentworth;	AGD	54	585050	6226630	Open site	Valid	Hearth : 2	Mound (Oven)	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0082	Wentworth Level 6;East Wentworth;	AGD	54	585300	6225940	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0083	Wentworth Level 7;South Wentworth;	AGD	54	585300	6225940	Open site	Valid	Modified Tree (Carved or Scarred) :	Scarred Tree	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0084	Wentworth Level 4;East Wentworth;	AGD	54	585560	6226810	Open site	Valid	Artefact : -	Isolated Find	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							
46-2-0085	Wentworth Level 8	AGD	54	585000	6225500	Open site	Valid	Artefact : -	Open Camp Site	4516
	<u>Contact</u>	<u>Recorders</u>	<u>Permits</u>							

Report generated by AHIMS Web Service on 04/07/2021 for Matt Cupper for the following area at Datum :GDA, Zone : 54, Eastings : 585000 - 615000, Northings : 6222000 - 6232000 with a Buffer of 1000 meters. Additional Info : Identify previously recorded Aboriginal cultural heritage sites in the study area. Number of Aboriginal sites and Aboriginal objects found is 114

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
46-2-0096	Tuckers creek	AGD	54	588100	6228680	Open site	Valid	Burial : -		
	<u>Contact</u>	<u>Recorders</u>		Randelle Blair				<u>Permits</u>		
46-2-0097	wentworth rifle range	AGD	54	585796	6226710	Open site	Valid	Burial : -		
	<u>Contact</u>	<u>Recorders</u>		Randelle Blair				<u>Permits</u>		
46-2-0098	tuckers creek-wentworth	AGD	54	588100	6228680	Open site	Valid	Burial : -		
	<u>Contact</u>	<u>Recorders</u>		Randelle Blair				<u>Permits</u>		
46-3-0087	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	<u>Contact</u> Randelle Blair	<u>Recorders</u>		Randelle Blair				<u>Permits</u>		
46-3-0119	Murndi Scarred Tree 1	GDA	54	595431	6223243	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		ERM Australia Pty Ltd- Sydney CBD				<u>Permits</u>		
46-3-0120	Murndi Scarred Tree 2	GDA	54	595539	6223178	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		ERM Australia Pty Ltd- Sydney CBD				<u>Permits</u>		
46-3-0121	Murndi Scarred Tree 3	GDA	54	595914	6223200	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		ERM Australia Pty Ltd- Sydney CBD				<u>Permits</u>		
46-3-0122	Murndi Shell Midden	GDA	54	596013	6223244	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		ERM Australia Pty Ltd- Sydney CBD				<u>Permits</u>		
46-2-0144	Wentworth Rifle Range	AGD	54	585780	6226705	Open site	Valid	Burial : -		
	<u>Contact</u>	<u>Recorders</u>		Randelle Blair				<u>Permits</u>		
46-3-0124	Gol Gol Inlet Creek fireplace	GDA	54	613740	6221290	Open site	Valid	Hearth : 3		
	<u>Contact</u>	<u>Recorders</u>		Harvey Johnston				<u>Permits</u>		
46-2-0312	Kelso Station Scarred Tree 4	GDA	54	585746	6229562	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		Everick Heritage Pty Ltd,Ms.Caitlin Marsh				<u>Permits</u>		
46-2-0313	Kelso Station Scarred Tree 1	GDA	54	585769	6229622	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>		Everick Heritage Pty Ltd,Ms.Caitlin Marsh				<u>Permits</u>		
46-2-0314	Kelso Station Artefact Scatter 2	GDA	54	586085	6229774	Open site	Valid	Artefact : -		

Report generated by AHIMS Web Service on 04/07/2021 for Matt Cupper for the following area at Datum :GDA, Zone : 54, Eastings : 585000 - 615000, Northings : 6222000 - 6232000 with a Buffer of 1000 meters. Additional Info : Identify previously recorded Aboriginal cultural heritage sites in the study area. Number of Aboriginal sites and Aboriginal objects found is 114

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	<u>Contact</u>	<u>Recorders</u>	Everick Heritage Pty Ltd,Ms.Caitlin Marsh					<u>Permits</u>		
46-2-0310	Kelso Station Scarred Tree 3	GDA	54	585668	6229562	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>	Everick Heritage Pty Ltd,Ms.Caitlin Marsh					<u>Permits</u>		
46-2-0311	Kelso Station Scarred Tree 2	GDA	54	585481	6229390	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>	Everick Heritage Pty Ltd,Ms.Caitlin Marsh					<u>Permits</u>		
50-2-0052	Kelso Station Artefact Scatter 1	GDA	54	585732	6229594	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>	Everick Heritage Pty Ltd,Everick Heritage Pty Ltd,Ms.Caitlin Marsh,Ms.Caitlin Marsh					<u>Permits</u>		
46-2-0018	Tuckers Creek 2;	AGD	54	588100	6228700	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	2136
	<u>Contact</u>	<u>Recorders</u>	Harvey Johnston					<u>Permits</u>	279	
46-3-0014	Fletchers Lake Burial 1;	AGD	54	596000	6231800	Open site	Valid	Burial : -, Artefact : -	Burial/s,Open Camp Site	1216,1363
	<u>Contact</u>	<u>Recorders</u>	Bonhomme Craib & Associates					<u>Permits</u>		
46-3-0015	Fletchers Lake;	AGD	54	595000	6232000	Open site	Valid	Burial : -	Burial/s	
	<u>Contact</u>	<u>Recorders</u>	K Williams					<u>Permits</u>		
46-3-0031	Golf Club Midden;	AGD	54	595000	6225900	Open site	Valid	Shell : -, Artefact : -	Midden	
	<u>Contact</u>	<u>Recorders</u>	Harvey Johnston					<u>Permits</u>	649	
46-3-0001	Merbein;River Road Buronga;	AGD	54	603281	6221378	Open site	Valid	Shell : -, Artefact : -	Midden	1586
	<u>Contact</u>	<u>Recorders</u>	ASRSYS					<u>Permits</u>		
46-2-0003	Dareton;Tuckers Creek;	AGD	54	588900	6228800	Open site	Valid	Burial : -	Burial/s	2136
	<u>Contact</u>	<u>Recorders</u>	ASRSYS					<u>Permits</u>	188	
46-2-0010	Wentworth Hospital 2	AGD	54	585100	6224900	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-2-0011	Wentworth Hospital 3	AGD	54	584900	6224900	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-2-0012	Wentworth Hospital 1	AGD	54	584800	6224900	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-2-0013	Wentworth	AGD	54	585001	6224120	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	<u>Contact</u>	<u>Recorders</u>	K Williams					<u>Permits</u>		

Report generated by AHIMS Web Service on 04/07/2021 for Matt Cupper for the following area at Datum :GDA, Zone : 54, Eastings : 585000 - 615000, Northings : 6222000 - 6232000 with a Buffer of 1000 meters. Additional Info : Identify previously recorded Aboriginal cultural heritage sites in the study area. Number of Aboriginal sites and Aboriginal objects found is 114

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
46-2-0014	Wentworth	AGD	54	585915	6223206	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	1044
	<u>Contact</u>	<u>Recorders</u>	K Williams					<u>Permits</u>		
46-2-0015	Wentworth Hospital 2	AGD	54	585100	6224960	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-2-0016	Wentworth Hospital 3	AGD	54	584900	6224940	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-2-0017	Wentworth Hospital 1	AGD	54	584885	6224950	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1044
	<u>Contact</u>	<u>Recorders</u>	Doctor.Sarah Martin					<u>Permits</u>		
46-3-0109	BURONGA HILL 01	GDA	54	605545	6223451	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>	Doctor.Matt Cupper					<u>Permits</u>		
46-3-0114	Gol Gol Lake Craib site 62	GDA	54	614135	6221689	Open site	Valid	Shell : 1		101271
	<u>Contact</u>	<u>Recorders</u>	Doctor.Matt Cupper					<u>Permits</u>		
46-3-0134	Fletchers Lake 006 (FL006)	GDA	54	596964	6232983	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Sunset Archaeological Services					<u>Permits</u>		
46-3-0135	Fletchers Lake 007 (FL007)	GDA	54	596967	6232980	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Sunset Archaeological Services					<u>Permits</u>		
46-3-0136	Fletchers Lake 008 (FL008)	GDA	54	596954	6232884	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Sunset Archaeological Services					<u>Permits</u>		
46-3-0137	Fletchers Lake 010 (FL010)	GDA	54	596921	6232822	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Sunset Archaeological Services					<u>Permits</u>		
46-3-0138	Fletchers Lake 011 (FL011)	GDA	54	596916	6232834	Open site	Valid	Shell : 1		
	<u>Contact</u>	<u>Recorders</u>	Sunset Archaeological Services					<u>Permits</u>		
46-3-0143	Fletchers Lake 044 (FL044)	GDA	54	596777	6232801	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	<u>Contact</u>	<u>Recorders</u>	Ms.Sarah Watts					<u>Permits</u>		
46-3-0144	Fletchers Lake 043 (FL043)	GDA	54	596739	6232731	Open site	Valid	Artefact : 1		
	<u>Contact</u>	<u>Recorders</u>	Ms.Sarah Watts					<u>Permits</u>		
46-3-0149	Fletchers Lake 018 (FL018)	GDA	54	596762	6232932	Open site	Valid	Modified Tree (Carved or Scarred) : 1		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0156	Fletchers Lake 025 (FL025)	GDA	54	596561	6232837	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0157	Fletchers Lake 026 (FL026)	GDA	54	596549	6232767	Open site	Valid	Artefact : 1, Shell : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0158	Fletchers Lake 027 (FL027)	GDA	54	596539	6232742	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0159	Fletchers Lake 028 (FL028)	GDA	54	596538	6232737	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0160	Fletchers Lake 029 (FL029)	GDA	54	596528	6232738	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0161	Fletchers Lake 030 (FL030)	GDA	54	596520	6232694	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0162	Fletchers Lake 031 (FL031)	GDA	54	596520	6232687	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0166	Fletchers Lake 035 (FL035)	GDA	54	596788	6232495	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0167	Fletchers Lake 036 (FL036)	GDA	54	596869	6232557	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0168	Fletchers Lake 037 (FL037)	GDA	54	596882	6232616	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0169	Fletchers Lake 038 (FL038)	GDA	54	596902	6232732	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0170	Fletchers Lake 039 (FL039)	GDA	54	596896	6232746	Open site	Valid	Shell : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0171	Fletchers Lake 040 (FL040)	GDA	54	596814	6232377	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0172	Fletchers Lake 041 (FL041)	GDA	54	596719	6232564	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0173	Fletchers Lake 042 (FL042)	GDA	54	596721	6232687	Open site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Sarah Watts					Permits		
46-3-0127	Buronga Botanical Gardens Burial 1	GDA	54	605885	6221157	Open site	Valid	Burial : 1		
	Contact	Recorders	Harvey Johnston					Permits		

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Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
46-3-0128	Buronga Botanical Gardens Burial 2	GDA	54	606142	6221149	Open site	Valid	Burial : 1		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-3-0196	Dareton Midden	GDA	54	595955	6226323	Open site	Valid	Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4287	
46-2-0306	MBHP AFT 79	GDA	54	584541	6228107	Open site	Partially Destroyed	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4270	
46-2-0307	Smyth Street Midden	GDA	54	584828	6226586	Open site	Valid	Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0300	MBHP AFT HTH SHL 04	GDA	54	584623	6227471	Open site	Partially Destroyed	Artefact : -, Hearth : -, Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4174,4270	
46-2-0302	GHD SM 02	GDA	54	585743	6225716	Open site	Partially Destroyed	Artefact : -, Hearth : -, Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4174	
46-2-0303	GHD SM 01	GDA	54	585810	6225595	Open site	Partially Destroyed	Hearth : -, Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4174	
46-2-0308	Kelso Midden	GDA	54	586037	6228924	Open site	Valid	Artefact : -, Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0305	GHD SM 04	GDA	54	584201	6227521	Open site	Valid	Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
50-3-0055	Red Hill Midden 01	GDA	54	594179	6227201	Open site	Valid	Artefact : -, Shell : -		104400
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>	4560,4618,4688	
46-2-0332	Willow Bend CP 2	GDA	54	584646	6225049	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0333	Willow Bend CP 1	GDA	54	584640	6225035	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0092	East Wentworth 2	AGD	54	586710	6228680	Open site	Valid	Artefact : -	Open Camp Site	
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0093	East Wentworth 1	AGD	54	586980	6228590	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-2-0095	WENTWORTH LEVEL 9	AGD	54	586350	6227320	Open site	Valid	Artefact : -		97372

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-3-0086	TAPIO 1	AGD	54	610680	6232110	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-3-0084	DARETON CAMPSITE 1	AGD	54	593720	6230120	Open site	Valid	Shell : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-3-0092	Buronga Loam Pit 1	GDA	54	611120	6223910	Open site	Valid	Artefact : 1		
	<u>Contact</u> Searle	<u>Recorders</u>						<u>Permits</u>	2495	
46-3-0093	Buronga Loam Pit 2	GDA	54	611900	6223670	Open site	Valid	Artefact : 1		
	<u>Contact</u> Searle	<u>Recorders</u>						<u>Permits</u>	2495	
46-3-0103	KB 11	GDA	54	597839	6232328	Open site	Valid	Hearth : 1		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0104	KB 12	GDA	54	597746	6232226	Open site	Valid	Artefact : 2		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0105	KB 13	GDA	54	597582	6232005	Open site	Valid	Artefact : 30		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0106	KB 14	GDA	54	597630	6232060	Open site	Valid	Artefact : 2		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0097	KB 5	GDA	54	601168	6222667	Open site	Valid	Artefact : 11		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0100	KB 8	GDA	54	602658	6222297	Open site	Valid	Artefact : 1		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0101	KB 9	GDA	54	597923	6232550	Open site	Valid	Artefact : 1		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0094	CSIRO Farm 1	GDA	54	598540	6223300	Open site	Valid	Hearth : -, Shell : -		
	<u>Contact</u> Kate Sefton	<u>Recorders</u>						<u>Permits</u>		
46-3-0095	KB1	AGD	54	606718	6223935	Open site	Valid	Artefact : -		
	<u>Contact</u>	<u>Recorders</u>						<u>Permits</u>		
46-3-0102	KB 10	GDA	54	597933	6232491	Open site	Valid	Artefact : 1		
	<u>Contact</u> Mr.John Gilding	<u>Recorders</u>						<u>Permits</u>		
46-3-0091	Dareton Boat Ramp Midden	GDA	54	595662	6226500	Open site	Valid	Earth Mound : -, Shell : -		104147,104148
	<u>Contact</u> T Russell	<u>Recorders</u>						<u>Permits</u>	4031,4109,4287	
46-3-0107	KB 2	GDA	54	603522	6231829	Open site	Valid	Artefact : 1		
	<u>Contact</u> Sarah Colley	<u>Recorders</u>						<u>Permits</u>		
46-3-0096	KB 4	GDA	54	602139	6222531	Open site	Valid	Hearth : 1		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Buronga

Client Service ID : 603490

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
	Contact Mr.John Gilding	Recorders		Mr.John Gilding				Permits		
46-3-0098	KB 6	GDA	54	601859	6222959	Open site	Valid	Hearth : 2		
	Contact Mr.John Gilding	Recorders		Mr.John Gilding				Permits		
46-3-0099	KB 7	GDA	54	602635	6222271	Open site	Valid	Artefact : 1		
	Contact Mr.John Gilding	Recorders		Mr.John Gilding				Permits		
46-3-0116	Gol Gol Lake Midden 4	GDA	54	612550	6222700	Open site	Valid	Artefact : 6, Hearth : 1, Shell : -		101633
	Contact	Recorders		Doctor.Matt Cupper				Permits		
46-3-0117	Gol Gol Lake Midden 3	GDA	54	612800	6221450	Open site	Valid	Shell : -		101633
	Contact	Recorders		Doctor.Matt Cupper				Permits	3211	
46-3-0118	Gol Gol Lake Midden 2	GDA	54	613755	6224500	Open site	Valid	Shell : -		101633
	Contact	Recorders		Doctor.Matt Cupper				Permits		
46-3-0178	Dareton Bmx Area (Burials)	GDA	54	593974	6226450	Open site	Valid	Burial : 3, Shell : -, Artefact : -		
	Contact	Recorders		Randelle Blair				Permits		
46-2-0295	Long Term Water Pipeline Hearth Shell 118	GDA	54	584023	6225468	Open site	Valid	Hearth : -, Shell : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Samuel Richards				Permits	4174	
46-2-0291	Long Term Water Pipeline Hearth 120	GDA	54	585146	6224991	Open site	Valid	Hearth : -		
	Contact	Recorders		Niche Environment and Heritage,Mr.Samuel Richards				Permits		
46-3-0192	Buronga Landfill Artefact Scatter 1	GDA	54	610565	6223164	Open site	Valid	Artefact : -		
	Contact	Recorders		Ms.Sarah Watts				Permits	4081	
46-3-0195	dareton golf club midden	GDA	54	594950	6225846	Open site	Valid	Aboriginal Resource and Gathering : -, Hearth : -, Shell : -		
	Contact	Recorders		Ms.Leanne Mitchell,office of environment and heritage - national parks and wildlife				Permits		
46-3-0194	RIVER ROAD - MILDURA	GDA	54	602793	6221907	Open site	Valid	Non-Human Bone and Organic Material : 1, Shell : 1		
	Contact	Recorders		Randelle Blair,Office of Environment & Heritage				Permits		
46-3-0202	PEC-W-114	GDA	54	610792	6232304	Open site	Valid	Artefact : -		
	Contact	Recorders		Navin Officer Heritage Consultants Pty Ltd,Mr.Adrian Cressey				Permits		

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Appendix N. Noise and Vibration Assessment (Sonus, 2021)

Buronga Landfill Expansion

Noise and Vibration Assessment

S6801C3

October 2021

sonus.

Sonus Contact: Chris Turnbull
Principal
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www.sonus.com.au

Document Title : Buronga Landfill Expansion
Noise and Vibration Assessment
Document Reference : S6801C3
Date : October 2021
Prepared By : Byron Holmes, MAAS
Reviewed By : Chris Turnbull, MAAS

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TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	THE PROPOSED DEVELOPMENT	5
3	SUBJECT SITE AND SURROUNDING LOCALITY.....	6
4	EXISTING ACOUSTIC ENVIRONMENT	6
5	OPERATIONAL NOISE ASSESSMENT	7
5.1	Criteria	7
5.2	Assessment	9
6	TRAFFIC NOISE ASSESSMENT	12
6.1	Criteria	12
6.2	Assessment	13
7	VIBRATION IMPACT ASSESSMENT.....	15
7.1	Criteria	15
7.2	Assessment	16
8	CONCLUSION	18
	APPENDIX A – Subject Site and Surrounding Locality	19
	APPENDIX B – Noise Level Data.....	20
	APPENDIX C – Background Noise Monitoring Results	21

1 INTRODUCTION

An environmental noise and vibration assessment has been made of the proposed Buronga Landfill expansion located on Arumpo Rd, Buronga, NSW.

The Buronga Landfill is owned and operated by the Wentworth Shire Council (**the Council**). Council is seeking Development Approval to expand the site with the extent and intensity of the works expected to gradually increase as a result. An overview of the subject site and surrounding locality is provided in Appendix A.

The proposed development is a State Significant Development and therefore requires preparation of an Environmental Impact Statement (**EIS**). A preliminary Scoping Report was submitted with the request for the Planning Secretary's Environmental Assessment Requirements (**SEARS**), which identified requirements for additional studies to inform the EIS, including an assessment of the potential noise impacts of the proposal.

Specifically, the SEARS identified the following information to be provided:

- An assessment of potential impacts due to noise sources associated with the proposed landfill expansion, in accordance with the EPA's 2017 *Noise Policy for Industry* (**the Policy**);
- An assessment of potential noise impacts associated with traffic movements in accordance with the Department of Environment, Climate Change and Water's (DECCW's) 2011 *NSW Road Noise Policy* (**the Road Noise Policy**);
- Include recommendations for any required mitigation measures (e.g. appropriate equipment to minimise noise levels) in noise assessment reporting;
- Identify and include all residential or noise sensitive premises likely to be impacted by the development in the noise assessments;
- An assessment of vibration from all proposed construction and operational activities, which should be assessed in accordance with DEC's 2006 *Assessing Vibration: a technical guideline* (**the Guideline**).

This report details the assessment of the noise and vibration impacts of the proposal in accordance with the SEARS requirements identified above.

The assessment is based on the following:

- *Buronga Landfill Approvals Support – Concept Layout*, prepared by Tonkin, job number 20180746, dated 7/10/2020;
- *Buronga Landfill Expansion – Environmental Impact Statement (draft) for State Significant Development (SSD)* 10096818, prepared by Tonkin, reference 202597R04, dated 28 September 2021;
- Noise measurements and observations at the current facility conducted on the 6th of May 2021;
- Background noise monitoring in the vicinity of the subject site between the 6th and 14th of May 2021;
- The understanding that the hours of operation of the expanded facility will be consistent with those of the existing facility.

2 THE PROPOSED DEVELOPMENT

The proposed development (**the Project**) is to expand the waste management services provided by WSC at the Buronga Landfill. The development is proposed to include:

- upgrading the existing recycling infrastructure to provide a dedicated recycling facility, community resource recovery area and bulking up areas to improve recycling rates and economics of recycling (the *Front End Recycling Facility (FERF)*);
- constructing new landfill cells to the north of the existing landfill area, increasing the landfill footprint from 19 ha to approximately 40 ha. The expansion is proposed to be undertaken in eleven stages with each stage providing 3-5 landfill cells;
- increasing maximum waste volumes from 30,000 tonnes per annum to 100,000 tonnes per annum. Current waste acceptance from within the Wentworth Shire Council area is nearing the limit of 30,000 tonnes per annum. It is also proposed to offer these services to the surrounding local government areas, such as Balranald, Central Darling and Murray River and potentially interstate;

This Project is proposed to be staged and is anticipated to result in the life of the landfill site extending for over 100 years.

3 SUBJECT SITE AND SURROUNDING LOCALITY

The subject site is located at 258 Arumpo Road, Buronga. The existing operations are concentrated in the south-western portion of the site, with the proposed development seeking to significantly expand the area operations to the north and north-west.

The locality is sparsely populated, with nearby noise sensitive premises comprising rurally located residences predominantly to the south-west of the subject site at distances of at least approximately 750 metres from the boundary of the licensed area. Additional rurally located residences are also located to the south-east and north-east of the site at distances in excess of 900 metres and 2 kilometres respectively from the boundary of the licensed area.

Other existing noise sources within the locality comprise the existing landfill operations, a Bentonite clay mining operation opposite the subject site to the west across Arumpo Road, a gypsum operation (Morello gypsum) further north opposite the facility across Arumpo Road, farming activity to the south-west of the subject site (primarily to the west of Arumpo Road), and road traffic on Arumpo Road serving these facilities and as general transit.

An overview of the locality showing the licensed area, nearby noise sensitive receivers (residences) and other existing noise sources is provided in Appendix A.

4 EXISTING ACOUSTIC ENVIRONMENT

Background noise monitoring was conducted in the vicinity of the subject site between the 6th and 14th of May 2021, with the aim of characterising the existing ambient noise environment. The noise logger was sited to characterise the noise impact from other noise sources (as identified above) within the locality on nearby noise sensitive premises (existing residences), while avoiding the influence of the existing operations on the measured noise levels as far as practicable.

The results of the monitoring were used to derive *Project Intrusiveness Noise Levels* to inform the assessment of operational noise from the facility against the Policy (refer to Section 5 below). The location of the noise monitor is shown in Appendix A, with the results of the background noise monitoring presented in Appendix C.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Criteria

Noise from industry within New South Wales is subject to the requirements of the *Noise Policy for Industry (the Policy)*. The Policy establishes the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

5.1.1 Project Noise Trigger Levels

The Policy sets out the procedure to determine the *Project Noise Trigger Levels* relevant to a particular industrial development. The project noise trigger levels are the lower (that is, the more stringent) value of the *Project Intrusiveness Noise Levels* and *Project Amenity Noise Levels*. A Project Trigger Noise Level is applicable to each of the day (7:00am to 6:00pm), evening (6:00pm to 10:00pm) and night (10:00pm to 7:00am) periods.

The Project Noise Trigger Levels are levels that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response; for example, further investigation of mitigation measures.

5.1.2 Project Intrusiveness Noise Levels

The intrusiveness of an industrial noise source is considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level (represented by the L_{A90} descriptor) by more than 5 dB (when that background noise level is beyond a minimum threshold).

To account for the temporal variation of background noise levels, the *Rating Background Level (RBL)* is used in the assessment. The outcome of this approach aims to ensure that the intrusiveness noise level is being met for at least 90% of the time periods over which annoyance reactions can occur (taken to be periods of 15 minutes).

To inform calculation of the RBL applicable to the assessment, background noise monitoring was conducted in the vicinity of the site over a period of approximately 9 days between the 6th and 14th of June 2021. The results of the background noise monitoring are presented in Appendix C.

Based on the above, the *Project Intrusiveness Noise Levels* are as follows:

Table 1: Project Intrusiveness Noise Levels

Period	Measured RBL dB(A)	Minimum RBL dB(A)	Project Intrusiveness Noise Levels ($L_{Aeq,15min}$ dB(A))
Daytime (7:00am to 6:00pm)	26	35	40
Evening (6:00pm to 10:00pm)	17	30	35
Night-time (10:00pm to 7:00am)	16	30	35

Daytime – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.

Evening – the period from 6 pm to 10 pm.

Night-time – the remaining periods.

5.1.3 Project Amenity Noise Level

The *Project Amenity Noise Level* is independent of the existing background noise environment and is aligned with the planning zone in which nearby noise sensitive premises with the potential to be impacted by the proposed development are located.

The *Project Amenity Noise Level* applicable to a new industrial development is 5dB(A) less than the applicable *Recommended Amenity Noise Level* which would otherwise apply. In this instance, all nearby noise sensitive premises are located within the “Rural 1” zone. As such, the following *Recommended Amenity Noise Levels* (as listed in Table 2.2 of the Policy), and the resulting *Project Amenity Noise Levels* applicable to the development apply to the development:

Table 2: Project Amenity Noise Levels

Receiver	Period	Recommended amenity noise level ($L_{Aeq,15min}$, dB[A])	Project amenity noise level ($L_{Aeq,15min}$, dB[A])
Residential	Daytime (7:00am to 6:00pm)	53	48
	Evening (6:00pm to 10:00pm)	48	43
	Night-time (10:00pm to 7:00am)	43	38

The Policy notes that the *Project Intrusiveness Noise Levels* are only applied to residential receivers (residences). For other receiver types identified in Table 2.2 of the Policy, only the amenity levels apply.

5.1.4 Criteria Summary

Based on the above, the following *Project Noise Trigger Levels* are applicable to the development, and have been used in the assessment. Note that as the hours of operation of the expanded facility are proposed to remain consistent with the current hours of operation (8:00am to 4:45pm Monday to Friday, and 9:00am to 4:45pm Saturday and Sunday), it is the daytime criterion that is most relevant to the assessment.

Table 3: Project Noise Trigger Levels summary

Receiver	Period	Project Trigger Level ($L_{Aeq,15min}$ dB[A])
Residential	Daytime (7:00am to 6:00pm)	40
	Evening (6:00pm to 10:00pm)	35
	Night-time (10:00pm to 7:00am)	35

5.2 Assessment

The noise levels at nearby residences resulting from the proposed site activity have been predicted based on noise measurements of the current operations at the existing facility on the 6/5/2021, and supplemented by a range of previous noise measurements and observations at other similar facilities. These include:

- operation of civil earthmoving equipment at the site, including a wheeled loader and an excavator;
- road truck movements;
- articulated dump truck movements;
- a road truck depositing waste material at the site;
- a dump truck depositing fill at the site; and,
- an air compressor.

Sound power levels for the above activities are provided in Appendix B.

The predictions have been made using the CONCAWE¹ noise propagation model implemented in the SoundPLAN computer noise modelling suite. Default noise-enhancing meteorological conditions consistent with those presented in Table D1 of Fact Sheet D of the Policy (stability category D, 2.5m/s from source to receiver) have been used for the assessment.

The predictions of noise from use of the facility have also been based on the following operational assumptions for the level of activity in any 15-minute² period. The below assumptions are based on the level of activity observed during the site visit on 6th May 2021 and adjusted to account for the increased intensity of operations expected to be associated with the expansion:

- Up to 2 road trucks accessing the site and depositing waste material;
- An additional road truck accessing the *front end recycling facility (FERF)* near the site entrance;
- Continuous operation of a wheeled loader processing waste throughout the assessment period;
- A single return dump truck movement between the excavator site, and the waste processing area;
- Continuous operation of an excavator throughout the assessment period;
- Continuous operation of the air compressor throughout the assessment period; and,
- Sound power levels presented in Appendix B.

Note that it has also been assumed that the mobile equipment fleet will be fitted with broadband reversing alarms.

To provide a conservative assessment, the above operations have been assumed to occur at the top of the cap within the first landfill cell to be developed (Stage 1A) located in the south-west corner of the expanded landfill footprint (and therefore closest to the nearest residences to the site). Lower noise levels would be expected to occur for later stages (which place operations further from the nearest residences), and for operations occurring at the bottom of the cell (where they will benefit from screening by previously developed landfill cells).

¹ Manning CJ 1981, "*Report no. 4/81: The propagation of noise from petrochemical complexes to neighbouring communities*", the oil companies' international study group for conservation of clean air and water in Europe (CONCAWE), Den Haag.

² Default assessment period of the Policy.

5.2.1 Corrections for Annoying Characteristics

The dominant noise sources are the excavator, front end loader and road trucks moving within the site. Review of the measurement data for these noise sources (including overall A and C-weighted levels and one-third octave band levels) indicates the potential for a low frequency characteristic to be associated with noise from the facility at nearby residences (as per Fact Sheet C of the Policy).

A low frequency character associated with a source will generally become more prominent with increasing distance from the source (such as at a distant receiver location) due to the lesser effect of atmospheric absorption on lower frequencies in comparison to higher frequencies. As such, a low frequency character would likely also be present at noise sensitive receiver locations where these sources are dominant.

In accordance with Fact Sheet C of the Policy, where any one-third octave band noise level exceeds the thresholds defined in Table C2 of the Policy by more than 5dB(A) a 5dB(A) positive adjustment applies to the evening/night periods and a 2dB(A) penalty applies to the daytime period.

On this basis a 2dB(A) positive adjustment has been applied to the predicted levels during the daytime period (noting that the existing and proposed hours of operation fall entirely within this period).

5.2.2 Predicted Noise Levels

Based on the above, the highest noise level predicted at an existing residence is 38dB(A) (including a 2dB(A) correction for a low frequency characteristic as discussed above) at the nearest residence to the south-west, achieving compliance with the project noise trigger level of 40dB(A).

Note that this outcome is based on the conservative scenario described above which places all activities at the top of the landfill cell closest to residences to the south-west (where operations will not be screened from nearby residences). Lower noise levels are predicted at other residences further from the site, and for other operational scenarios which place noise sources further from the nearest residence or lower in the landfill cell such that they benefit from screening by the previously completed landfill cells.

6 TRAFFIC NOISE ASSESSMENT

6.1 Criteria

Road traffic noise associated with new road projects, redevelopment of existing road corridors or land use changes associated with a significant increase in traffic on the existing road network is subject to the *NSW Road Noise Policy (the Road Noise Policy)*. The Road Noise Policy establishes the NSW *Department of Environment, Climate Change and Water's* (DECCW's) requirements for the assessment of noise impacts associated with road projects. The primary purpose of the Road Noise Policy is to provide assessment criteria for road traffic noise based on protecting amenity and wellbeing.

The noise descriptors used by the Road Noise Policy in assessment of road traffic noise are based on average equivalent noise levels (L_{Aeq}) for the day (15-hour period between 7am and 10pm) and for the night (9-hour period between 10pm and 7am). Different criteria apply depending on the type of road (freeway/arterial/sub-arterial road or local road), type of noise sensitive receiver (residential or non-residential), and whether the assessment relates to a new or an existing road (either redevelopment of an existing road or additional traffic on an existing road).

The relevant assessment criteria based on the road category (local road), receiver type (existing residences) and project type (non-road project contributing to increased traffic on the road network) are presented below:

Table 4: Road noise criteria

Road Category	Type of project / land use	Assessment criteria [dB(A)]	
		Day (7:00am to 10:00pm)	Night (10:00pm to 7:00am)
Local roads	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, 1 \text{ hour}} \leq 55$ (external)	$L_{Aeq, 1 \text{ hour}} \leq 50$ (external)

Relative Increase Criterion

In addition to the assessment criteria outlined in the above table, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development would usually be considered against the Relative Increase Criterion (RIC). However; as the only road expected to be impacted by the proposed land use change is categorised as a 'local road', the RIC does not apply and is therefore not relevant to this assessment.

6.2 Assessment

An assessment has been made of the road traffic noise impacts expected to be associated with the proposed development.

The primary access route to the expanded facility will remain consistent with the existing facility. That is, access to the site will be via Arumpo Road. As the majority of the major population centres serviced by the facility are located to the south, consistent with the current facility the majority of the vehicles accessing the site would be expected to travel to/from the site along Arumpo Road to the south.

As the purpose of the development is to realise additional landfill capacity due to the site approaching capacity, it is not anticipated that the development would result in a significant increase in traffic on the local road network in the short to medium term, even with a gradual increase in intensity of the works on-site.

Nonetheless, an assessment of the road traffic noise impacts associated with the proposal has been undertaken based on the peak site traffic generation predicted in the Traffic Impact Assessment (TIA) prepared for the project and detailed within the EIS. The TIA predicts the following traffic volumes to be associated with the project:

Table 5: Daily traffic volumes (vehicles/day) generated by the Project

Vehicle Type	Daily Traffic Volumes (vehicles/day) for Each Scenario							
	Current Operation		Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Light Vehicles	30	48	45	72	46	74	61	98
Light Rigid Trucks	4	6	5	8	15	24	16	26
Heavy Rigid Trucks	21	34	22	35	81	130	82	131
Articulated Trucks	1	2	3	5	2	3	4	6
TOTAL	56	90	75	120	144	230	163	261

Based on the above, a peak daily traffic volume of 261 vehicles per day is associated with the ‘*Future Operation plus Construction*’ scenario, representing the ‘worst case’ scenario in terms of road traffic noise generated by the Project.

To enable a comparison of the above scenario against the requirements of the Road Noise Policy, road traffic noise levels associated with the above scenario have been predicted at residences in the vicinity of Arumpo Road to the south of the site have been predicted using the SoundPLAN noise modelling suite. The predictions have been generated based on the posted speed limit of 100km/h which applies to Arumpo Road for the 600 metres south of the site entrance gate (and 80km/h beyond this point), and take into account the mix of vehicle types presented for the ‘peak’ *Future Operation plus Construction* scenario provided in Table 5 above.

Based on the predictions, a 1-hour average noise level ($L_{Aeq, 1 \text{ hour}}$) of 51 dB(A) is predicted at the most affected house, comfortably in compliance with the 55 dB(A) criterion applicable under the Road Noise Policy.

For residences further from Arumpo Road, or those in the vicinity of Arumpo Road to the north of the site entrance lower noise levels are predicted.

Based on the above, the proposed development will comfortably achieve the assessment criteria, and therefore satisfy the Road Noise Policy.

7 VIBRATION IMPACT ASSESSMENT

7.1 Criteria

Vibration assessments are typically separated into two categories, comprising levels at which the vibration might be felt to cause annoyance and concern, and levels at which building or infrastructure damage might occur.

The vibration levels associated with human annoyance occurs at a lower threshold than those associated with structural damage. As such, vibration which achieves compliance with human annoyance criteria will also achieve structural damage criteria. Ongoing vibration impacts from the operational phase of a project are typically assessed against human annoyance criteria.

For construction activities, vibration impacts are typically assessed in terms of structural damage criteria. This approach acknowledges that vibration from construction usually occurs over a limited timeframe, and that achieving human perception criteria which seek to minimise vibration impacts to imperceptible levels may be difficult or impractical to achieve in some circumstances.

As identified by the SEARS, an assessment of vibration from all proposed construction and operational activities against DEC's 2006 *Assessing Vibration: a technical guideline* (**the Guideline**) is required.

The Guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. The Guideline is based on guidance contained in BS 6472:1992 "*Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz To 80 Hz)*", and is widely used both within NSW and interstate for the assessment of vibration impacts.

The Guideline provides the following criteria to be met at nearby vibration sensitive locations (residences) for continuous and impulsive vibration:

Table 6: Summary of Guideline vibration criteria applicable to the assessment

	x and y axes rms acceleration (m/s ²)		z axis rms acceleration (m/s ²)	
	Preferred	Preferred	Preferred	Maximum
Continuous vibration				
Residences – Daytime	0.0071	0.014	0.010	0.020
Residences – Night-time	0.005	0.010	0.007	0.014
Impulsive vibration				
Residences – Daytime	0.21	0.42	0.30	0.60
Residences – Night-time	0.071	0.14	0.10	0.20

As the above criteria are based around human annoyance, compliance with the above will also ensure that structural damage is unlikely to occur.

7.2 Assessment

As the activities currently conducted on-site (and expected to continue on-site following the expansion) are generally continuous sources of vibration, the vibration expected to arise from these activities has been assessed against the continuous vibration criteria presented in the above table using the ‘screening method’ detailed in Appendix A of the Guideline. The Guideline notes that the use of the screening represents a conservative approach to demonstrating compliance or the need to use the more precise approach using appropriate frequency weightings. As the hours of operation of the expanded facility will be between 8:00am and 4:45pm, only the ‘daytime’ criteria are relevant to the assessment.

Vibration in terms of acceleration (in m/s²) was measured for the processes currently occurring on-site (and proposed to continue following the expansion) expected to generate the highest levels of vibration, including the following:

- Wheeled loader operating at high and low power settings at a distance of 100 metres;
- Dump truck moving and dumping fill at a distance of 50 metres.

Given the nature of the project (being expansion of a landfill site), there will not be a defined construction phase (rather the existing operations comprising placement of waste material and capping with fill derived from elsewhere within the site will be relocated into the expanded footprint). As such, the above activities are expected to be representative of those associated with all phases of the project, albeit closer to the

nearest vibration sensitive receiver locations (residences) than activities within the expanded site footprint to the north.

The results of the measurements and the corresponding 'preferred' acceleration criteria are presented below:

Table 7: Summary of vibration monitoring results

Vibration Source	X axis		Y axis		Z axis	
	Measured (rms, m/s ²)	Criteria (rms, m/s ²)	Measured (rms, m/s ²)	Criteria (rms, m/s ²)	Measured (rms, m/s ²)	Criteria (rms, m/s ²)
Loader – lower power	0.001	0.0071	0.003	0.0071	0.001	0.01
Loader – higher power	0.001	0.0071	0.002	0.0071	0.001	0.01
Dump truck	0.002	0.0071	0.002	0.0071	0.001	0.01

Based on the above, the 'preferred' rms acceleration levels are comfortably achieved for the processes currently occurring on-site at distances in the order of 50-100 metres (noting that assessment of unweighted vibration levels against the Guideline preferred levels represents a conservative approach). As the nearest residence is greater than 900 metres from the existing operations (and will be even further from the expanded operations), vibration levels at nearby residences will be even lower than those measured.

As the expanded operations will utilise the same processes as the existing operations, and will occur further from the nearest vibration sensitive receivers to the south-west, even lower levels of vibration are anticipated to result from the expansion. On this basis, vibration from the proposed expansion will comfortably meet the requirements of the Guideline.

8 CONCLUSION

An environmental noise and vibration assessment has been made of the proposed Buronga Landfill expansion located on Arumpo Rd, Buronga, NSW.

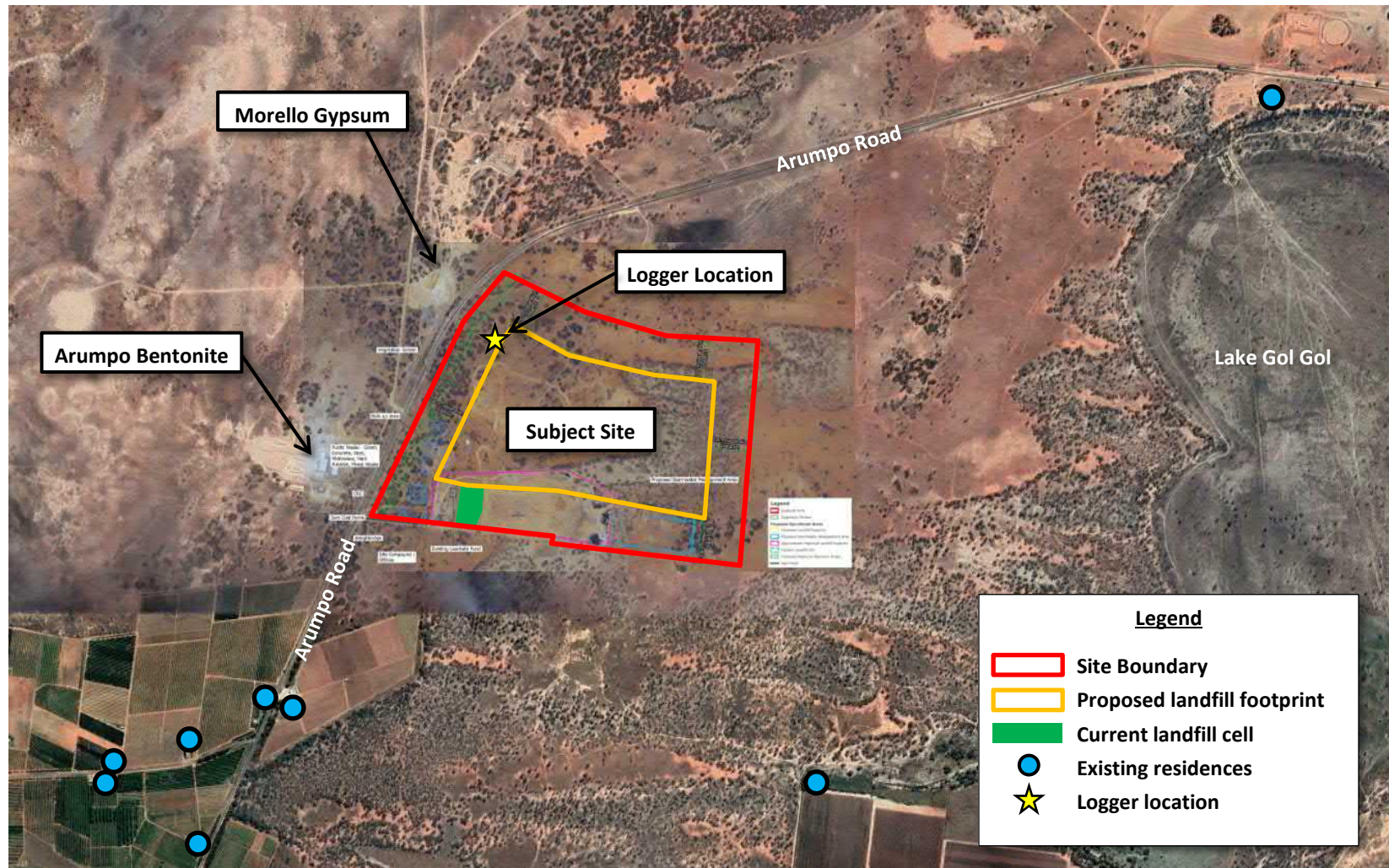
The expansion seeks to realise additional landfill capacity due to the current site footprint approaching its capacity. The intensity of the works currently being undertaken on-site is therefore expected to increase gradually as a result of the expansion.

The noise and vibration assessment has comprised the following:

- Establishment of objective noise and vibration criteria in accordance with the requirements of the SEARS;
- Identification of the sources of noise and vibration associated with the expansion;
- Prediction of operational noise and vibration impacts, and prediction of road traffic noise impacts associated with the expansion (as required by the SEARS);
- Evaluation of the predicted impacts against the established criteria.

Based on the assessment, noise and vibration impacts are predicted to achieve the objective criteria established in accordance with the relevant policies and guidelines as required by the SEARS without the requirement for any noise or vibration mitigation measures.

APPENDIX A – Subject Site and Surrounding Locality



APPENDIX B – Noise Level Data

Activity		Sound Power Level
Operational noise sources	Road truck moving within site at 20 km/h	112 dB(A)
	Truck unloading skip	116 dB(A)
	Front End Loader – high power	113 dB(A)
	Front End Loader – low power	107 dB(A)
	Dump Truck moving within site at 20 km/h	112 dB(A)
	Dump Truck reversing and dumping fill	101 dB(A)
	Excavator	108 dB(A)
	Compressor	99 dB(A)
Road traffic noise sources	Peak <i>Future Operation + Construction</i> (TNM, per metre 80km/h)	63 dB(A)
	Peak <i>Future Operation + Construction</i> (TNM, per metre 100km/h)	65 dB(A)
	Road truck moving on road at 80 km/h	111 dB(A)

APPENDIX C – Background Noise Monitoring Results

