

Buronga Landfill Expansion

Landfill Gas Monitoring Plan

Wentworth Shire Council

SSD-10096818

30 September 2024

Ref: 202597R12_Apx.L_Rev03



Building exceptional
outcomes together



Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
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Project: Buronga Landfill Expansion | Landfill Gas Monitoring Plan

Client: Wentworth Shire Council

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1 Introduction

1.1 Background

This Landfill Gas Monitoring Plan (LGMP) has been prepared to ensure compliance with the regulatory requirements outlined in the Buronga Landfill Expansion Development Consent (SSD-10096818), Environment Protection Licence (EPL) 20209, and the NSW Environmental Guidelines: Solid Waste Landfills (2016). The LGMP aims to monitor landfill gas (LFG) emissions, assess their environmental impact, and ensure the safety and health of nearby communities and site workers.

The LGMP has been prepared by Tonkin on behalf of Wentworth Shire Council (WSC) as part of the Landfill Environmental Management Plan (LEMP) in support of the expansion to the Buronga Landfill (the site). The LGMP was prepared by Loren Cockshell and Ellen Tansell who are Environmental Scientists and have extensive experience in landfill gas monitoring, both are supported by Mamdoh Ibrahim (Principal Engineer- Waste), who has 23 years of industry experience including design, construction, operation, closure and post closure of landfills in Australia and internationally, CVS of the team are provided in Appendix B.

WSC currently holds Environment Protection Licence (EPL) 20209 which covers waste disposal activities (Construction of landfill cells and leachate and stormwater collection systems) and resource recovery activities (recovered aggregate processing and storage / Waste storage) at the site and is under the development processes of the expansion to the site under a Development Consent Application Number: SSD 10096818.

1.2 Site and Ownership

The site is located at 258 Arumpo Road, Buronga NSW and is shown in Figure 2 and Figure 3 of Appendix A. The site is owned and operated by WSC.

1.3 Relevant Statutory Requirements:

The LGMP is developed in accordance with the following statutory requirements:

NSW Department of Planning, Industry and Environment, 2023, Buronga Landfill Expansion Development Consent, 19 July 2023, Ref: SSD-10096818 (the Development Consent);

NSW EPA, 2023, Environment Protection Licence – 20209, Licence Version Date 8 March 2023 (the EPL);

NSW EPA, 2016, *Environmental Guidelines, Solid Waste Landfills*, Second Edition, April 2016, Ref: EPA 2016/0259 (The Landfill Guidelines);

Waste Avoidance and Resource Recovery Act 2001 (NSW) (WAAR Act 2001);

Protection of the Environment Operations Act 1997 (NSW) (the POEO act 1997);

1.4 Relevant Limits and Performance Measures:

1.4.1 LFG Emissions Limits:

The allowable concentration of methane (CH₄) and other landfill gases must not exceed the limits specified in the EPL:

- Methane Concentration (Surface Emissions): Methane concentrations must remain below 500 parts per million (ppm) in surface emissions. Any reading above this threshold requires further investigation and corrective actions, such as repairing or replacing the cover material.
- Methane Concentration (Enclosed Structures): Methane concentrations inside enclosed structures must remain below 1% (v/v). If this threshold is exceeded, immediate corrective action is required, and the EPA must be notified within 24 hours.



- Methane Concentration (Critical Levels): If Methane concentrations exceed 1.25% (v/v) in any location, the EPA must be notified within 48 hours, and the frequency of monitoring must increase to daily until the situation is under control.

1.4.2 Performance Criteria:

Compliance with the NSW EPA's Environmental Guidelines for Solid Waste Landfills regarding LFG monitoring and control.

1.5 Performance Indicators:

- Methane Concentration: Continuous monitoring of methane levels at designated monitoring points.
- Surface Emissions: Regular surface monitoring to detect any fugitive emissions.
- Gas Collection Efficiency: Percentage of LFG captured by the gas extraction system compared to estimated gas production.

1.6 Reference Documentation

This plan was written with reference to the following documents and legislation:

NSW Department of Planning, Industry and Environment, 2023, Buronga Landfill Expansion Development Consent, 19 July 2023, Ref: SSD-10096818 (the Development Consent);

NSW EPA, 2023, Environment Protection Licence – 20209, Licence Version Date 8 March 2023 (the EPL);

NSW EPA, 2016, *Environmental Guidelines, Solid Waste Landfills*, Second Edition, April 2016, Ref: EPA 2016/0259 (The Landfill Guidelines);

Waste Avoidance and Resource Recovery Act 2001 (NSW) (WAAR Act 2001);

Protection of the Environment Operations Act 1997 (NSW) (the POEO act 1997);

Wentworth Shire Council (2015), Buronga Landfill, Landfill Environmental Management Plan, December 2015, Ref: 21/21400/181846.

Tonkin (2022), Buronga Landfill Expansion Environmental Impact Statement, SSD-10096818, 25 January 2022, Ref: 202597R04Rev1. (the expansion development EIS)

Tonkin (2022), Buronga Landfill Expansion Submission Report, SSD-10096818, 1 December 2022, Ref: 202597R05Rev2.

Tonkin (2023), Buronga Landfill Expansion Amendment Report, SSD-10096818, 8 February 2023, Ref: 202597R07Rev0.

1.7 Consultation:

In accordance with Development Consent (SSD_10096818) Condition A11, the draft of this LGMP was provided to the EPA for consultation.



2 Landfill Gas Monitoring Plan

2.1 Landfill Gas

Putrescible waste produces landfill gas as it decomposes following filling. Landfill gas is generated by the anaerobic decomposition of biodegradable wastes and the chemical breakdown within the solid waste. Landfill gas primarily comprises methane (CH₄) and carbon dioxide (CO₂) with other minor components. The design of the facility has been developed to manage landfill gas to prevent environmental harm in accordance with the Landfill Guidelines.

2.2 Management Structure and Responsibilities

Overall responsibility for the site lies with the owner and licensee.

WSC may engage consultants to assist with the following tasks as required:

- Design or advice for future development of the site;
- Environment management advice such as for landfill gas, surface and groundwater management, monitoring and reporting;
- Survey; and
- Planning advice.

Day to day responsibilities for carrying out operational procedures associated with the environmental management of the site is allocated to:

- The Site Manager; and
- WSC's site staff.

2.3 Landfill Gas Management

The Landfill Guidelines requires the following outcomes of landfill gas management:

- Minimise emissions of untreated landfill gas to air and through sub-surface strata and services;
- Minimise greenhouse gas (GHG) emissions (methane, the major bulk component of landfill gas, is 20 to 25 times more potent than carbon dioxide);
- Minimise emissions of offensive odour;
- Minimise the explosive risk to humans from gas build-up in confined spaces;
- Ensure that, wherever feasible, landfill gas is sustainably utilised for energy recovery; and
- Minimise emissions of air pollutants from the combustion of landfill gas in flaring or electricity-generating equipment.

All Proposed 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. The waste will be regularly covered with soil, with completed cells capped as discussed in Section 5.1 of the LEMP.

Currently Buronga Landfill does not produce sufficient LFG to warrant active control systems. It is expected that as the quantity of waste increases then active systems will be required to control LFG emissions. It will be necessary to conduct tests to predict the quality and quantity of gas available to determine if and when the Buronga Landfill may require an active system. The high evaporation and low rainfall of Buronga results in placed waste tending to be placed drier than other major facilities and hence site-specific trials will need to be conducted to determine the appropriate control.

A crude estimate of LFG generation using a first order decay function estimates that after 5 years of placing 60,000 tpa, the LFG generation may exceed 150 m³/hr, demonstrating that the need for more



active LFG management will not be required in the short term. Regardless, monitoring will be undertaken routinely (Section 2.4) to ensure LFG generation is not posing an environmental risk and allowance has been made for an active LFG control system to ensure that it is not overlooked.

2.3.1 LFG Risk Assessment

Within one year of the commencement of operation of the site expansion development, WSC will arrange LFG Risk Assessment to be conducted by qualified personnel based on the as constructed documentation and the waste tonnage and composition received at the expansion cell. The LFG Risk Assessment will identify the extent of gas controls for the site and should be updated as gas monitoring data from the expansion cells is obtained. The landfill gas risk assessment should address all potential sources, pathways and receptors for landfill gas migration. The source assessment should consider the types of wastes received in the expansion cells, the size of the landfill expansion, the gas generating potential, monitoring results, gas volumes and flow rates, and odour modelling and surveys. Potential pathways include through the ground, service pipes, basements and atmosphere. All sensitive receptors at on- and off-site locations should be considered in particular, all buildings within 250 metres of the deposited waste.

The system of landfill gas controls will depend on the landfill gas risk assessment conducted for the expansion development.

2.3.2 WSC Strategy to Optimise the LFG collection system

When the LFG modelling results and risk assessment show that a LFG control system is required, an experienced LFG company will be engaged to trial, design, construct and maintain the system to optimise the collection of the LFG. This will ensure the system is appropriately sized and will maximise the collection efficiency and destruction of greenhouse gases.

An active control system is typically comprised of:

- Vertical gas collection wells. Wells are typically < 1 m diameter and placed at a grid spacing of around 50-100 m. The wells are drilled to around 75% the depth of the waste to ensure no damage to the liner;
- Horizontal gas collection wells
- Gas collection header lines
- Blower
- Condensate collection system
- Gas treatment system

Typical information for an active LFG control system is provided in Appendix B.

The potential location of the proposed LFG Management Area is shown in Figure 6 of Appendix A. The treatment of landfill gas aims to destroy the methane in the gas, reducing the potential greenhouse effect of the gas. Covering and capping of the waste encourages landfill gas to leave the landfill via the extraction system instead of via emissions to the atmosphere.

2.4 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 (Table 2-1). LFG monitoring will be undertaken across areas of intermediate and final cover on a monthly basis and inside on-site buildings and structures on a monthly 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.

The current site EPL does not sets out the requirements for sub-surface, surface and enclosed structures landfill gas monitoring.

Table 2-1 Landfill Gas Monitoring

Reasons for Monitoring		
Ensure that no detrimental effects to the environment are occurring due to emissions of landfill gas		
Maintain health of vegetation on the cap		
Ensure that landfill gas is not accumulating in enclosed structures and services on site and unacceptable health and safety risks are not occurring.		
Ensure Compliance with:		
<ul style="list-style-type: none"> • Landfill Guidelines • POEO Act 1997 		
Item	Surface Emissions	Enclosed Structure Screening
Key Information	Methane Concentration (ppm) Field observations of odour	Methane Concentration (% v/v) Field observations of odour
Locations	Surface of landfill with either interim cover and/or final capping and around perimeter of premises	Inside enclosed structures on site (at or below floor level inside all site buildings) and inside any services on site Inside any off-site structures or services within 250 m of deposited waste or leachate storage
Methodology	As per Section 5.2 of the Landfill Guidelines	As per Section 5.4 of the Landfill Guidelines
Responsibility	Council	Council
Frequency	monthly unless otherwise determined by the EPA Licence and/or by the LFG risk assessment	monthly unless otherwise determined by the EPA Licence and/or by the LFG risk assessment
Duration	Subject to annual review and EPA requirements	



Acceptance Criteria	Methane concentrations below 500 ppm No evidence of vegetation die-back due to methane impact	Methane concentrations below 1% (v/v)
Reporting - Internal	Interim results provided to Council, Monitoring report provided to Council	
Reporting - External	Monitoring results must be submitted to EPA in the Annual return	
Non-Conformance Procedures	<p>Should the threshold level of 500 ppm be exceeded, Council must notify EPA. In accordance with the EPL, if methane concentrations exceed 1.25% (v/v) Council must notify EPA within 48 hours and increase the frequency of monitoring to daily, until the EPA determines otherwise.</p> <p>Investigative and corrective actions can include:</p> <ul style="list-style-type: none"> • Repair or replacement of cover material • Flux (emissions) monitoring to quantify emission rates and identify the extent of gas loss • Installation of sub-surface monitoring wells to gauge the extent of lateral migration of gas • Adjustment or installation of landfill gas controls to extract and treat landfill gas. 	<p>Should the threshold level of 1% (v/v) be exceeded:</p> <ul style="list-style-type: none"> • The EPA must be notified within 24h • Testing of the building where the threshold level was exceeded should occur daily until ventilation or other measures have been put into place to eliminate the methane accumulation and the EPA approve a reduction in monitoring frequency. • Within 14 days, Council must submit a plan to the EPA for further investigation and/or remediation of the elevated gas levels • If the detected levels pose a danger of asphyxiation or explosion to persons on site, immediate action must be taken to ensure the safety of all persons on site.

3 Reporting

3.1 Annual Reporting

WSC will prepare an Annual Return in accordance with the requirement of the EPL. The Annual Return will include the following:

- A certified Statement of Compliance,
- A signed Monitoring and Complaints Summary,
- A Statement of Compliance for Licence Conditions,
- A Statement of Compliance for Load Based Fee,
- A Statement of Compliance for Requirement to Prepare Pollution Incident Response Management Plan,
- A Statement of Compliance for Requirement to Publish Pollution Monitoring Data; and



- A Statement of Compliance for Environmental Management Systems and Practices.

The Annual Return will be prepared for the required reporting period, and will be submitted to the EPA no later than 60 days after the end of the reporting period. WSC will retain a copy of the Annual Return for a period of at least 4 years after the Annual Return is supplied to the EPA.

The Annual Return will be prepared for the required reporting period and will be submitted to the EPA no later than 60 days after the end of the reporting period. WSC will retain a copy of the Annual Return for a period of at least 4 years after the Annual Return is supplied to the EPA.

The monitoring and complaints summary will contain the following information:

- Tabulated results of all monitoring information collected;
- Graphical presentation of data from at least the last three years in order to show variability/and or trends. Any statistically significant variations or anomalies will be highlighted and explained;
- An analysis and interpretation of all monitoring data;
- An analysis of and response to any complaints received;
- Identification of any deficiencies in environmental performance identified by the monitoring data, trends or incidents and of remedial action taken or proposed to be taken to address these deficiencies; and
- Recommendations on improving the environmental performance of the facility.

The monitoring and complaints summary must be signed by WSC or by a person approved in writing by the EPA to sign on behalf of the Licence holder.

3.2 Incident Reporting

Any incident that causes or threatens material harm to the environment or may lead to a breach of EPL conditions must be communicated by WSC or its employees immediately after first becoming aware of the incident. Notifications must be made by telephoning the Environment Line service on 131 555. The Planning Secretary must be notified in writing via the Major Projects website. Written notice including details of the notification must be provided to EPA within 7 days of the date of which the incident occurs. Reportable incidents could include but are not limited to:

- Identification of non-domestic quantities (>200 g/tonne) of hazardous waste mixed amongst solid waste;
- Fire at the landfill;
- Entry of leachate or waste into the stormwater management system;
- Identification of any failure of an environmental protection system;
- Identification of a significant difference in groundwater or stormwater indicator parameters; and
- Any other incident or observation that could potentially pose an immediate environmental hazard outside normal operating conditions.

The occurrence of any such incident will also be recorded in the site's daily logbook as appropriate.

As required in the development consent, the written incident notification shall be provided to the Planning Secretary within seven days after WSC becomes aware of an incident. The written notification must:

- identify the development and application number;
- provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
- identify how the incident was detected;
- identify when the applicant became aware of the incident;
- identify any actual or potential non-compliance with conditions of consent;



- describe what immediate steps were taken in relation to the incident;
- identify further action(s) that will be taken in relation to the incident; and
- identify a project contact for further communication regarding the incident.

Within 30 days of the date on which the incident occurred, WSC must provide the Planning Secretary and the EPA with a detailed report on the incident addressing all requirements below, and such further reports as may be requested. The Incident Report must include:

- a summary of the incident;
- outcomes of an incident investigation, including identification of the cause of the incident;
- details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
- details of any communication with other stakeholders regarding the incident.

Where an authorised officer of the EPA suspects on reasonable grounds that an event has occurred at the premises that has caused, is causing or is likely to cause material harm to the environment, the authorised officer may request a written report of the event. WSC 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. The report may be required to contain any or all of the following information:

- The cause, time and duration of the event;
- The type, volume and concentration of every pollutant discharged as a result of the event;
- The name, address and business hours telephone number of employees or agents of the WSC, or a specified class of them, who witnessed the event;
- The name, address and business hours telephone number of every other person who witnessed the event, unless WSC cannot obtain that information after making reasonable effort;
- Action taken by WSC in relation to the event, including any follow up contact with complainants;
- Details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
- Any other relevant matters.

The EPA and/or the Planning Secretary may make a written request for further details in relation to any of the above matters if it's not satisfied with the report provided by WSC. WSC must provide such further details to the EPA and/or the Planning Secretary within the time specified in the request.

3.3 Compliance Reporting

Within six months after the commencement of construction / first year of commencement of operation of the site expansion development, and in the same month each subsequent year, WSC will submit a Compliance Report to the Planning Secretary reviewing the environmental performance of the development to the satisfaction of the Planning Secretary.

Compliance Reports will be prepared in accordance with the Compliance Reporting Post Approval Requirements (Department 2020) and will also:

- identify any trends in the monitoring data over the life of the development;
- identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the development.

WSC will make each Compliance Report publicly available within 60 days after submitting it to the Planning Secretary and notify the Planning Secretary in writing at least seven days before this is done.



3.4 Independent Audit

Within one year of the commencement of operation of the site expansion development, and every three years after, unless the Planning Secretary directs otherwise, WSC will prepare an Independent Environmental Audit (Audit) of the development.

Audits will:

- be prepared in accordance with the Independent Audit Post Approval Requirements (Department 2020);
- be led and conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Planning Secretary; and
- be submitted to the satisfaction of the Planning Secretary within three months of commissioning the Audit (or within another timeframe agreed by the Planning Secretary).

WSC will:

- review and respond to each Independent Audit Report prepared under the condition as required in the development consent;
- submit the response to the Planning Secretary and any other NSW agency that requests it, together with a timetable for the implementation of the recommendations;
- implement the recommendations to the satisfaction of the Planning Secretary; and
- make each Independent Audit Report and response to it publicly available no later than 60 days after submission to the Planning Secretary and notify the Planning Secretary in writing at least 7 days before this is done.

3.5 Record Keeping

The following records shall be kept at the legal address of the site Licensee:

- Copy of conditions of planning consent and authorisation under the *Amended Environmental Planning and Assessment Act 1979*;
- Records of inspections conducted by staff;
- Records of monitoring as discussed above;
- Records of complaints received;
- Correspondence with or records of inspections by EPA;
- Records of situations where licence conditions have been breached and how the breaches were rectified;
- Copy of LEMP in its entirety;
- The site's EPL;
- Site diary/daily log-book;
- Plans of waste storage locations for future possible retrieval;
- Worksite WHS field folder
- Any other applicable Council operational plans and policies including closure and post closure management plans (when developed);
- Copies of any site reporting; and
- Evidence and outcomes of site reviews.

WSC shall ensure that the above records are kept up to date and readily accessible for future reference.



4 Contingency Plan

4.1 Unpredicted Impacts Management

In the event of unpredicted impacts, such as a significant increase in LFG emissions or system failure:

- Immediate investigation will be conducted to determine the cause.
- Temporary measures, such as increasing gas extraction or installing additional wells, will be implemented to mitigate the impact.
- A detailed incident report will be prepared, including corrective actions and a timeline for resolving the issue.

4.1.1 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.

4.1.2 Emergency Response for Methane Exceedances

Council will determine appropriate emergency response procedures based on the circumstances observed at the site. This response may include:

- Cordoning off areas;
- Notify the EPA within 48 hours
- Daily testing of the building or enclosed structure until ventilation or other measures have been put in place to eliminate the methane build-up;
- Installation or adjustment of source and receptor landfill gas controls; and
- Further sub-surface monitoring to delineate any potential migration of landfill gas.

Advice may need to be sought from consultants with suitable experience managing LFG. The response will be dependent on the issues faced.

5 Continuous Improvement Program

5.1 Environmental Performance Improvement

The LGMP will include a continuous improvement program to enhance environmental performance:

- Regular evaluation of new technologies for LFG capture and treatment.
- Assessment of operational practices to improve gas collection efficiency.
- Engagement with stakeholders to address any concerns and implement feedback.



6 Protocols for Managing Non-compliance

6.1 Non-compliance Management

In case of non-compliance with statutory requirements or performance criteria:

- Immediate notification will be sent to the EPA.
- A corrective action plan will be developed and implemented within the shortest possible timeframe.
- Follow-up monitoring will be conducted to ensure the effectiveness of the corrective actions.

WSC will also notify the Planning Secretary in writing via the Major Projects website within seven days after WSC becomes aware of any non-compliance.

The non-compliance notification will:

- identify the development and the application number;
- set out the condition of consent that the development is non-compliant with;
- the way in which it does not comply and the reasons for the non-compliance (if known); and
- what actions have been, or will be, undertaken to address the non-compliance.

A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

7 Plan Review Protocol

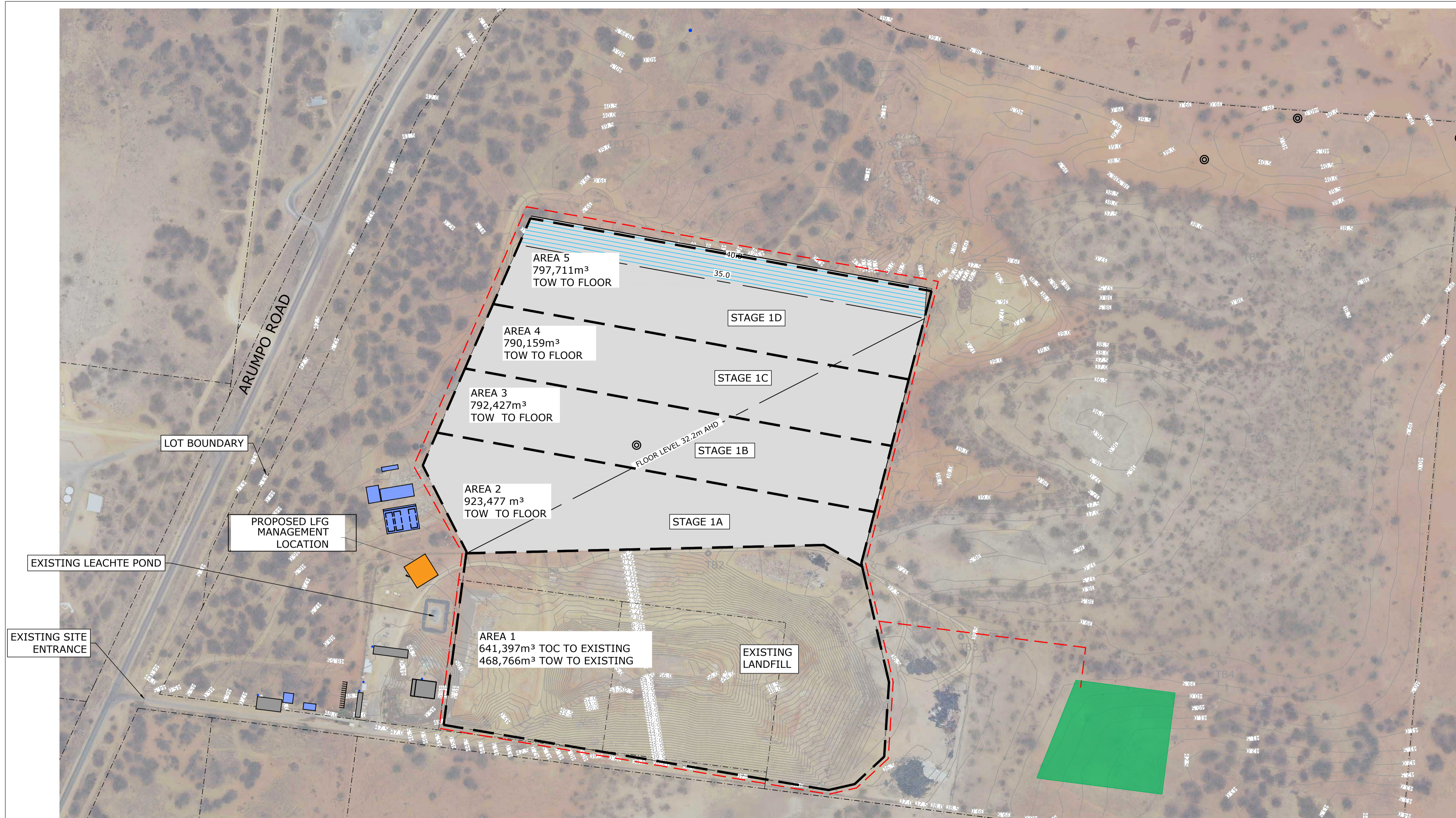
The LGMP will undergo a formal review every three years or following significant changes in site operations, regulatory requirements, or after any major incident. Any revisions will be submitted to the EPA for approval.



Appendix A – Figures



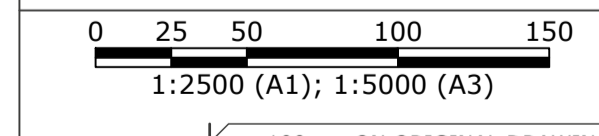
Figure 1: Stage 1 Proposed Cells Layout



LEGEND

- 40.0 EXISTING CONTOUR (0.5m INTERVAL)
- PROPOSED STAGE BOUNDARY
- PROPOSED CELL BOUNDARY
- PROPOSED STAGE 1 SERVICE ALIGNMENT
- PROPOSED STAGE 2 SERVICE ALIGNMENT
- 33.0 PROPOSED FLOOR CONTOURS
- PROPOSED LEACHATE POND
- ABORIGINAL ARTIFACT SITE
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)

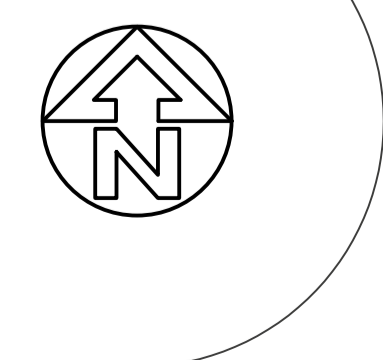
THIS DRAWING IS TO BE VIEWED IN COLOUR AS SOME FEATURES / SYMBOLS ARE DIFFERENTIATED BY COLOUR. DRAWING NOT TO BE RELIED ON IF PRINTED IN GREYSCALE.



SHEET SIZE
A1

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
C	FOR INFORMATION		IN	JDT
B	ISSUED FOR INFORMATION	10.8.22	IN	JDT
A	FOR INFORMATION	14.09.21		

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:2500
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
APPROVED / PROJECT LEADER
MEL SALT



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

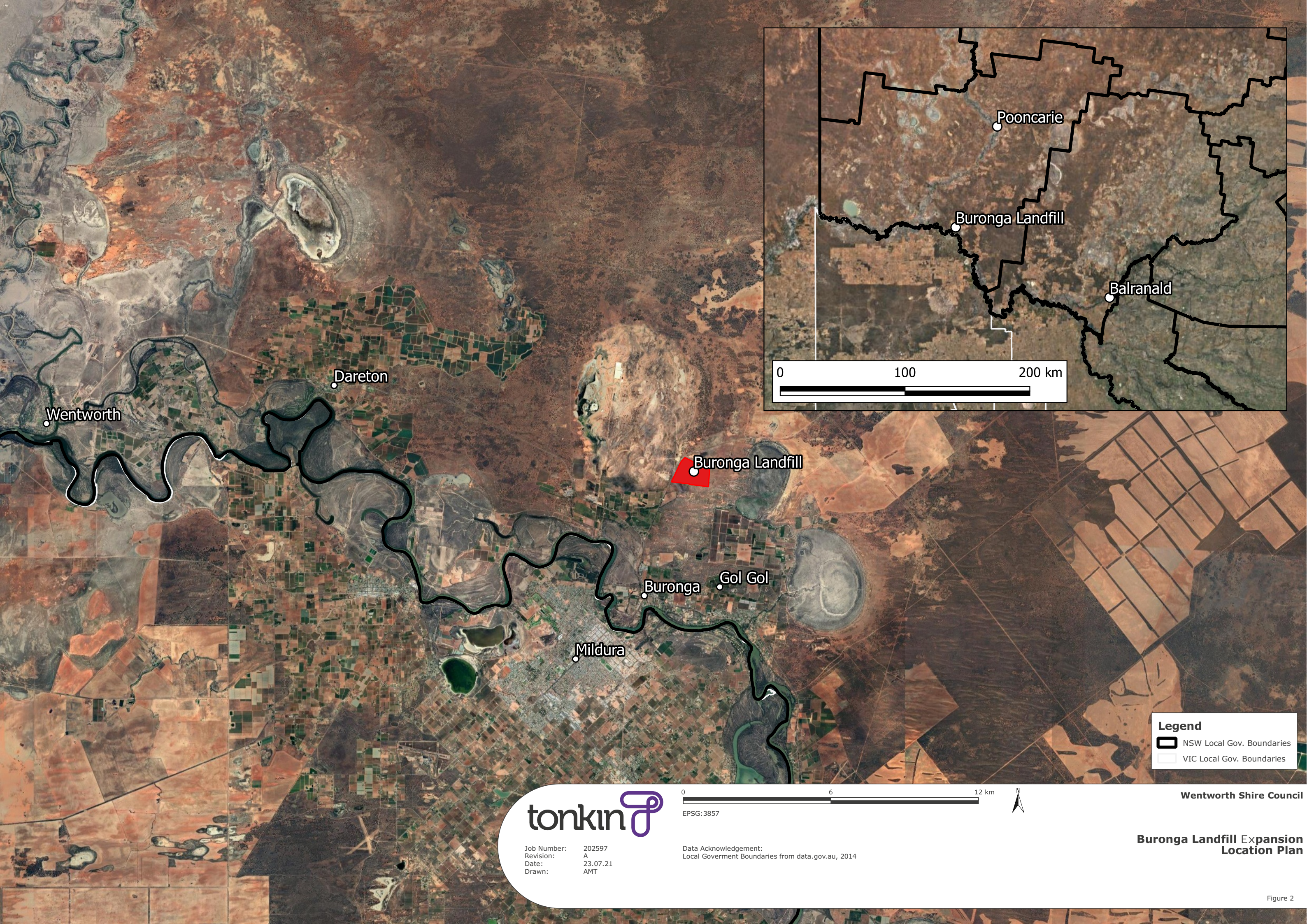
FIGURE 1

PROPOSED CELL LAYOUT

FILENAME: 202597 CONCEPT DESIGN.DWG	PROJECT NUMBER 202597	DRAWING NUMBER 01	REVISION C
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Figure 2: Regional Location Plan



Wentworth

Dareton

Buronga Landfill

Buronga

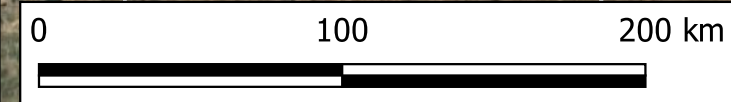
Gol Gol

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

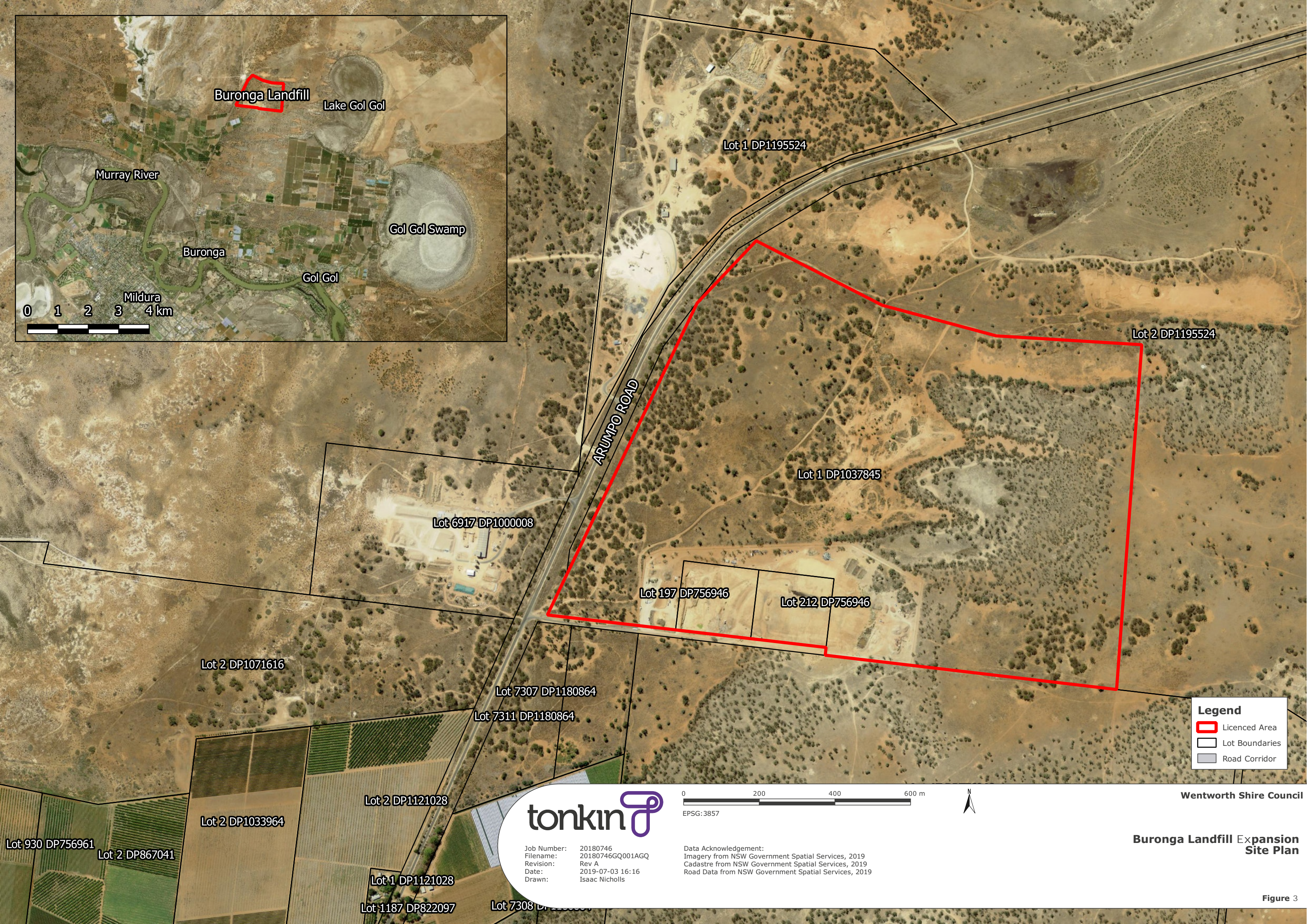
Data Acknowledgement:
 Local Government Boundaries from data.gov.au, 2014

Wentworth Shire Council

**Buronga Landfill Expansion
 Location Plan**



Figure 3: Site Location Plan



Buronga Landfill

Lake Gol Gol

Murray River

Gol Gol Swamp

Buronga

Gol Gol

0 1 2 3 4 km

Mildura

Lot 1 DP1195524

Lot 2 DP1195524

ARUMPO ROAD

Lot 1 DP1037845

Lot 6917 DP1000008

Lot 197 DP756946

Lot 212 DP756946

Lot 2 DP1071616

Lot 7307 DP1180864

Lot 7311 DP1180864

Lot 2 DP1121028

Lot 2 DP1033964

Lot 930 DP756961

Lot 2 DP867041

Lot 1 DP1121028

Lot 1187 DP822097

Lot 7308 DP1180864

Legend

- Licenced Area
- Lot Boundaries
- Road Corridor



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

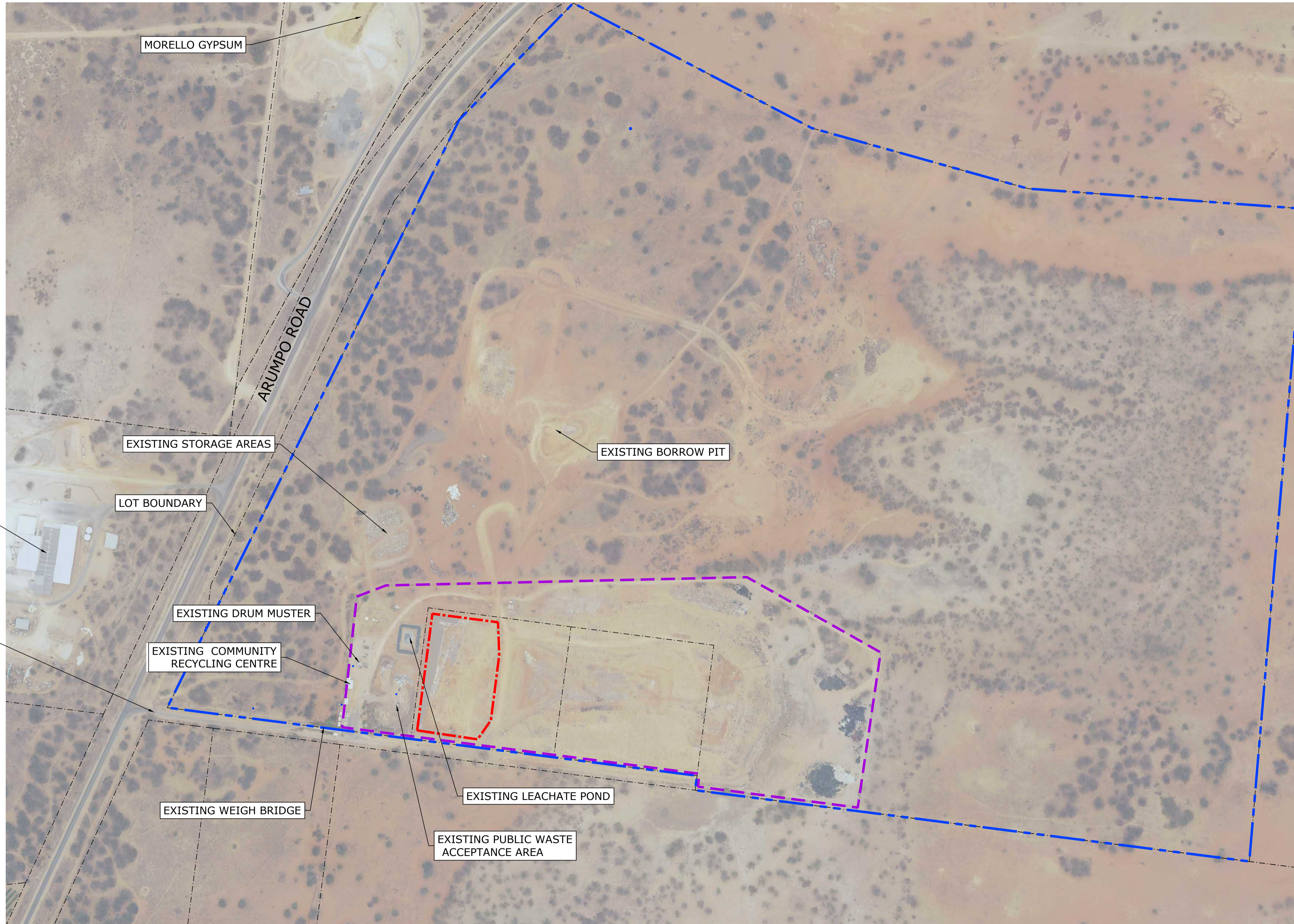


Wentworth Shire Council

Buronga Landfill Expansion Site Plan



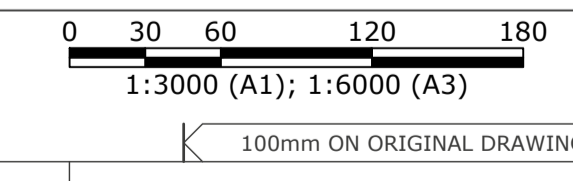
Figure 4: Current Layout



LEGEND

	LICENCED AREA
	LANDFILL FOOTPRINT
	ACTIVE CELL

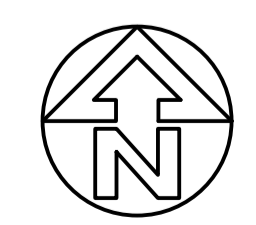
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SHEET SIZE
A1

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
B	ISSUED FOR APPROVAL	8.2.23	IN	JDT
A	ISSUED FOR INFORMATION	10.8.22	IN	JDT

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:3000
SURVEYED:PRICEMERRET
SURVEY DATE:03.03.21
APPROVED / PROJECT LEADER
MEL SALT



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BURONGA LANDFILL EXPANSION

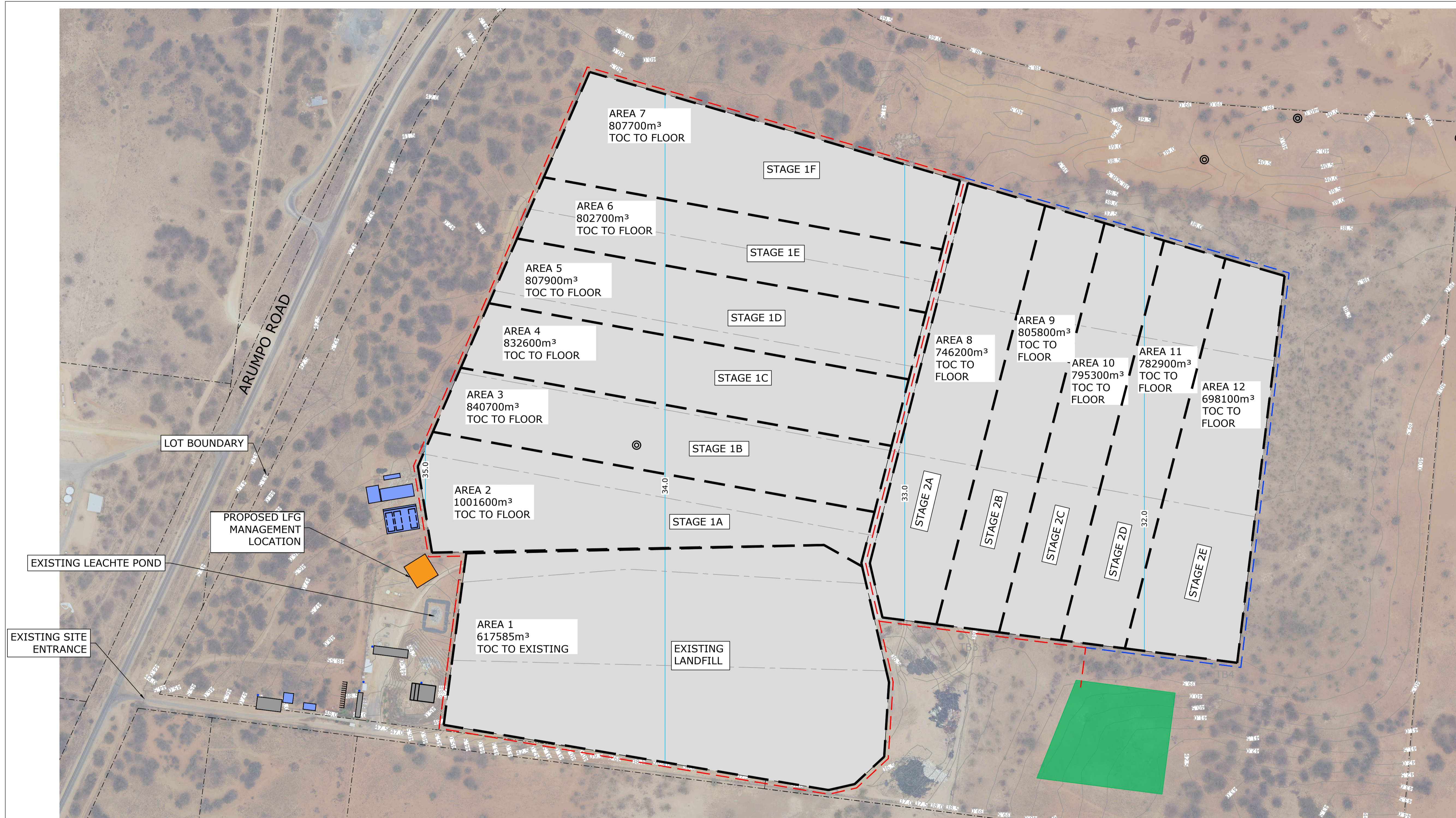
FIGURE 4

CURRENT SITE LAYOUT

FILENAME: 202597 CONCEPT DESIGN.DWG	PROJECT NUMBER 202597	DRAWING NUMBER 04	REVISION B
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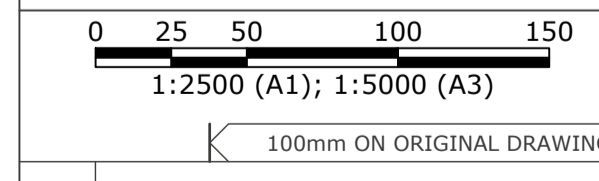
Figure 5: Proposed Layout



LEGEND

- 40.0 EXISTING CONTOUR (0.5m INTERVAL)
- PROPOSED STAGE BOUNDARY
- PROPOSED CELL BOUNDARY
- PROPOSED STAGE 1 SERVICE ALIGNMENT
- PROPOSED STAGE 2 SERVICE ALIGNMENT
- 33.0 PROPOSED FLOOR CONTOURS
- PROPOSED LEACHATE POND
- ABORIGINAL ARTIFACT SITE
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)

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

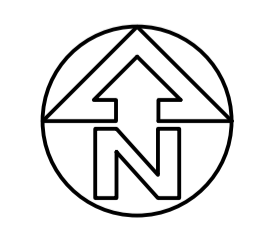
SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.

SCALE: 1:2500

SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21

APPROVED / PROJECT LEADER



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BURONGA LANDFILL EXPANSION

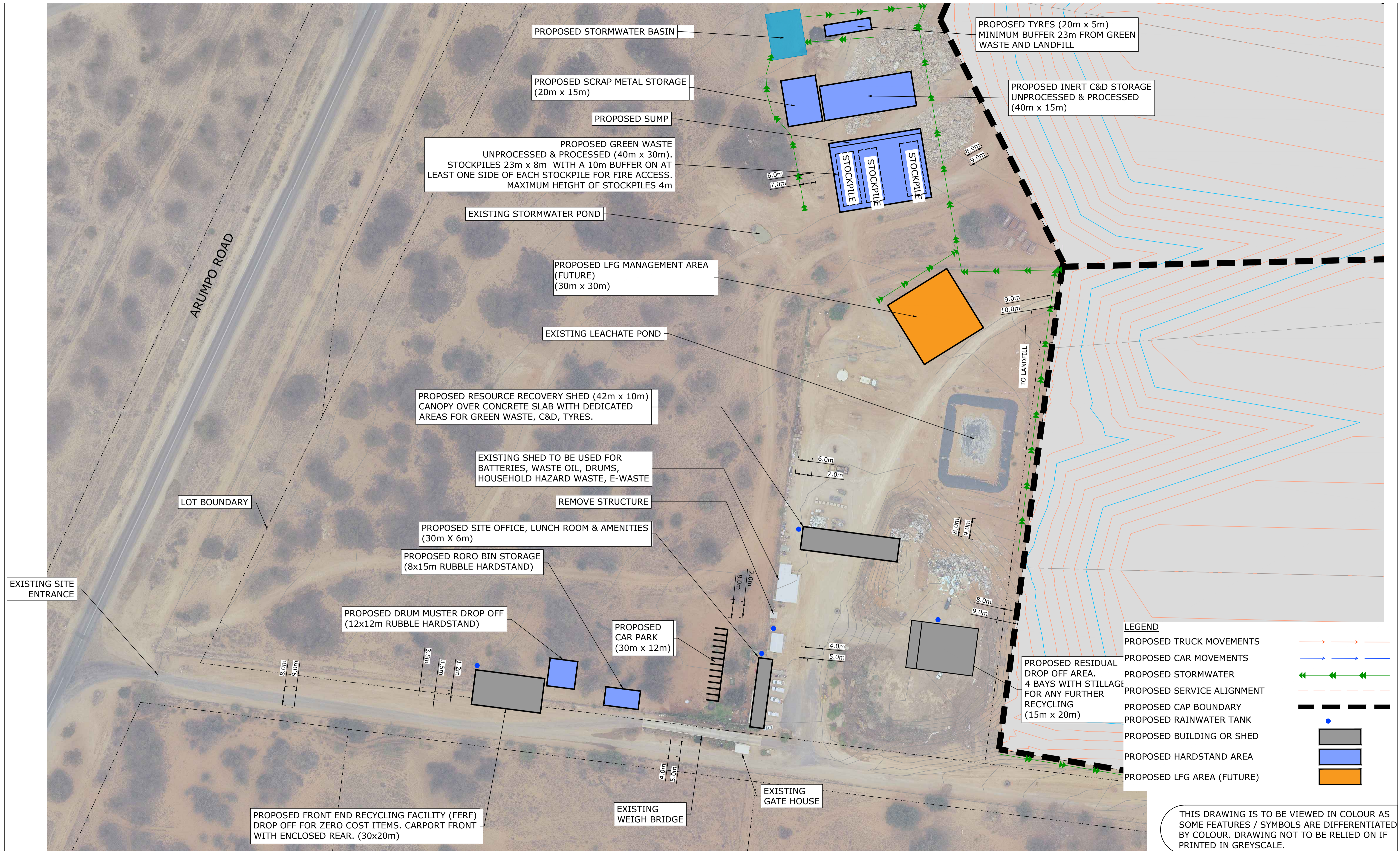
FIGURE 5

PROPOSED CELL LAYOUT

FILENAME: 202597 CONCEPT DESIGN.DWG	PROJECT NUMBER 202597	DRAWING NUMBER 05	REVISION B
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Figure 6: Proposed Concept Design of Upgraded Recycling & Resource Recovery Areas



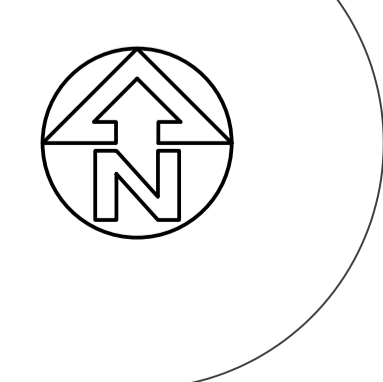
0 7.5 15 30 45
1:750 (A1); 1:1500 (A3)

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
C	ISSUED FOR APPROVAL	8.2.23	IN	JDT
B	ISSUED FOR INFORMATION	10.8.22		
A	FOR INFORMATION	14.09.21		

SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:750

SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
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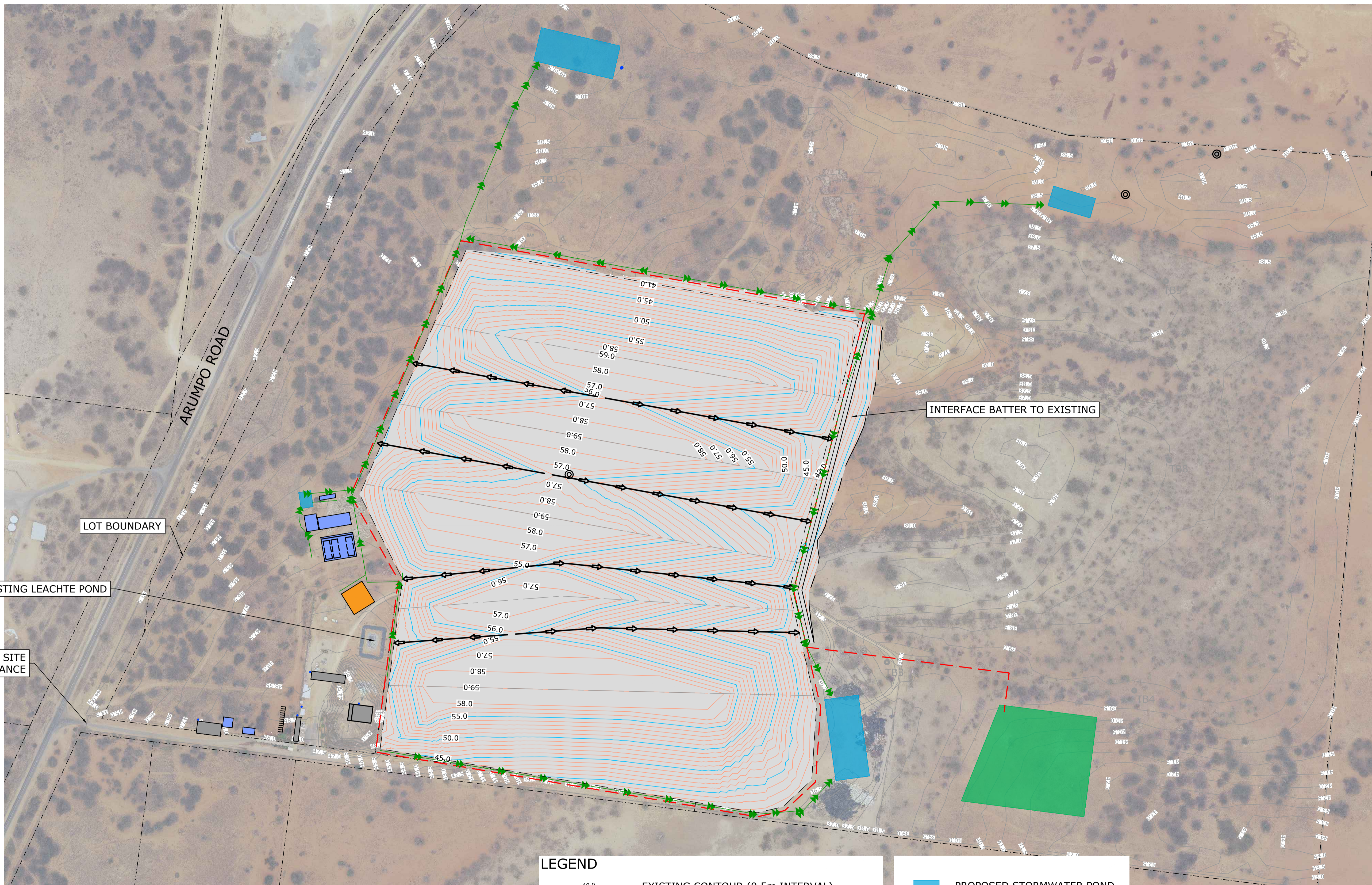
NOT FOR CONSTRUCTION

WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 6 - CONCEPT DESIGN OF UPGRADED RECYCLING & RESOURCE RECOVERY AREAS

FILENAME: 202597 CONCEPT DESIGN.DWG PROJECT NUMBER: 202597 DRAWING NUMBER: 06 REVISION: C



Figure 7: Stormwater Management Stage 1

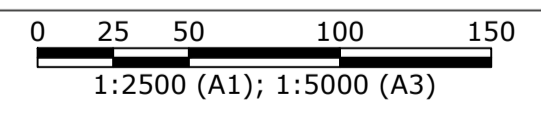


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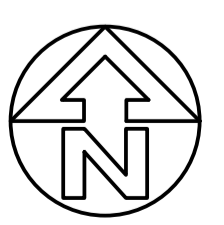
- 40.0 EXISTING CONTOUR (0.5m INTERVAL)
- 51.0 DESIGN CONTOUR MAJ (5.0m INTERVAL)
- 50.1 DESIGN CONTOUR MIN (1.0m INTERVAL)
- PROPOSED STAGE BOUNDARY
- PROPOSED CAP CROWN
- PROPOSED CAP DRAIN
- PROPOSED STORMWATER DRAIN
- PROPOSED STAGE 1 SERVICE ALIGNMENT

- PROPOSED STORMWATER POND
- PROPOSED LEACHATE POND
- ABORIGINAL ARTIFACT SITE
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)

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SHEET SIZE
A1



COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:2500
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
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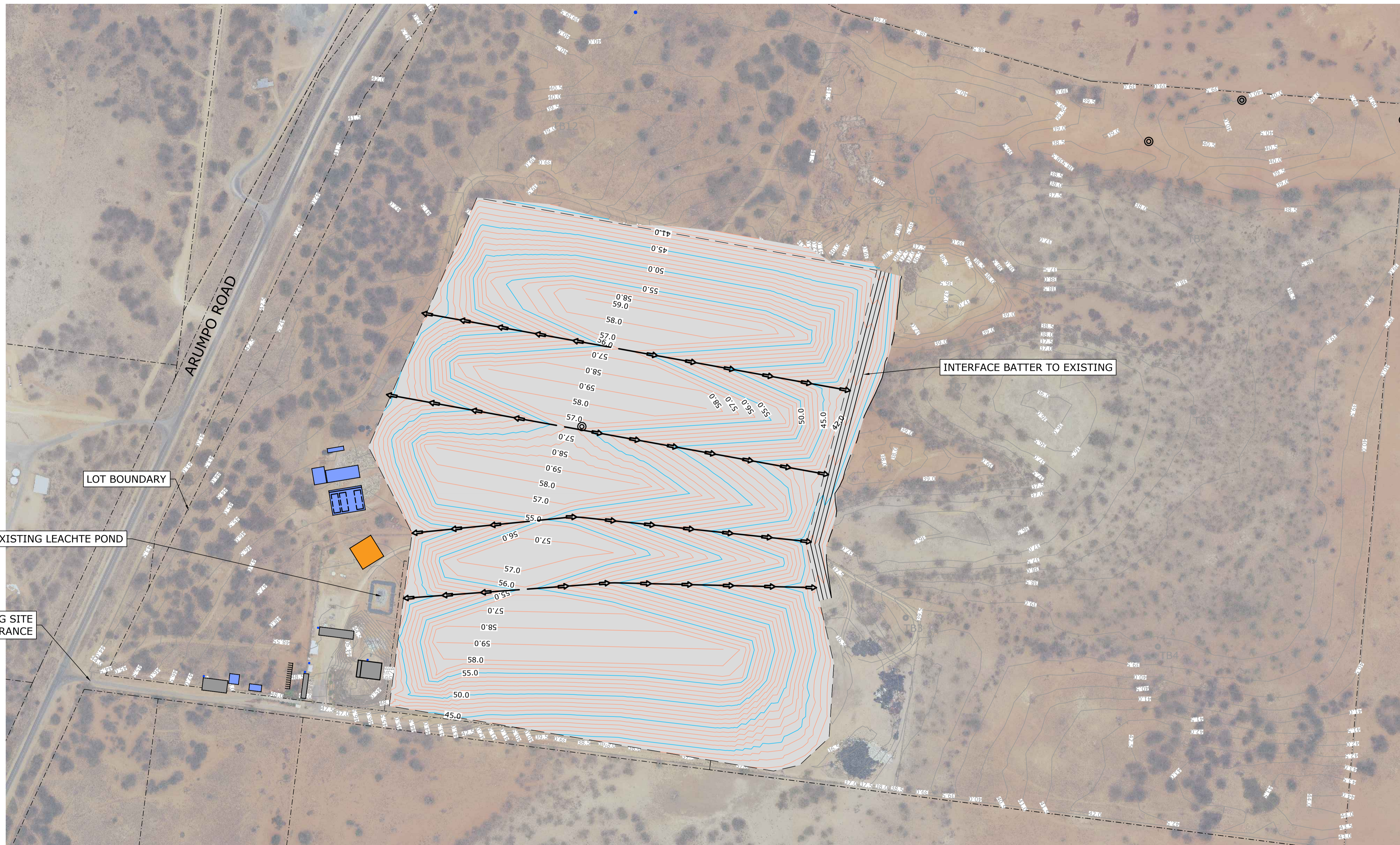
NOT FOR CONSTRUCTION
WENTWORTH SHIRE COUNCIL BURONGA
LANDFILL EXPANSION FIGURE 7
STORMWATER/ EROSION AND SEDIMENT
CONTROL STAGE 1

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
C	ISSUED FOR APPROVAL	8.2.23	IN	JDT
B	ISSUED FOR INFORMATION	10.8.22		
A	FOR INFORMATION	14.09.21		

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	07	C



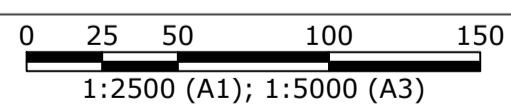
Figure 8: Proposed Top of Cap Contours



LEGEND

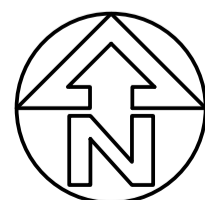
- 40.0 EXISTING CONTOUR (0.5m INTERVAL)
- 51.0 DESIGN CONTOUR MAJ (5.0m INTERVAL)
- 50.1 DESIGN CONTOUR MIN (1.0m INTERVAL)
- PROPOSED STAGE BOUNDARY
- PROPOSED CAP DRAIN
- ABORIGINAL ARTIFACT SITE
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)

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SHEET SIZE
A1

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:2500
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
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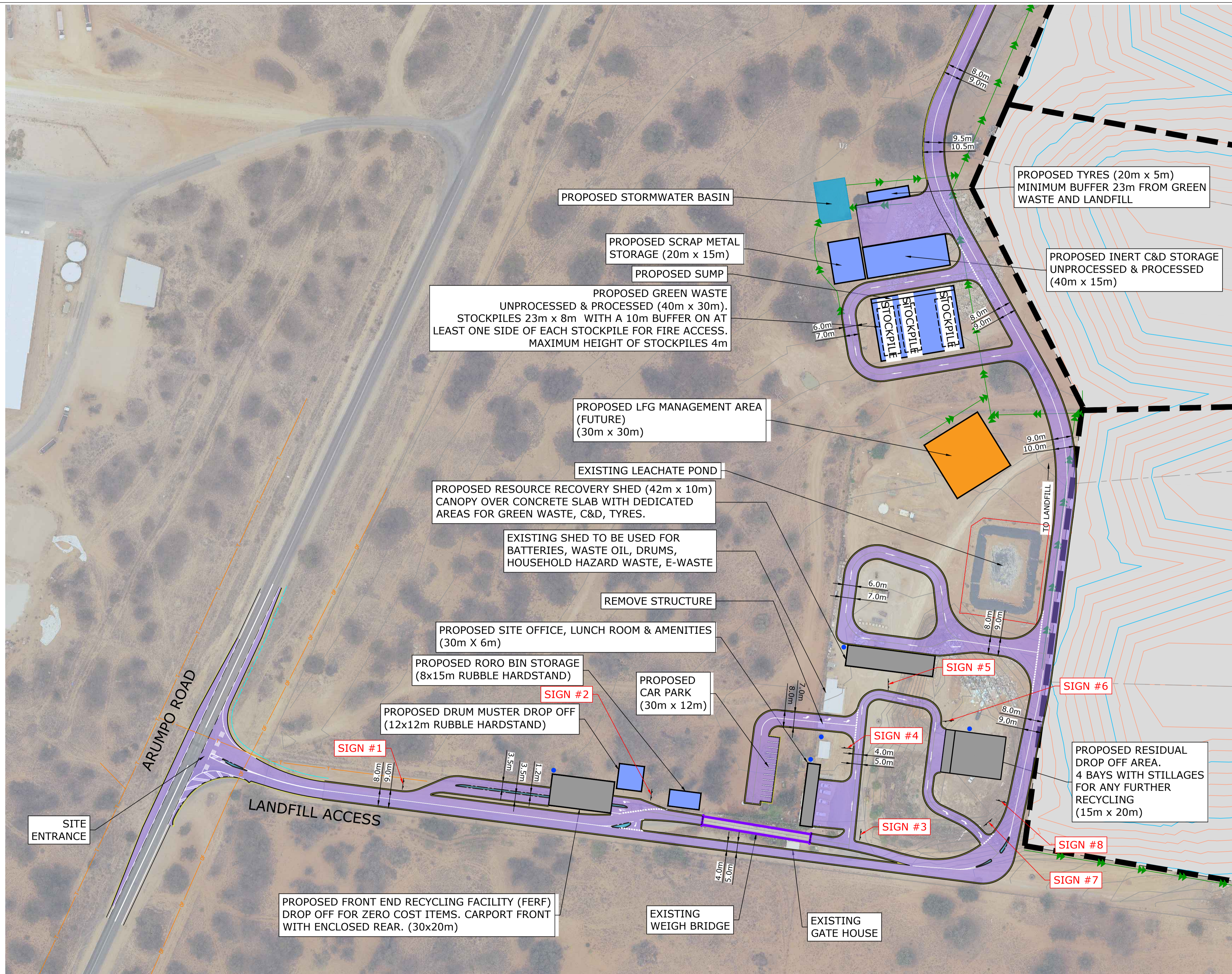
WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 8
PROPOSED TOP OF CAP CONTOURS

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
C	ISSUED FOR APPROVAL	8.2.23	IN	JDT
B	ISSUED FOR INFORMATION	10.8.22		
A	FOR INFORMATION	14.09.21		

FILENAME: 202597 CONCEPT DESIGN.DWG	PROJECT NUMBER 202597	DRAWING NUMBER 08	REVISION C
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Figure 9 to 12: Proposed Recycling Area Traffic Control and Signage



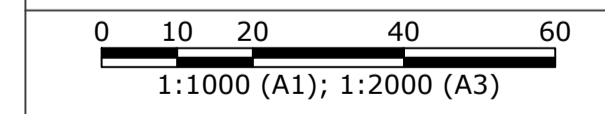
SIGNAGE LEGEND

- SIGN #1 GENERAL / GREEN WASTE / CONSTRUCTION / COMMERCIAL
- SIGN #2 GENERAL / GREEN WASTE / CONSTRUCTION / COMMERCIAL
 EXIT
- SIGN #3 PUBLIC DROP-OFF
 AUTHORISED VEHICLES ONLY
- SIGN #4 STAFF ONLY
 PAINT, GAS CYLINDERS, OIL
 GENERAL / GREEN WASTE / CONSTRUCTION / EXIT
- SIGN #5 GREEN WASTE / MASONARY / TYRES / E-WASTE
 DOMESTIC WASTE / EXIT
- SIGN #6 DOMESTIC WASTE
 EXIT
- SIGN #7 NO LEFT TURN
 EXIT
- SIGN #8 AUTHORISED VEHICLES ONLY
 NO PUBLIC ACCESS

LEGEND

- PROPOSED STORMWATER
- PROPOSED SERVICE ALIGNMENT
- PROPOSED CAP BOUNDARY
- PROPOSED RAINWATER TANK
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)
- NEW PAVEMENT RECONSTRUCTION
- NEW UNSEALED SHOULDER
- CONCRETE INFILL
- SAWCUT
- MOUNTABLE KERB
- HL1 300mm WIDE HOLDING LINE
- HL2 150mm WIDE HOLDING LINE
- CL 100mm WIDE CONTINUITY LINE
- OL 150mm WIDE OUT LINE
- DBL 100mm WIDE DOUBLE BARRIER LINE
- EL 150mm WIDE EDGE LINE

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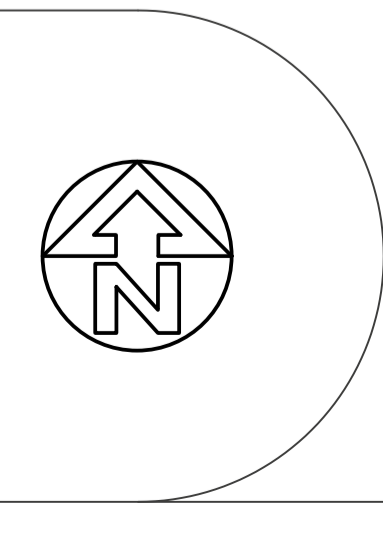
REV	DESCRIPTION	DATE	DES.	DWN.
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A	FOR INFORMATION	10.10.22	TG	TG
	AMENDMENT / REASON FOR ISSUE			

SHEET SIZE
A1

COORDS: MGA94 ZONE 54
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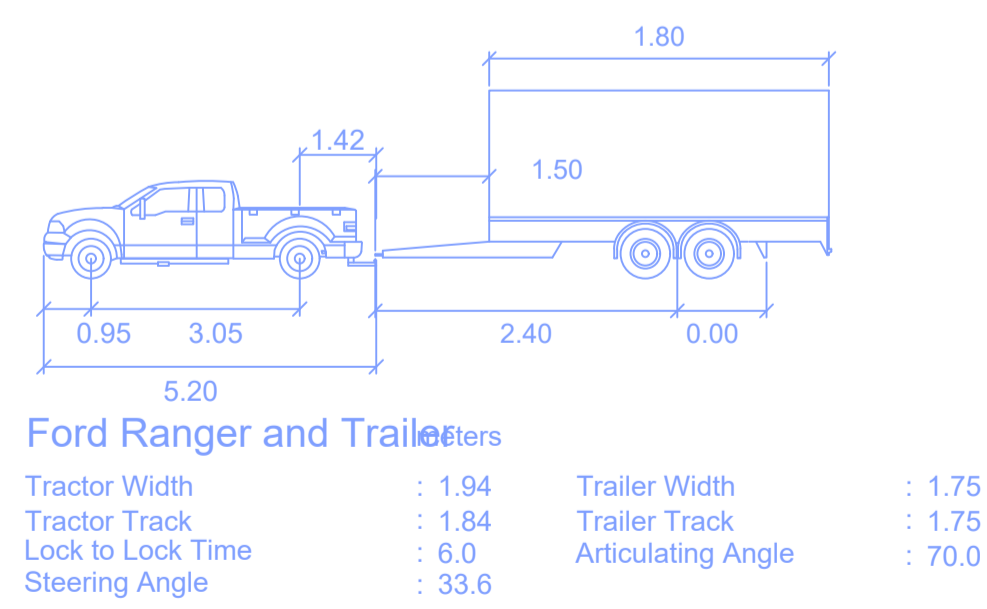
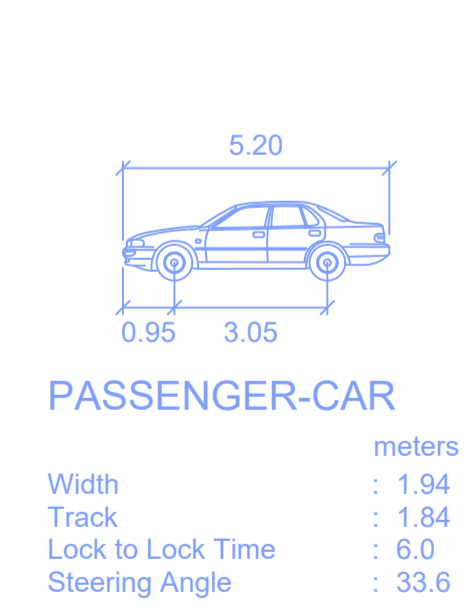
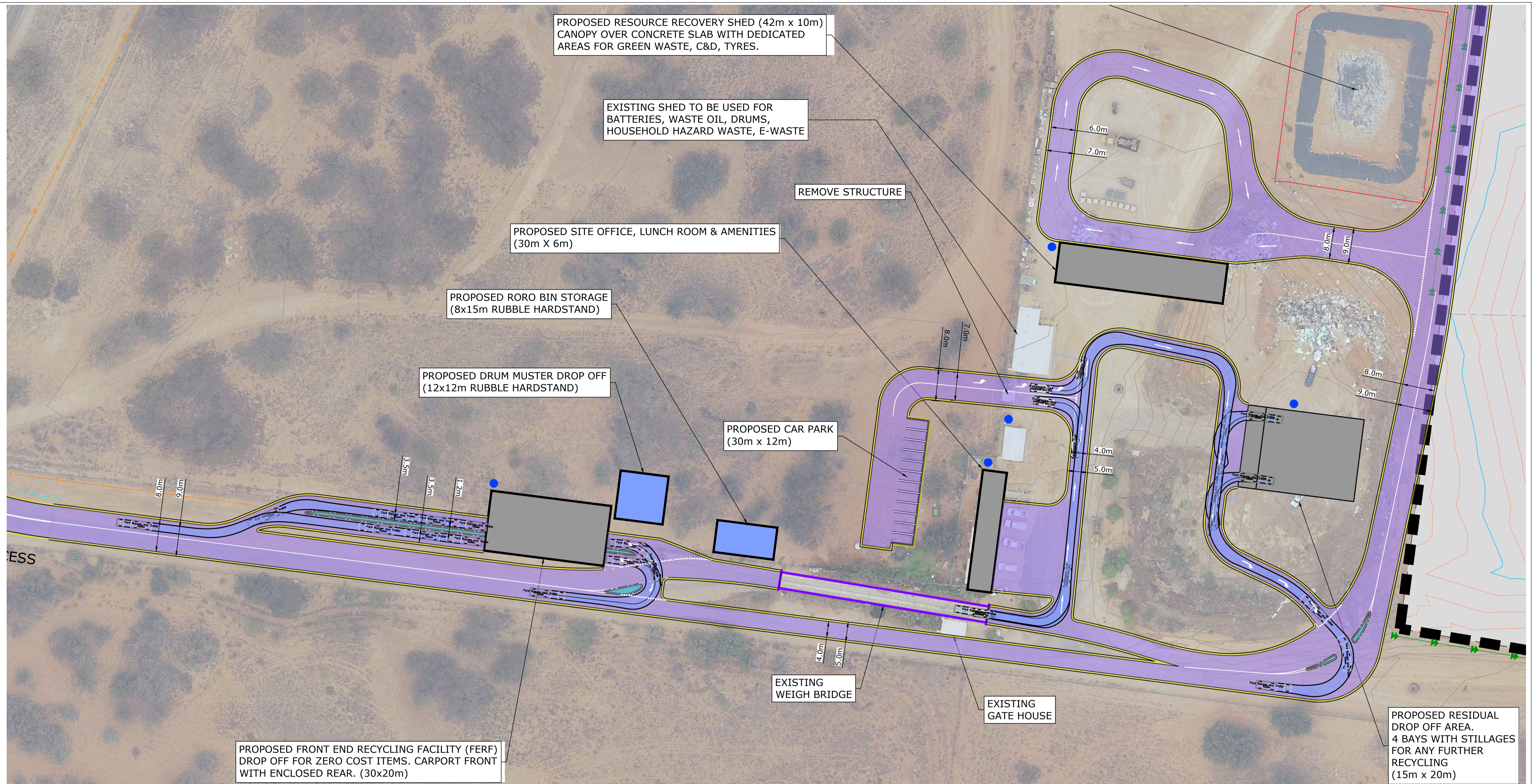


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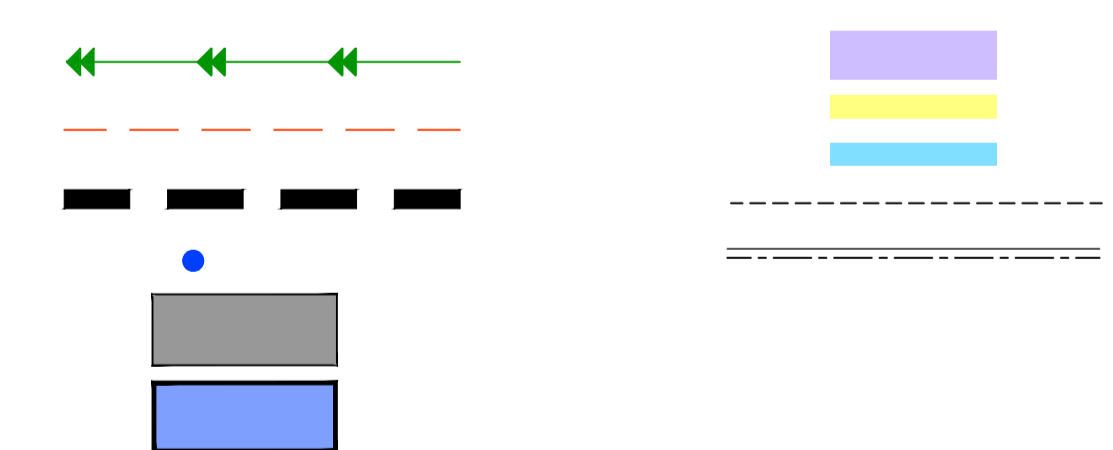
BURONGA LANDFILL EXPANSION
FIGURE 9 - CONCEPT DESIGN OF UPGRADED FRONT END ACCESS ROADS

FILENAME: 202597 CONCEPT DESIGN.DWG PROJECT NUMBER: 202597 DRAWING NUMBER: 9 REVISION: B



LEGEND

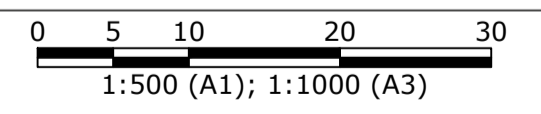
- PROPOSED STORMWATER
- PROPOSED SERVICE ALIGNMENT
- PROPOSED CAP BOUNDARY
- PROPOSED RAINWATER TANK
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA



- NEW PAVEMENT RECONSTRUCTION
- NEW UNSEALED SHOULDER
- CONCRETE INFILL
- SAWCUT
- MOUNTABLE KERB

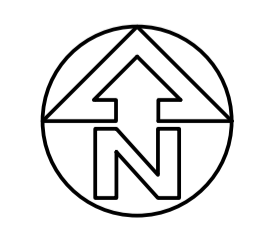
- HL1 300mm WIDE HOLDING LINE
- HL2 150mm WIDE HOLDING LINE
- CL 100mm WIDE CONTINUITY LINE
- OL 150mm WIDE OUT LINE
- DBL 100mm WIDE DOUBLE BARRIER LINE
- EL 150mm WIDE EDGE LINE

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SHEET SIZE
A1

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SCALE: 1:500			
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SURVEY DATE: 03.03.21			
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MEL SALT			
REV	ISSUED FOR APPROVAL	DATE	DES. DWN.
B	ISSUED FOR APPROVAL	8.2.23	IN JDT
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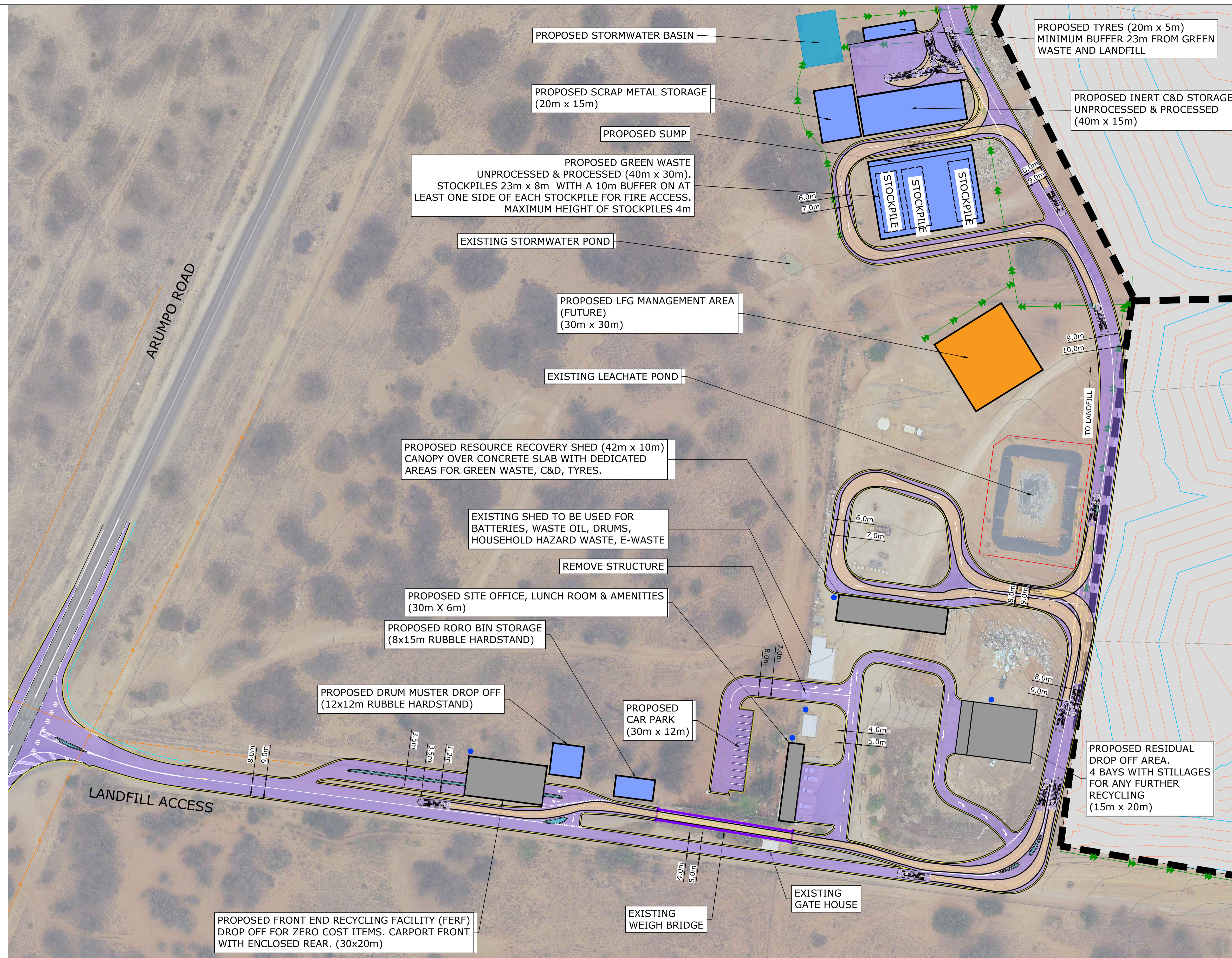
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WENTWORTH SHIRE COUNCIL

BURONGA LANDFILL EXPANSION

FIGURE 10: TURN PATHS FOR LIGHT VEHICLE ACCESS

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	10	B



PROPOSED TYRES (20m x 5m)
MINIMUM BUFFER 23m FROM GREEN WASTE AND LANDFILL

PROPOSED INERT C&D STORAGE
UNPROCESSED & PROCESSED
(40m x 15m)

PROPOSED GREEN WASTE
UNPROCESSED & PROCESSED (40m x 30m).
STOCKPILES 23m x 8m WITH A 10m BUFFER ON AT
LEAST ONE SIDE OF EACH STOCKPILE FOR FIRE ACCESS.
MAXIMUM HEIGHT OF STOCKPILES 4m

EXISTING STORMWATER POND

PROPOSED LFG MANAGEMENT AREA
(FUTURE)
(30m x 30m)

EXISTING LEACHATE POND

PROPOSED RESOURCE RECOVERY SHED (42m x 10m)
CANOPY OVER CONCRETE SLAB WITH DEDICATED
AREAS FOR GREEN WASTE, C&D, TYRES.

EXISTING SHED TO BE USED FOR
BATTERIES, WASTE OIL, DRUMS,
HOUSEHOLD HAZARD WASTE, E-WASTE

REMOVE STRUCTURE

PROPOSED SITE OFFICE, LUNCH ROOM & AMENITIES
(30m X 6m)

PROPOSED RORO BIN STORAGE
(8x15m RUBBLE HARDSTAND)

PROPOSED DRUM MUSTER DROP OFF
(12x12m RUBBLE HARDSTAND)

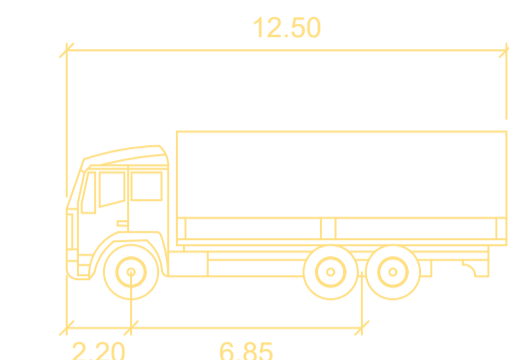
PROPOSED CAR PARK
(30m x 12m)

PROPOSED RESIDUAL
DROP OFF AREA.
4 BAYS WITH STILLAGES
FOR ANY FURTHER
RECYCLING
(15m x 20m)

PROPOSED FRONT END RECYCLING FACILITY (FERF)
DROP OFF FOR ZERO COST ITEMS. CARPORT FRONT
WITH ENCLOSED REAR. (30x20m)

EXISTING
WEIGH BRIDGE

EXISTING
GATE HOUSE

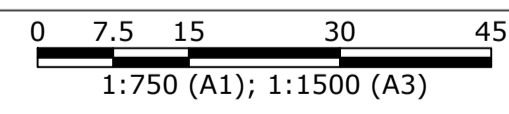


SU TRUCK

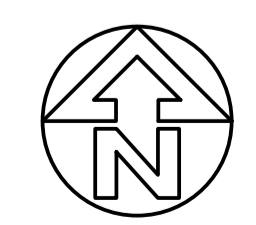
	metres
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

LEGEND

- PROPOSED STORMWATER
 - PROPOSED SERVICE ALIGNMENT
 - PROPOSED CAP BOUNDARY
 - PROPOSED RAINWATER TANK
 - PROPOSED BUILDING OR SHED
 - PROPOSED HARDSTAND AREA
 - PROPOSED LFG AREA (FUTURE)
-
- NEW PAVEMENT RECONSTRUCTION
 - NEW UNSEALED SHOULDER
 - CONCRETE INFILL
 - SAWCUT
 - MOUNTABLE KERB
-
- HL1 300mm WIDE HOLDING LINE
 - HL2 150mm WIDE HOLDING LINE
 - CL 100mm WIDE CONTINUITY LINE
 - OL 150mm WIDE OUT LINE
 - DBL 100mm WIDE DOUBLE BARRIER LINE
 - EL 150mm WIDE EDGE LINE



SHEET SIZE
A1



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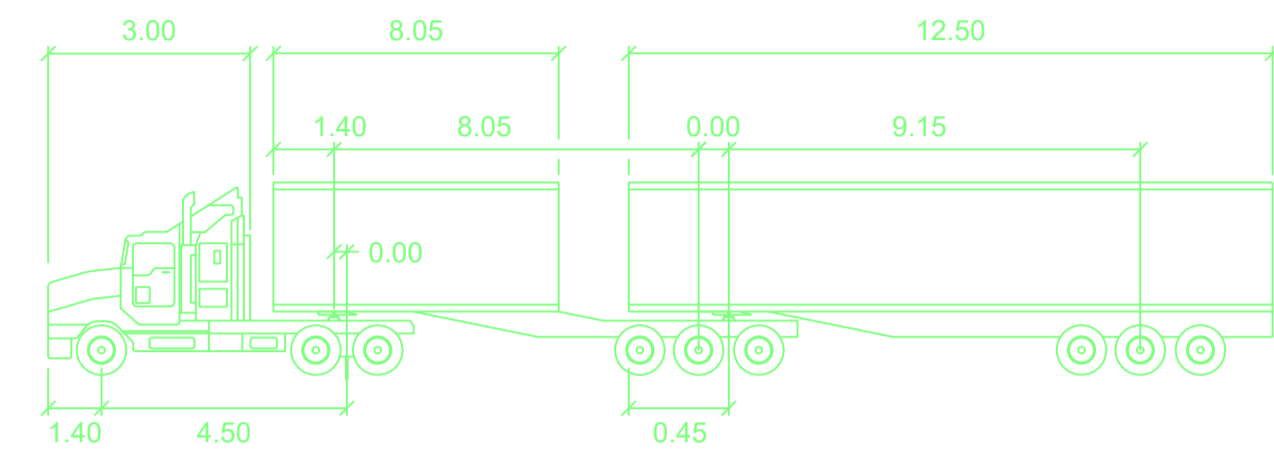
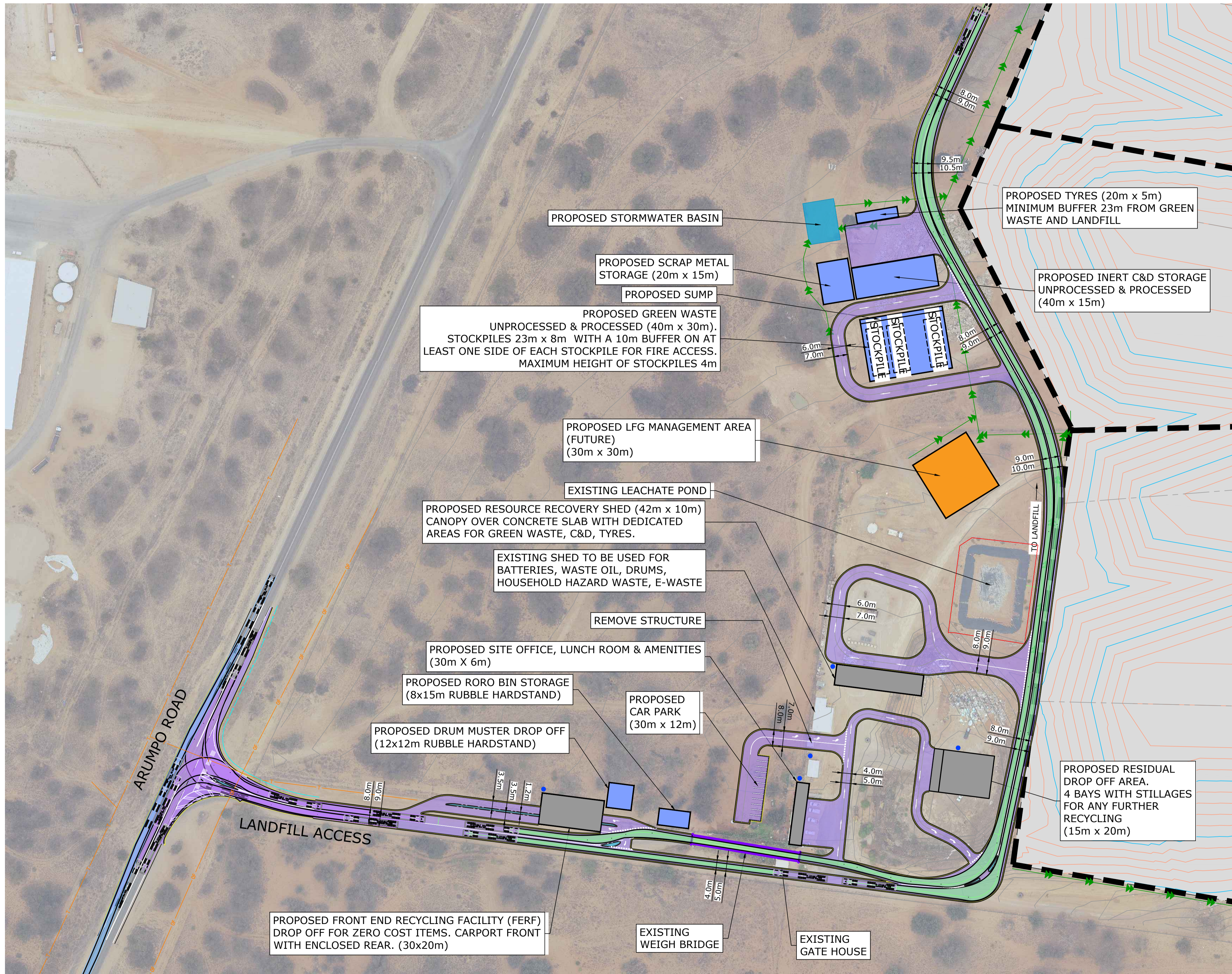


NOT FOR CONSTRUCTION
WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 11: TURN PATHS FOR
HEAVY RIGID VEHICLE ACCESS

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
B	ISSUED FOR APPROVAL	8.2.23	IN	JD
A	FOR INFORMATION	10.8.22	TG	TG

COORDS: MGA94 ZONE 54
DATUM: ALL LEVELS TO A.H.D.
SCALE: 1:750
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
APPROVED / PROJECT LEADER
MEL SALT

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	11	B



B-DOUBLE 26M

	Tractor Width	Trailer Width	Tractor Track	Trailer Track	Lock to Lock Time	Steering Angle	Articulating Angle
Tractor Width	: 2.50				: 6.0		
Trailer Width		: 2.50				: 23.4	
Tractor Track	: 2.50						: 70.0
Trailer Track		: 2.50					

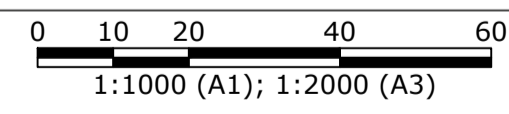
LEGEND

- PROPOSED STORMWATER
- PROPOSED SERVICE ALIGNMENT
- PROPOSED CAP BOUNDARY
- PROPOSED RAINWATER TANK
- PROPOSED BUILDING OR SHED
- PROPOSED HARDSTAND AREA
- PROPOSED LFG AREA (FUTURE)

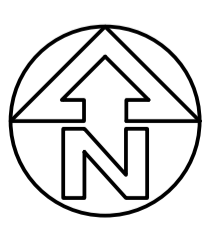
- NEW PAVEMENT RECONSTRUCTION
- NEW UNSEALED SHOULDER
- CONCRETE INFILL
- SAWCUT
- MOUNTABLE KERB

- HL1 300mm WIDE HOLDING LINE
- HL2 150mm WIDE HOLDING LINE
- CL 100mm WIDE CONTINUITY LINE
- OL 150mm WIDE OUT LINE
- DBL 100mm WIDE DOUBLE BARRIER LINE
- EL 150mm WIDE EDGE LINE

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.



SHEET SIZE
A1



PUBLIC UTILITIES:
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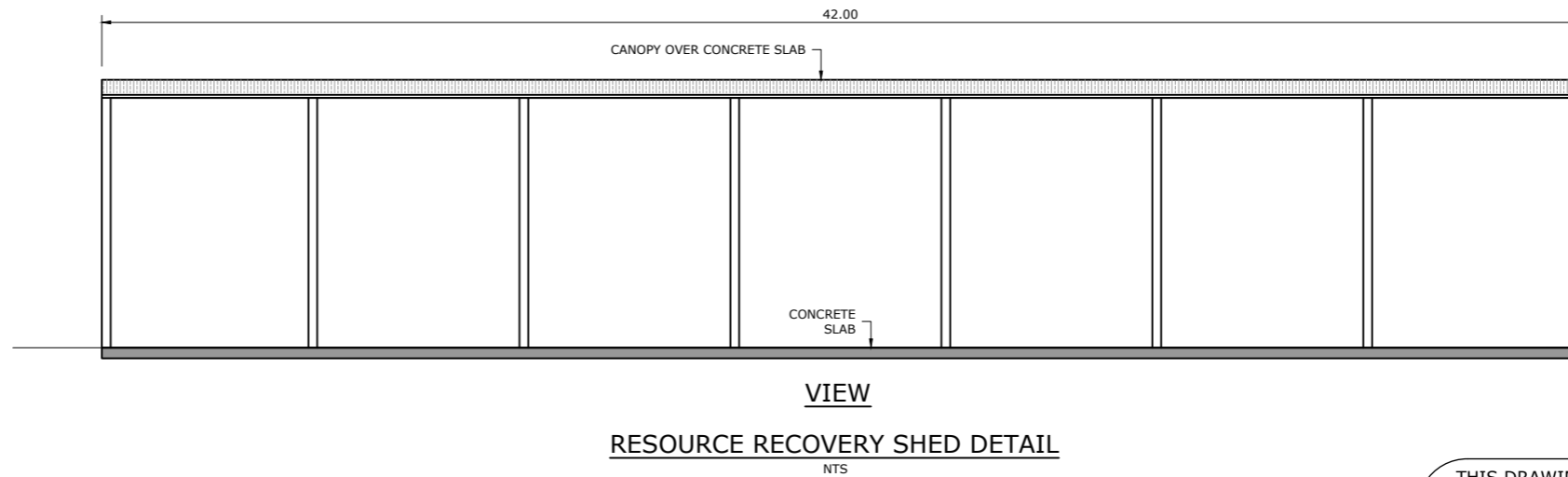
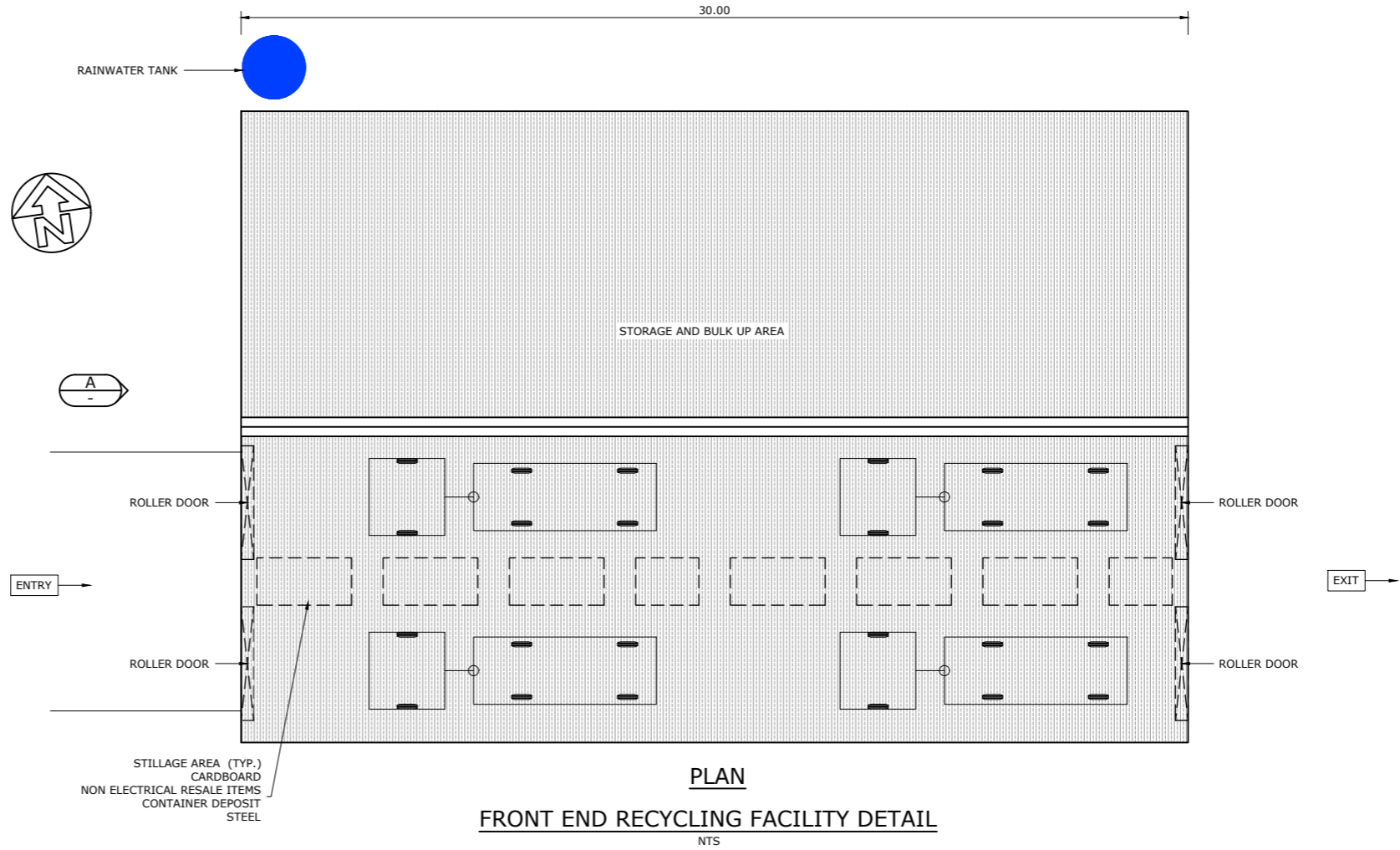
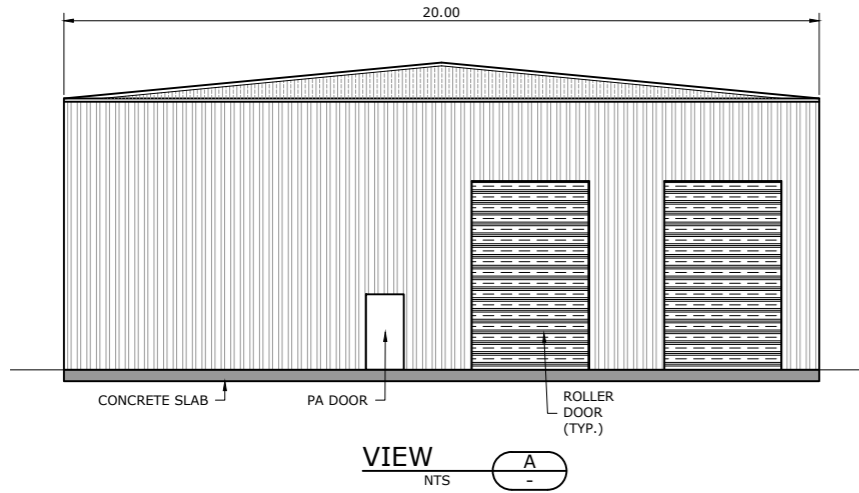
NOT FOR CONSTRUCTION
WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
TURN PATHS FOR
B-DOUBLE ACCESS

REV	DESCRIPTION	DATE	TG	TG	APPROVED / PROJECT LEADER
B	ISSUED FOR APPROVAL	8.2.23	IN	JDT	MEL SALT
A	FOR INFORMATION	10.8.22	TG	TG	
	AMENDMENT / REASON FOR ISSUE				

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	12	B

NOTE:

FERF SHED TO BE COLOURBOND STEEL WITH DULL FINISH IN GREEN OR GREY



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NOT FOR CONSTRUCTION

WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 13
FERF & RESOURCE RECOVERY SHED DETAILS



FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	13	

PUBLIC UTILITIES:
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100mm ON ORIGINAL DRAWING - DO NOT SCALE DRAWING				SHEET SIZE A1		
REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.	COORDS:	
					DATUM:	
					SCALE:	NTS
					SURVEYED:	
					SURVEY DATE:	
					APPROVED / PROJECT LEADER	




Figure 13: FERF & RESOURCE RECOVERY SHED DETAILS




Legend

- Standing Water Level Contours —
- Groundwater Wells




Job Number: 202597
 Filename: 202597GQ001Rev0
 Revision: Rev 0
 Date: 2023-05-31
 Drawn: IPN

0 40 80 120 160 m



N



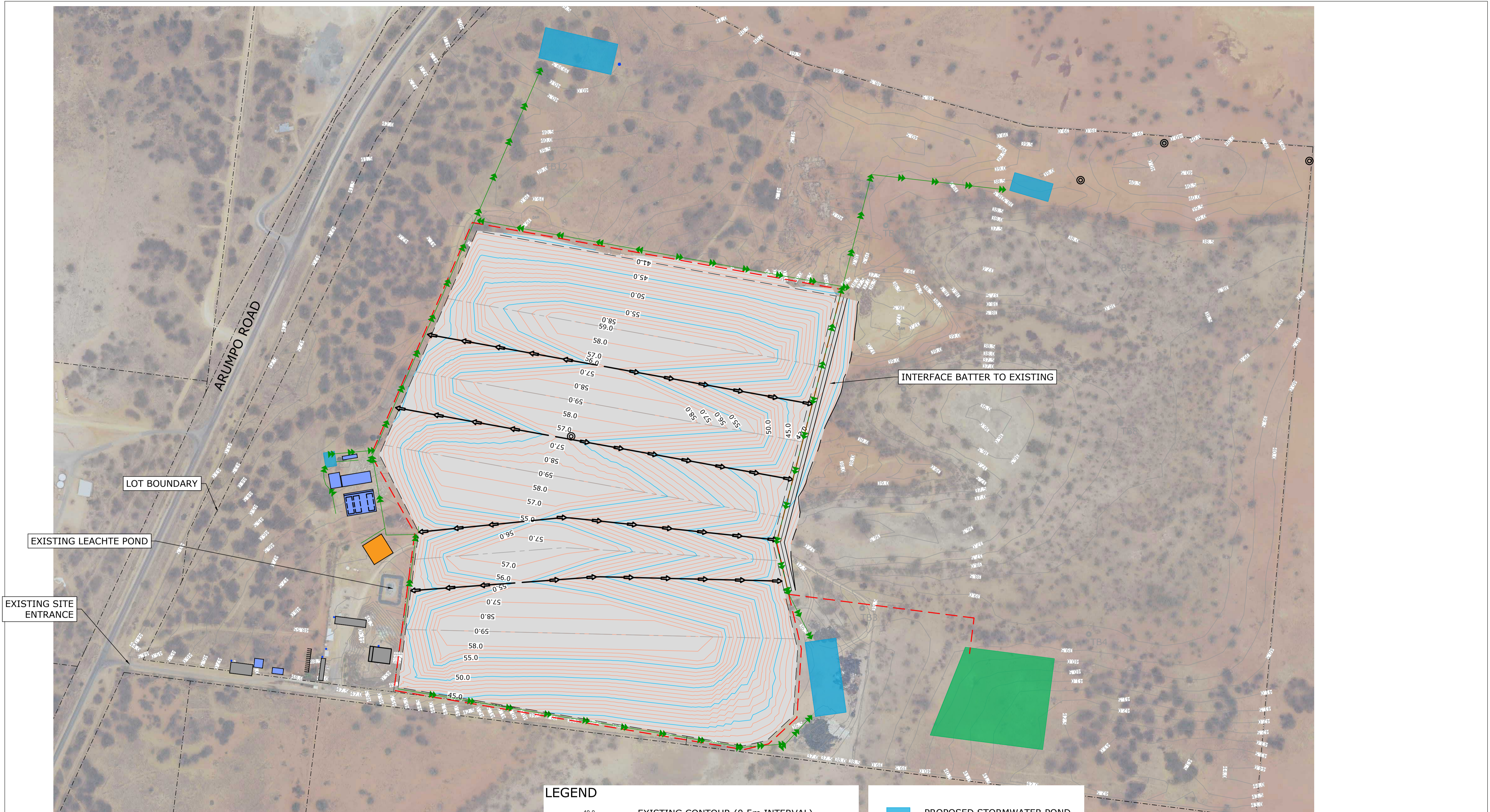
Wentworth Shire Council

**Buronga Landfill Expansion Detailed Design
 Stage 2 Geotechnical Investigation
 Standing Water Level Plan**

Figure 14



Figure 14: Monitoring Wells and Standing Water Level Plan



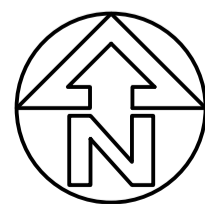
- LEGEND**
- 40.0 — EXISTING CONTOUR (0.5m INTERVAL)
 - 51.0 — DESIGN CONTOUR MAJ (5.0m INTERVAL)
 - 50.1 — DESIGN CONTOUR MIN (1.0m INTERVAL)
 - - - - - PROPOSED STAGE BOUNDARY
 - — — — — PROPOSED CAP CROWN
 - — — — — PROPOSED CAP DRAIN
 - — — — — PROPOSED STORMWATER DRAIN
 - - - - - PROPOSED STAGE 1 SERVICE ALIGNMENT
 - PROPOSED STORMWATER POND
 - PROPOSED LEACHATE POND
 - ⊙ ABORIGINAL ARTIFACT SITE
 - PROPOSED BUILDING OR SHED
 - PROPOSED HARDSTAND AREA
 - PROPOSED LFG AREA (FUTURE)

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: 1:2500
SURVEYED: PRICEMERRET
SURVEY DATE: 03.03.21
APPROVED / PROJECT LEADER
MEL SALT



PUBLIC UTILITIES:
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NOT FOR CONSTRUCTION



WENTWORTH SHIRE COUNCIL
BURONGA LANDFILL EXPANSION
FIGURE 15
STORMWATER MANAGEMENT STAGE 1

REV	AMENDMENT / REASON FOR ISSUE	DATE	DES.	DWN.
C	FOR INFORMATION		IN	JDT
B	ISSUED FOR INFORMATION	10.8.22	IN	JDT
A	FOR INFORMATION	14.09.21		

FILENAME:	PROJECT NUMBER	DRAWING NUMBER	REVISION
202597 CONCEPT DESIGN.DWG	202597	15	C



Figure 15: Final Landform

Buronga Landfill Expansion

Amendment Report

Appendix F – LFG Typical Details

Wentworth Shire Council

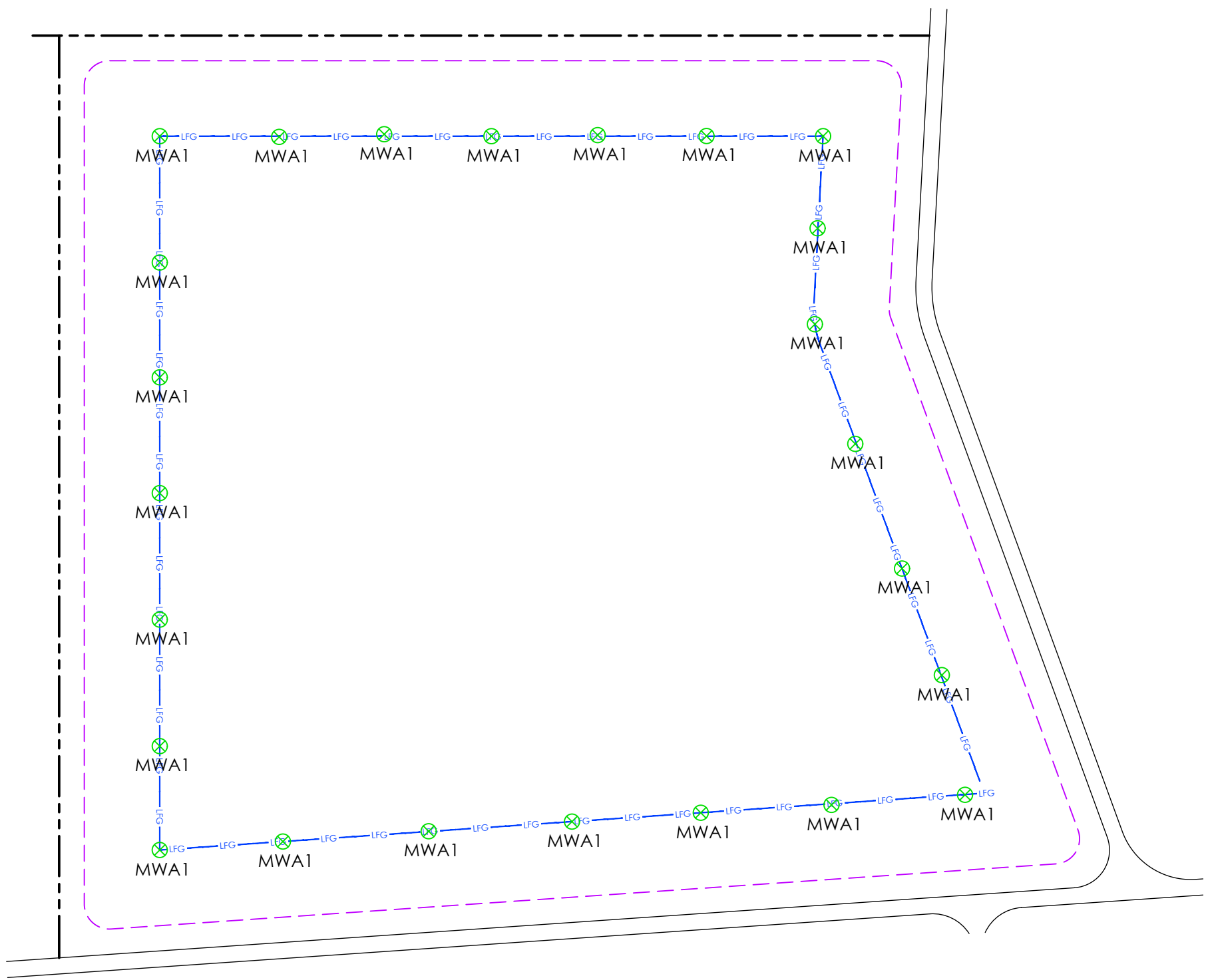
SSD-10096818
8 February 2023
Ref: 202597R07



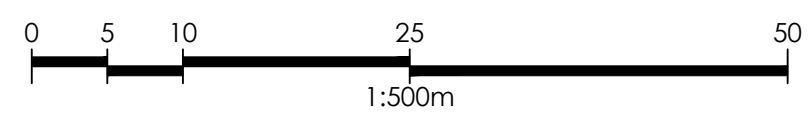
Building exceptional
outcomes together



Appendix B – Amendment Report Appendix F LFG Typical Details



- ### LEGEND
- ⊗ MWxx WELL (NEW)
 - ⊗ MWxx WELL (EXISTING)
 - XX WELLHEAD MANIFOLD
 - J-TRAP
 - ★ BAROMETRIC TRAP
 - ✕ FLARE
 - ⊕ SURVEY DATUM
 - ⊙ LEACHATE PIT
 - ⊗ VALVE PIT
 - / — PERIMETER FENCE
 - - - - - EXTENT OF WASTE
 - - - - - LICENCE BOUNDARY



NOT FOR CONSTRUCTION

REV	DATE	AMENDMENT DESCRIPTION	DES	DRN	CHK	APPR
1	01.12.21	FOR INFORMATION		PS		



SCALE:
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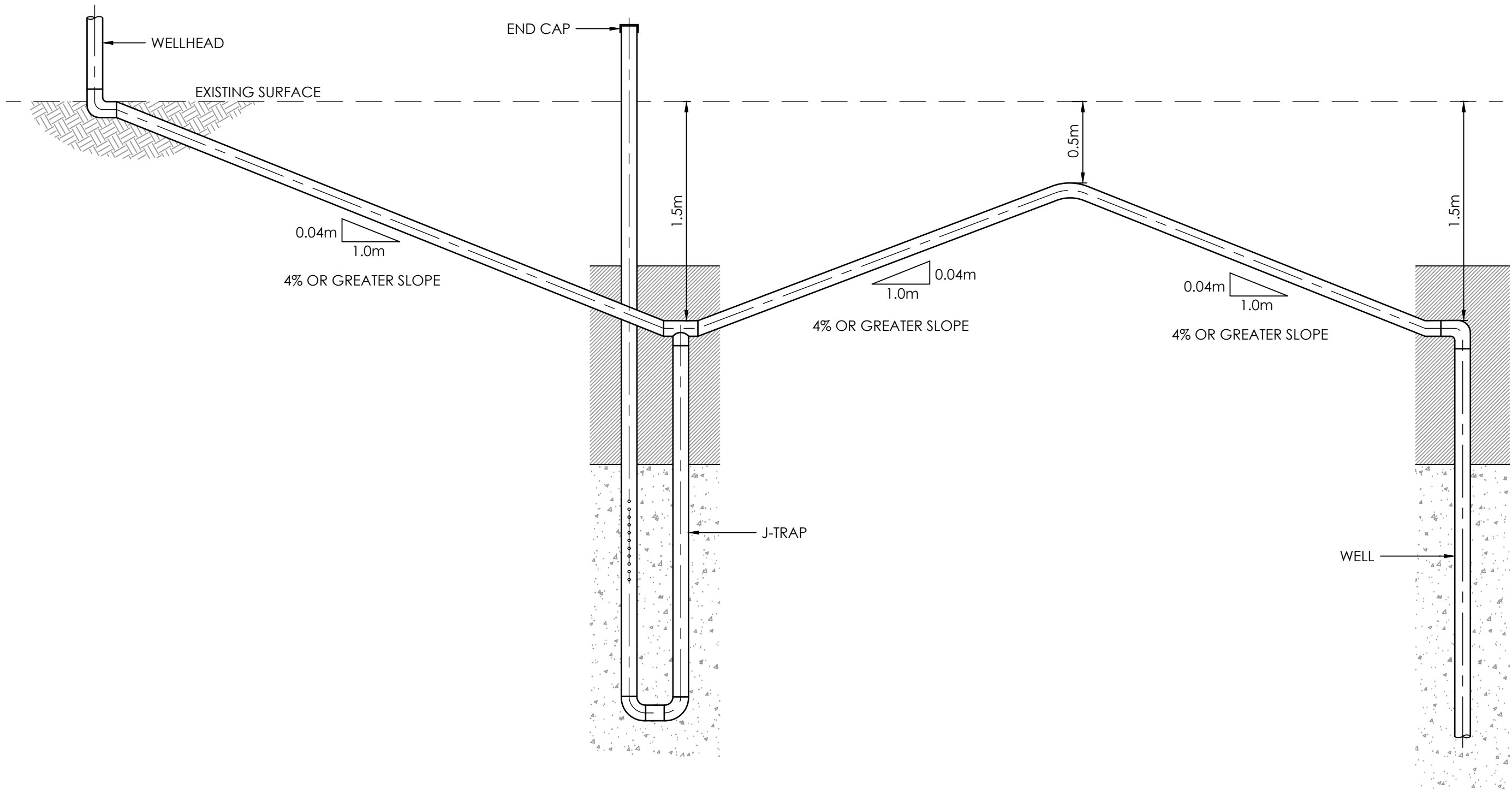
SHEET SIZE:
A3

REV:
1

BIOGAS SYSTEMS

GAS FIELD LAYOUT AND LEGEND

BGSD-001



NOT FOR CONSTRUCTION

REV	DATE	AMENDMENT DESCRIPTION	DES	DRN	CHK	APPR
1	06/21	FOR INFORMATION		PS		



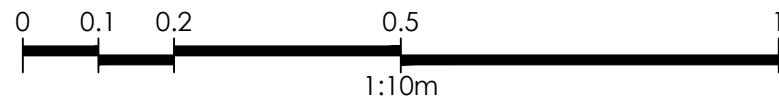
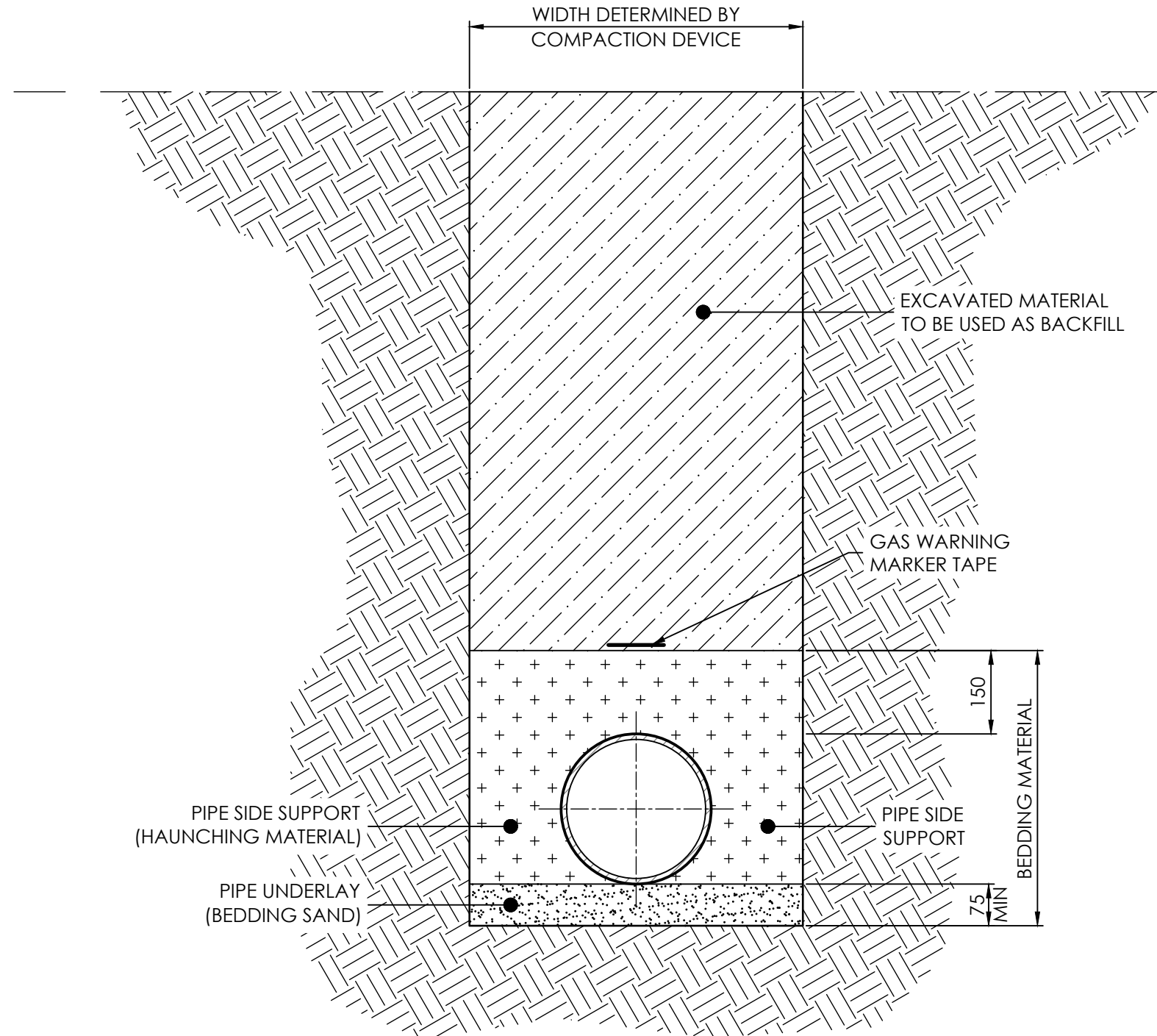
SCALE:
NTS

SHEET SIZE:
A3

REV:
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BIOGAS SYSTEMS
STANDARD 63mm FLOWLINE DETAIL
BGSD-002

100mm ON ORIGINAL PRINT. DO NOT SCALE
drawing file: BGSD-002_FLOWLINE_63mm.dwg Plot Date: 12/8/2021 5:34 PM



NOTE:
HAUNCHING AND INITIAL BACKFILL (PIPE OVERLAY) MATERIAL TO COMPLY WITH REQUIREMENTS OF BEDDING MATERIAL.

NOT FOR CONSTRUCTION

REV	DATE	AMENDMENT DESCRIPTION	DES	DRN	CHK	APPR
1	01.12.21	FOR INFORMATION		PS		



SCALE:
1:10m

SHEET SIZE:
A3

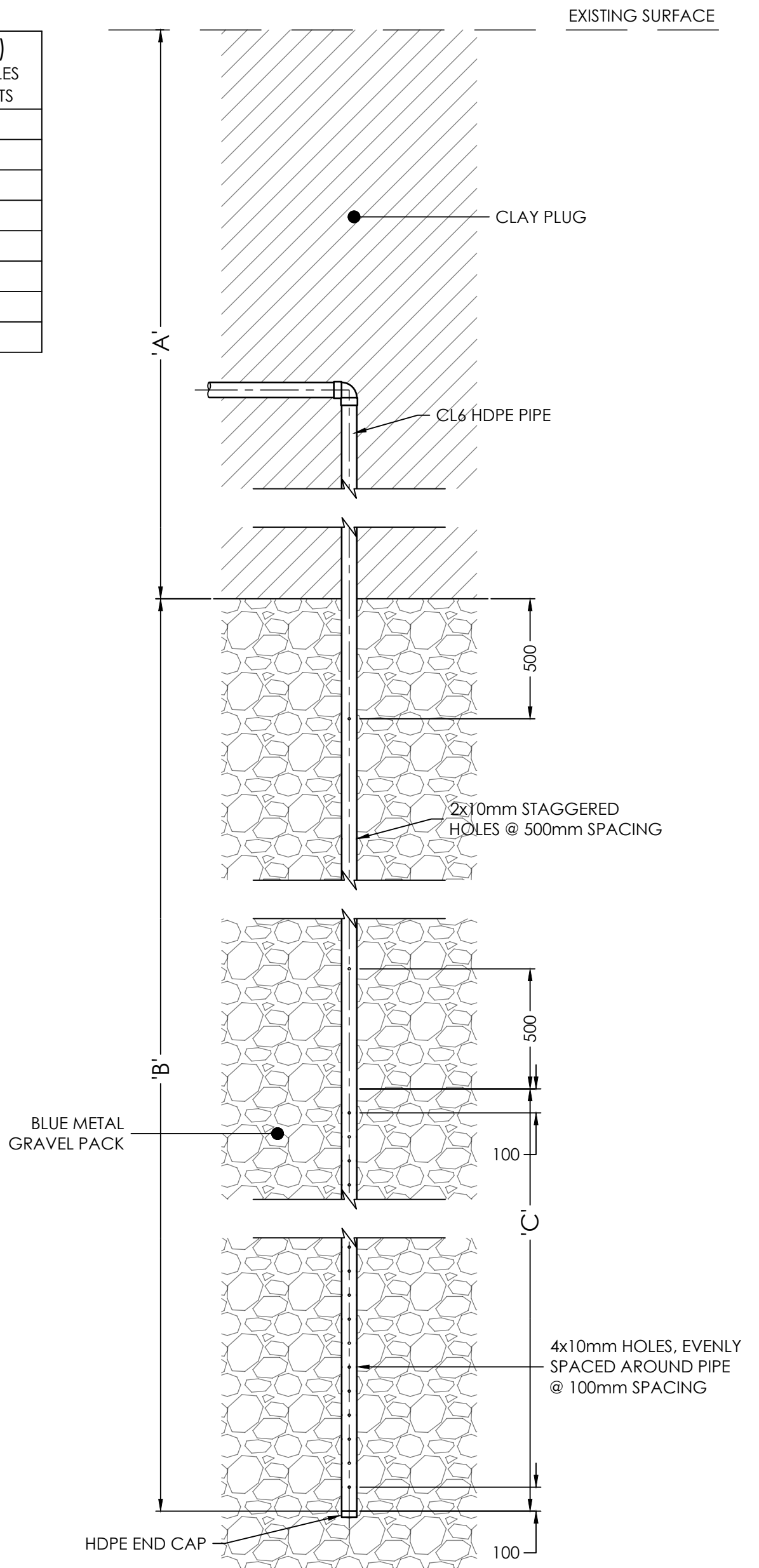
REV:
1

BIOGAS SYSTEMS
TYPICAL TRENCH DETAILS
BGSD-017

100mm ON ORIGINAL PRINT. DO NOT SCALE

WELL DIMENSIONS

WELL DEPTH (m)	'A' (mm) CLAY PLUG	'B' (mm) BLUE METAL GRAVEL PACK	'C' (mm) 4x10mm HOLES @ 100mm CTS
6	2400	3600	2000
8	3000	5000	2000
10	3500	6500	2000
12	3500	8500	2000
15	4000	11000	5000
16	4000	12000	6000
18	4000	14000	8000
25	4000	21000	15000



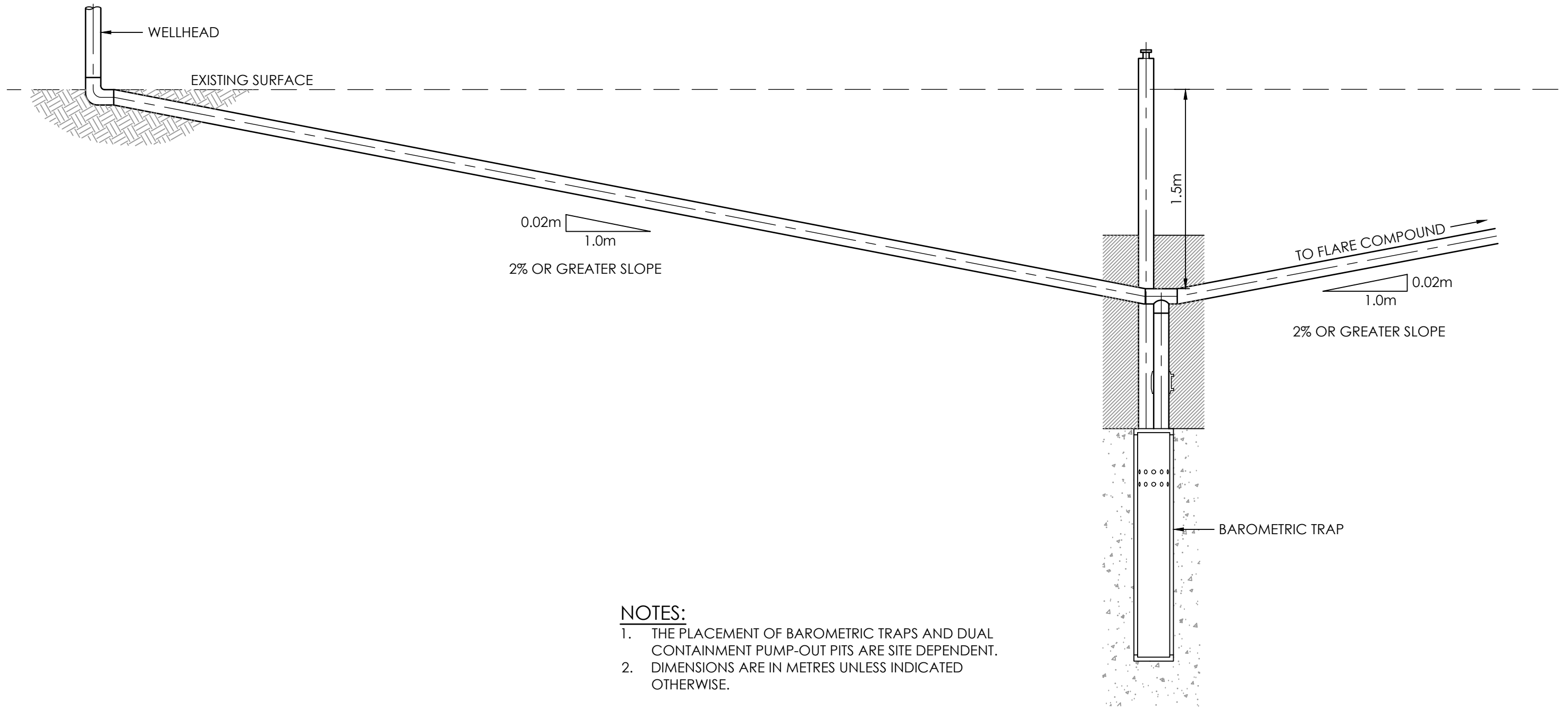
TYPICAL WELL ARRANGEMENT

SUITABLE FOR Ø63 AND Ø90 PIPE
NOT TO SCALE



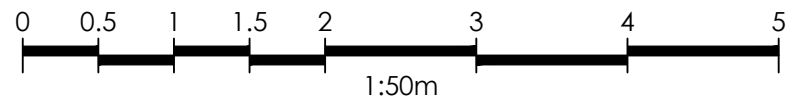
NOT FOR CONSTRUCTION

							SCALE:	NTS	BIOGAS SYSTEMS EXTRACTION WELL DESIGN BGSD-018
							SHEET SIZE:	A3	
							REV:	1	
1	01.12.21	FOR INFORMATION		PS					
REV	DATE	AMENDMENT DESCRIPTION	DES	DRN	CHK	APPR	100mm ON ORIGINAL PRINT. DO NOT SCALE		



NOTES:

1. THE PLACEMENT OF BAROMETRIC TRAPS AND DUAL CONTAINMENT PUMP-OUT PITS ARE SITE DEPENDENT.
2. DIMENSIONS ARE IN METRES UNLESS INDICATED OTHERWISE.



NOT FOR CONSTRUCTION

REV	DATE	AMENDMENT DESCRIPTION	DES	DRN	CHK	APPR
1	01.12.21	FOR INFORMATION		PS		



SCALE:
1:50m

SHEET SIZE:
A3

REV:
1

BIOGAS SYSTEMS
TYPICAL MAIN AND LATERAL HEADER
ELEVATION PROFILE
BGSD-028

100mm ON ORIGINAL PRINT. DO NOT SCALE



The LMS Gas Flare provides Australia's most proven flare for the clean combustion of landfill biogas. LMS have engineered this technology by drawing on more than 35 years of biogas combustion experience. LMS flares have been purpose built for the landfill environment and their performance in terms of total carbon abated from Australian landfills is unmatched.

With a fleet of more than 100 LMS Gas Flares, they are proven for continuous reliable operation over many years and all environments. As the manufacturer LMS maintains a full inventory spare parts, such that in the unlikely event of a system failure, any service part that is required will be immediately available. This is backed by our local service capacity, with experienced and appropriately qualified service technicians based around Australia.

The LMS Gas Flare has the capability for high destruction efficiencies and a low noise to ensure compliance with environmental regulations.

These compact flares are designed for rapid deployment and are suitable for both mobile and permanent installations on natural ground or capped landfill.

Technology

The LMS Gas Flares are equipped to operate remotely and can be monitored through a user friendly PLC interface, providing continuous flame detection linked to advanced burner control hardware with automated dial out alarms.

Environment

Temperature maintenance and control of flue gas retention time is vital to ensure efficient destruction of pollutants. This is enhanced by multiple burner configurations, control of primary and secondary air, and thermal insulation within the combustion chamber that also reduces audible noise.

Safety

Anti-flash back considerations and liquid collection are required to ensure a safe and reliable system. The gas supply line is fitted with a slam shut solenoid valve and an in line flame arrestor. Constant flame fail detection, incorporating system shut down and isolation, safeguard against any unburnt gases emitting to the atmosphere.

LMS Gas Flare Specifications

MODEL	LMS Standard Landfill Biogas Flare
FLOW CAPACITY	Multi Stage – 50m ³ /hour – 1,000m ³ /hour (20:1 turndown)
COMPLIANCE	Clean Energy Regulator (carbon credit generation) AS/NZS 5601 AS 3814 (Type B Gas Device) AS60079 IECEx (Hazardous zoning & electrical equipment) AS/NZS 3000:2018 (wiring) EPA (>98% destruction efficiency)
COMBUSTION	Retention inspirators Combustible methane range 25% to 95% by volume Maximum energy combustion 19,000MJ/hour Combustion Temperature >760 C
FLUE STACK	Insulated stainless steel (7 metres)
TRANSPORT	Modularised on a 6 m shipping container platform
INSTALLATION	Less than 1 Day
MONITORING	Continuous with automated alarms and shut down Remote access for data and systems control and restarting Automated data to cloud
GAS FEED	Centrifugal blower incorporating variable speed drive control 1,000m ³ /hour maximum delivery (dependent gas quality and volume available) Maximum suction pressure, minimum discharge pressure combined 15kPa Methane analyser with built in alarms In line gas flow meter
FILTRATION	Stainless steel liquid knock out pot fitted with stainless steel demister pads and pre-gas entry filter.
POWER SUPPLY	415v3 phase
SAFETY ENGINEERING	Hazardous Area Dossier Automated slam shut and manual isolation valves Flame detection incorporating auto shut down Remote PLC automation Flame arrestor Schedule 10S stainless steel pipe work Gas isolation valves In line pressure transmitters and test points Condensate level indicator Flash back temperature sensor Self-contained and lockable Filter in intake manifold Lockable electrical control panel/cabinet Refractory lined combustion chamber
DIMENSIONS	Length – 6 metres Width – 2.4 metres Total height at stack – 8 metres

LMS Low-Cal Flare Specifications

MODEL	LMS Low-Cal Landfill Biogas Flare
FLOW CAPACITY	Multi Stage – 25m ³ /hour – 250m ³ /hour (10:1 turndown)
COMPLIANCE	Clean Energy Regulator (carbon credit generation) AS/NZS 5601 AS 3814 (Type B Gas Device) AS60079 IECEx (Hazardous zoning & electrical equipment) AS/NZS 3000:2018 (wiring) EPA (>98% destruction efficiency)
COMBUSTION	Retention inspirators Combustible methane range 20% to 95% by volume Maximum energy combustion 4,900MJ/hour Combustion Temperature >760 C
FLUE STACK	Insulated stainless steel (7.4 metres)
TRANSPORT	Modularised on a 3.7 m x 1.4 m galvanised steel base frame
INSTALLATION	Less than 1 Day
MONITORING	Continuous with automated alarms and shut down Remote access for data and systems control and restarting Automated data to cloud
GAS FEED	Centrifugal blower incorporating variable speed drive control 250m ³ /hour maximum delivery (dependent gas quality and volume available) Maximum suction pressure, minimum discharge pressure combined 10kPa Methane analyser with built in alarms In line gas flow meter
FILTRATION	Stainless steel liquid knock out pot fitted with stainless steel demister pads and pre-gas entry filter.
POWER SUPPLY	415v3 phase
SAFETY ENGINEERING	Hazardous Area Dossier Automated slam shut and manual isolation valves Flame detection incorporating auto shut down Remote PLC automation Flame arrestor Schedule 10S stainless steel pipe work Gas isolation valves In line pressure transmitters and test points Condensate level indicator Flash back temperature sensor Lockable electrical control panel/cabinet Refractory lined combustion chamber
DIMENSIONS	Length – 3.7 metres Width – 1.4 metres Total height at stack – 7.4 metres

LMS Dual Stack Flare Specifications

MODEL	LMS 7000 Series Dual Stack Landfill Biogas Flare
FLOW CAPACITY	Multi Stage – 50m ³ /hour – 2,000m ³ /hour (40:1 turndown)
COMPLIANCE	Clean Energy Regulator (carbon credit generation) AS/NZS 5601 AS 3814 (Type B Gas Device) AS60079 IECEx (Hazardous zoning & electrical equipment) AS/NZS 3000:2018 (wiring) EPA (>98% destruction efficiency)
COMBUSTION	Retention inspirators Combustible methane range 25% to 95% by volume Maximum energy combustion 38,000 MJ/hour Combustion Temperature >760 C
FLUE STACK	Insulated stainless steel (8.5 metres)
TRANSPORT	Modularised on a 6 m shipping container platform
INSTALLATION	3 Days
MONITORING	Continuous with automated alarms and shut down Remote access for data and systems control and restarting Automated data to cloud
GAS FEED	Via external delivery system with methane detection 2,000m ³ /hour maximum delivery (dependent gas quality and volume available) Maximum supply pressure 35kPa In line gas flow meter
FILTRATION	Via external delivery system
POWER SUPPLY	240VAC
SAFETY ENGINEERING	Hazardous Area Dossier Automated slam shut and manual isolation valves Flame detection incorporating auto shut down Remote PLC automation Flame arrestor Schedule 10S stainless steel pipe work Gas isolation valves In line pressure transmitters and test point Flash back temperature sensor Self-contained and lockable (optional) Lockable electrical control panel/cabinet Refractory lined combustion chamber
DIMENSIONS	Length – 6 metres Width – 2.4 metres Total height at stack – 8.5 metres



Appendix C – Authors and Reviewers CVs

Loren Cockshell

Environmental Scientist

Loren is an Environmental Scientist with a passion for the environment and the natural world. Her interests and skillsets include sustainability, GIS, community engagement, climate resilience, and environmental awareness.

She is experienced in environmental monitoring including groundwater, surface water, landfill gas and soil, in remote and urban locations.

She has undertaken various environmental reporting including monitoring reports, preliminary site investigations (PSIs), review of environmental factors (REF) reports, environmental and heritage impact assessment reports (EHIAR) and environmental risk assessments.

Loren has proven experience in sustainability reporting including sustainability plans including base case for emissions and climate change risk assessments to improve sustainability outcomes for DIT projects in SA. She is dedicated to a more sustainable future and environmental awareness.

Strong skills include working well collaboratively and independently as well as being an accomplished communicator. Loren builds relationships and works well under pressure, is organised and thorough, and has great attention to detail.

Recent, relevant experience

Environmental Scientist | Monash former landfill environmental monitoring | Berri Barmera Council | 2023-ongoing

Environmental scientist responsible for completing landfill gas monitoring, data management and reporting.

Environmental Scientist | Lynton and Eden Hills former landfills environmental monitoring | City of Mitcham | 2022-ongoing

Environmental scientist responsible for completing landfill gas monitoring, data management and reporting.

Environmental Scientist | Kadina and Wallaroo former landfills environmental monitoring | Copper Coast Council | 2022-ongoing

Environmental scientist responsible for completing landfill gas monitoring, groundwater and surface water sampling, data management and reporting.

Environmental Scientist | CCR Inert Landfill Rehabilitation | Canberra Concrete Recyclers | Canberra | 2022

Worked collaboratively to produce a high-quality written Management Plan for detailing the environmental setting, sensitive receptors, conceptual site model, risk assessment and environmental management.

Environmental Scientist | ARR Reuse Projects | Adelaide Resource Recovery | Adelaide | 2022

Conducting data compilation, preparation, and statistical analysis to advise soil sampling requirements. Collaboratively working on updating company documentation of Adelaide Resource Recovery. Stockpile sampling of waste trommel fines (WTF) and recycled timber waste (RTW).



Qualifications

Bachelor of Environmental Science majoring in Earth Science and Environmental Quality

Certificate 3 in Commercial Cookery

Construction Induction Card

First Aid Training

IS Rating Skills

Skills and expertise

Collaboration and problem-solving skills

Excellent written communication and report writing skills

Environmental fieldwork and monitoring e.g. groundwater, surface water, landfill gas, soil

Geographic Information Systems (GIS)

Environmental data entry, preparation, compilation and management

Loren is an Environmental Scientist with a passion for the environment and the natural world.

Environmental Field Work and Monitoring

Environmental Scientist

- nWCH Detailed Design – soil environmental monitoring, data management, report writing
- TM-16 Riverlea Water Supply – groundwater and soil environmental monitoring, data management, report writing
- St. Hallett Winery Woodlot Soil Sampling – soil sampling and reporting
- Happy Valley WTP Pac Dosing Storage Shed – Soil Waste Classification report
- Victor Harbor Growth Package – Soil Waste Classification report
- Urrbrae Wetland Sediment Study – sediment sampling and reporting, groundwater and surface water sampling
- Wandilo Composting Monitoring 2022 - groundwater and surface water monitoring, data management, report writing
- Millicent Saleyards Monitoring 2022 - groundwater and surface water monitoring, data management, report writing
- Sixth Creek & River Torrens – soil sampling
- Coast Park Stage 2 - Tennyson to Grange – soil sampling
- Soil Investigation, 550 Womma Road – soil sampling
- Southern Waste Capping – soil stockpile sampling
- Tusmore – groundwater sampling.

Preliminary Site Investigations

Environmental Scientist

- 724 Etiwanda Avenue, Mildura VIC
- Lot 442 Fleming Street, Moorook South SA
- 40a Bertha Street, Mount Gambier SA
- Lot 201 Riddoch Highway, Port MacDonnell SA
- Lot 1 Goodes Road, Pyap SA
- Lot 21 Tiers Road, Lenswood SA
- Lot 2 Chinamans Lane, Penola SA
- Lot 24 Chowilla Street, Renmark West SA
- Lot 105 Moorna Street, Renmark SA
- Lot 466 Renmark Avenue, Renmark SA
- Lot 2 Gratwick Road, Loxton SA
- Section 1032 & Lots 51 & 52 Short Street, Millicent SA
- Lot 63 Kestral Street, Chaffey SA
- Lot 45 & 46 Luther Road, Loxton SA
- 1926 Bookpurnong Road, Loxton SA
- 540 Caddy Road, Loveday SA
- 167 Ruwoldt Road, Yahl SA
- Lot 105 Coastal Road, Blackfellows Caves SA
- Lots 1-4 Chris Court, Paringa SA
- 21871 Sturt Highway, Wonuarra SA
- Lot 39 Arumpo Street, Renmark SA
- Lot 64 Old Sturt Highway, Berri SA.

Environmental Reports

Environmental Scientist

- Bonny Hills to Kew Rising Main - Review of Environmental Factors (REF) Stage 1 and Stage 2 reports
- Sewer Rising Main Renewal – Review of Environmental Factors (REF) report
- Arumpo Road – Review of Environmental Factors (REF) report
- Caboolture West NDP1 SPS & SRM –Application for a New Environmental Authority for a Prescribed ERA: Supporting Information report
- Subdivision design of Old Hospital Site – Statement of Environmental Effects (SEE) report
- Main South Road Productivity Package Planning Study – Environmental and Heritage Impact Assessment Report (EHIAR) Level 1 and Level 2
- VO1 Stuart Hwy Glendambo design MM642 – Environmental and Heritage Impact Assessment Report (EHIAR) Level 2
- Coast Park Stage 2 - Tennyson to Grange – Environmental Impact Assessment Report (EIAR) Level 3
- Wasleys Feedmill Env Risk Assessment – Environmental Risk Assessment report
- Pedder Crescent Geotech Investigations – environmental reporting.

Sustainability Reports and Climate Change Risk Assessments

Environmental Scientist

- Main South Road Productivity Package Planning Study – Planning Sustainability Plan
- Stuart Hwy Flood Damage – Sustainability Plan (Level 1); Climate Change Risk Assessment
- VO1 Stuart Hwy Glendambo design MM642 – Sustainability Plan (Level 2); Climate Change Risk Assessment
- Manton Street Adams Street Upgrade – Sustainability Plan (Level 2)
- Coast Park Stage 2 - Tennyson to Grange – Sustainability Plan (Level 2); Climate Change Risk Assessment.

Phytocap Trial Reports

Environmental Scientist

- Moe Landfill 2022 - Moe 2022 Annual Report, data management, report writing; Monthly summary reports; QA/QC checks
- Morwell Landfill 2022 - Morwell 2022 Annual Report, data management, report writing; Monthly summary reports; QA/QC checks
- Drysdale 2022 Annual Report - Drysdale 2022 Annual Report, data management, report writing; Monthly summary reports; QA/QC checks
- MBC 2022/23 - Monthly summary reports; QA/QC checks
- MRL Phytocap Trial - Monthly summary reports; QA/QC checks
- Dunmore Phytocap Concept Design – Monthly summary reports; QA/QC checks.

Ellen Tansell

Environmental Scientist

With over seven years' experience, Ellen is an experienced Environmental Scientist and Project Manager with extensive expertise within the field of contaminated site assessment and investigation.

Ellen is a skilled environmental scientist who specialises in environmental impact, soil science and chemistry. She has a broad range of project experience across metropolitan and regional South Australia, including environmental management on local and state government projects.

An adept and competent field operative across a range of sites, Ellen is proficient across a wide range of field sampling techniques including soil, groundwater and landfill gas and has additional experience in supervising and co-ordinating sub-contractors and sub-consultants within the field.

Ellen has also experience in undertaking and directing soil remediation works and co-ordinating laboratory testing. Ellen is also skilled in the analysis and interpretation of analytical data, the formulation of conceptual site models and the analysis of historical trends.

Ellen has written numerous reports and is proficient in the compilation of site history information and the production of both PSI and DSI reports. Ellen has become proficient in completing Environmental, Heritage and Impact Assessment Reports (EHIAR) for DIT and has been involved in environmental auditing for a rail construction project.

Ellen also has experience in the production of Construction and Operational Environmental Management Plans. Ellen has excellent written communication and report writing skills and has trained and reviewed work completed by junior scientists.

Ellen's knowledge of local soil conditions, environmental audit requirements and your processes will assist in meeting project milestones.

Recent, relevant experience

- Undertaking landfill gas monitoring and groundwater sampling, data management and reporting at numerous closed and operational landfill sites.
- Undertaking groundwater sampling at Coleman Road, Eden Hills, Lynton, Brinkley and SRWRA landfills.
- Undertaking groundwater, surface water and leachate sampling at Southern Waste ResourceCo's McLaren Vale landfill.
- Remediation supervision of the former City of West Torrens Council Depot.
- In-situ waste soil classification along Hutt Street, Grote Street, Lefevre Terrace and Frome Road for Adelaide City Council.
- Dredge sampling at Lucky Bay and Wallaroo plus the development of dredge management plans for Council.
- Numerous waste soil classifications for offsite disposal in accordance with the Waste Derived Fill Standard.
- Waste soil classification works for Brown Hill and Keswick Creek Stormwater Board.
- Undertaking groundwater sampling, data management and reporting at Birdwood STEDS.



Qualifications

Bachelor of Science (EcoChemistry) majoring in chemistry and soil science

Skills and expertise

Contaminated Site Investigations

Site History Investigations

Environmental Impact Reports

Environmental Management Plans

Environmental Works for Construction

Soil science

Chemistry

Ellen is a skilled environmental scientist, who is proficient in a wide range of field sampling techniques and supervising and coordinating subcontractors in the field.

- Landfill Gas monitoring at Seacliff Park, Coleman Road, Lonsdale, Eden Hills, Lynton, Brinkley, Glenfield, Eumundi and Landsborough landfills.
- Borehole logging and soil sampling.
- Soil sampling and classification of potentially contaminated soil and stockpiles at multiple sites across metropolitan Adelaide.
- Waste soil classification works for sediment within the Urrbrae Wetlands.
- Landfill gas and groundwater (supervision) well installation.
- Supervision of groundwater well installation and development for SA Water at multiple Wastewater Treatment Plants (WWTP) across South Australia.
- Environmental sample collection and management.
- Environmental data collection and data management.
- Environmental reporting.
- Ballast and fines sampling and classification of potentially contaminated material along railway track alignment.
- Development of a 15-year forward management plan for Tamworth Regional Council.
- Development of Wastewater Irrigation Management Plans for St Hallett Wines and Kingston SE Community Wastewater Management System.
- Conducting multiple environmental construction audits for the Gawler Railway Electrification Project (GREP) for Acciona plus audits for Adelaide Airport.
- Assistance in the development of an Environment Impact Statement for the Buronga Landfill Expansion.
- Sampling and management of a recycled timber product and waste trommel fines at Wingfield.
- On-going soil and water monitoring and assistance for wastewater irrigation from MBL's rendering plant in Keith, South Australia including the development of annual reports, wastewater irrigation management plan and environmental management plan.
- Production of annual Environmental Monitoring Reports for the Millicent Saleyards.
- Conducted multiple audits for wastewater treatment plants and waste transfer stations in regional Queensland.
- Completed multiple Environmental Site History searches and reports for regional South Australia.
- Preparation of a Construction Environmental Management Plan (CEMP) including a Soil Erosion Drainage Management Plan (SEDMP), Dewatering and Earthworks Management Plan (DEMP) and an Acid Sulfate Soil Management Plan for Torrens Island Power Station Battery Energy Storage System project. Additionally, an Operational Environment Management Plan (OEMP) was also produced for the client.
- Development and Independent Design Certification (IDC) review for EHIA Reports for DIT for numerous projects around South Australia including Horrocks Highway, Airport Road (Berri), Fullarton Road, Eyre Highway, Strath-Goolwa Road and Barrier Highway.
- Development and review of sustainability plans and greenhouse gas assessments.
- Monitoring, assistance, and review of phytocap trials for multiple landfills across Australia including Melbourne Regional Landfill (MRL), Moe and Morwell Landfills, Drysdale Landfill and Maddingley Brown Coal.
- Development of Environmental Assessment Reports and Aftercare Management Plans for Woombye and Coolum Landfills located in Queensland.
- Completion of an Environmental Risk Assessment for Ridley's Wasleys Feed mill.
- Groundwater monitoring review for Timberlink's Tarpeena Sawmill.
- Development and review of Review of Environmental Factors (REF) reports for projects within NSW including Bonny Hills to Kew Rising main and Arumpo Road.

Mamdoh Ibrahim

Principal Waste Engineer

Mamdoh is an experienced Chartered Professional Engineer (CPEng) in Civil Engineering specialised in Waste Management with 23 years' industry experience. He brings a strong track record of performance in design, construction supervision and operation of landfills.

Mamdoh has worked in NSW, Australia for over 7 years. Prior to this he worked in Oman and Egypt for many of the major waste management companies and the Omani Government.

His key areas of specialisation include Waste Management Strategies, landfill site selection studies, Landfill Environmental Management Plans, Landfill Master Planning, Landfill gas and Leachate management, Landfill Capping design, Landfill Closure and Post Closure Plans and Quarry Management.

He likes to share his experience and ensure that lessons are learned from each project and is passionate about the delivery of projects that enable the construction of solutions that will benefit communities.

Recent, relevant experience

Principal Engineer – Waste | Tonkin | Sydney, NSW | 2023 - current

- Providing comprehensive technical support to the Waste and Environmental team, focusing particularly on waste management and landfill projects
- Leading the process of landfill site selection, including the identification of necessary approvals and conducting technical studies. Developing concept designs and management strategies tailored to each site
- Serving as the team leader and primary reviewer for critical aspects of landfill projects, such as landfill cell design, filling plans, stormwater management plans, and environmental management plans (LEMP). Additionally, oversee cap design to ensure regulatory compliance and environmental sustainability
- Conducting rigorous Construction Quality Assurance (CQA) inspections and provide detailed review and approval of CQA reports, ensuring the highest standards of construction quality and environmental protection
- Assessing current landfill site operation practices and provide expert advice on potential improvements, optimizing efficiency and environmental impact.

Landfill Manager | Elizabeth Drive Landfill | Cleanaway and Suez | Sydney, NSW | 2016–2023

Mamdoh's role as Landfill Manager for this project included the following:

- Establish, review and update landfill masterplan
- Identify CAPEX and budget needs
- Review and approve design work for landfill cells, lining systems, surface water management system, leachate management system, landfill capping and landfill gas collection systems
- Manage excavation of 1.5M cubic meters of Shale and Clay to create the landfill airspace with a total cost of \$15M
- Manage cell construction, lining system and leachate collection systems carried out by contractors for 3 General Waste Cells with total construction cost of \$3.5M and 2 Restricted Waste Cells with a total cost of \$2.5M



Qualifications

Bachelor of Engineering (Civil)

Professional accreditations and affiliations

MIEAust, CPEng, NER (Civil Engineering)

Waste Management & Resource Recovery Association (WMRR), Australia

Skills and expertise

Waste Management

Landfill Engineering

Environmental Engineering

Construction Quality Assurance

Project Management

Driving excellence through dedication to quality deliverables, authentic and honest communication and innovation.

- Manage all other construction and infrastructure works in the landfill including internal roads, surface water management, landfill gas collection system works carried out by contractors
- Preparation of tenders, tender evaluation, supervision of works, contract management and review quantity survey reports
- Managed the landfill operation activities receiving around 1M tonne per annum including site team and contractors' teams to achieve the operational KPIs
- Ensure compliance with EPA licence, DA consent and other requirements and report to NSW EPA, Penrith Council, Mine Safety and other authorities. Manage the Landfill Expansion.

Landfill Engineer | Oman Environmental Services Holding Company| Muscat, Oman | 2010 – 2015

- Management and Supervision of 3 landfills' operation contracts being Multaqa Landfill, Barka Landfill and Sur Landfill receiving a total of 1.5M tonne per annum
- Review and approval of the design and construction method statements as well as ensuring the functionality of the landfill facilities for 8 engineered landfills and waste management facilities, including Multaqa landfill expansion, Barka landfill, Thumryat Landfill Ezz Landfill, Al Buraimi Landfill, Sohar Landfill, Sur Landfill Expansion and Duqm Waste Treatment Project
- Supervision of projects engineers and attending site visits and major inspections and meetings for several landfill design and construction projects
- Scoping, tendering and supervision of specialised consultants carrying out multiple site selection studies, Environmental Impact Assessment (EIA) studies, topographic survey and geotechnical investigation studies for waste management facilities.

Team Leader and Reviewer | Environmental Assessment Report and the Aftercare Management Plan for the Closed Landfills | Coolum Landfill and Woombye Landfill | Sunshine Coast Council, QLD | 2023 - 2024

In this project, Mamdoh applied his extensive experience in capturing any signs of contaminations resulting from the closed landfill, identifying any potential environmental risks, and suggested practical mitigation measures to control the identified risks.

In conducting this project Mamdoh carried out sites inspections for both landfills to identify any changes in the site, the improvements completed by the Council, damages, failures, contamination to the environment, also carried out the update of the Environmental Risk Assessment and the provided recommendations for improvements.

Coolum (closed) Landfill and Woombye (closed) Landfill are owned by Sunshine Coast Council. The Landfills are closed and capped. The project included an Environmental Risk Assessment and Aftercare Management Plan and presents recommendations for effectively enhancing control over the related environmental risks.

Providing technical support and site inspections | Construction Quality Assurance (CQA) for the lining of cell 6 | Dunmore Landfill | Shellharbour City Council, NSW | 2023

Providing technical advice to the Council and the Cell Construction Contractor to ensure the installation of the lining system is completed to satisfy the design requirement, and solve the onsite construction difficulties, approve and sign off the different liner layers and the leachate collection system.

Construction quality assurance (CQA) services for the Cell 6 at Dunmore landfill and the associated as-constructed reporting. The services were provided to a high quality and in a timely manner. Due to our involvement in sourcing suitable materials, timely intervention and resolution of construction issues and absence of outstanding CQA matters, potential delays and risks to Council were minimised.

Review Cell Design | Port Pirie Contaminated Soil Landfill Cell Design | Port Pirie Landfill | Department for Energy and Mining (DEM), SA | 2023

Provide practical insight to the cell design to ensure the highest capacity with the optimum excavation and backfilling works and compliance with the SA EPA Guidelines.

Mamdoh undertook the cell design review completed by the design team against the requirements set within the basis of design, the Client requirements, the site survey, the site stormwater management plan and the EPA guidelines.

Tonkin undertook the design for a Contaminated Soil Cell at the Pt Pirie Landfill (the site), located at Pt Pirie South, SA. The construction of a Contaminated Soil Cell which consists of 4 sub cells is considered as a solution for the disposal of waste streams including lead contaminated soils generated from the Port Pirie Lead Abatement Program (TLAP).

Team Leader and Reviewer | Bunya, Caboolture and Dakabin Waste management Facilities Filling Plan and Storm Water Management Plan | City of Moreton Bay, QLD | Bunya Caboolture and Dakabin Landfills | 2023 - 2024 |

Utilising his expertise in landfill operations, Mamdoh led the Tonkin team to develop practical filling plans that inform the operational teams on preparing for each filling stage, including tasks such as access road preparation and stormwater management. The approach includes realistic estimations of available airspace and recommendations for best practices to optimize waste compaction and airspace utilization.

Mamdoh has undertaken site inspection for the 3 landfill sites and guided the project team through the concept staging planning and review of the filling plans and the storm water management plans as well as liaison with the Council team and project management aspects.

The project included updates to the current landfill filling plans and stormwater management plans for each of their three major waste management facilities located within the City of Moreton Bay being the Bunya, Caboolture and Dakabin Waste Management Facilities. The plans are intended to: allow to plan for new capital works projects and improve operational efficiencies, recommend the sequence and timing of staged filling at the site, consider the alternate daily cover currently being used by Council in lieu of soil, consider access and egress, roads and wet weather pads, include estimated airspace consumption rates and remaining airspace calculations, include capping and rehabilitation progress recommendations, address the management of surface water runoff, include the minimisation of exposure of runoff to waste resulting in leachate generation, address stormwater management infrastructure.

Team Leader and Reviewer | West Daly Waste Management Strategy and Wadeye Waste Management Facility Concept Design | West Daly Regional Council, NT | 2023 - 2024

Mamdoh collaborated closely with the Council to pinpoint the optimal concept design and management strategy for upgrading the landfill. This involved identifying future facilities and processes aimed at enhancing recycling and environmental management.

Tonkin has been engaged by the West Daly Regional Council (WDRC) to undertake engineering concept design for the upgrade of the existing Wadeye Waste Management Facility (the site) located at Wadeye, NT. The site is owned and operated by WDRC.

Principal Waste Engineer | Wurrumiyanga Landfill Upgrade | Wurrumiyanga Landfill | Tiwi Island Regional Council, NT | 2023

Mamdoh undertook the development of a consultant's scope of service for the environmental approvals, design and documentation of an additional landfill cell as part of the Wurrumiyanga Landfill Upgrade.

Utilizing his experience in initiating and expansion of landfill sites, Mamdoh has undertaken a thorough review of the relevant legislation and guidelines in Northern Territory. He has compiled a list of necessary studies, investigations, designs, and documentation required for constructing an additional cell in the Wurrumiyanga Landfill. Additionally, he has provided an opinion of the anticipated costs associated with conducting these studies, investigations, designs, and obtaining the necessary approvals.

The Project was awarded to Tonkin by Tiwi Island Regional Council to provide a high order list of the feasibility surveys, studies and engineering investigations as well as a high-order list of the environmental studies and likely approvals that are likely to be required based on one upgraded/new landfill cell along with a list of the design (including typical drawings) and documentation required for the design of a new landfill cell.