

Appendix H - Odour Management Plan

Erskine Park Resource Management Facility

Odour Management Plan

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Contents

1. INTRODUCTION	3
1.1 Scope and Objectives of the OMP	3
1.2 Development Consent Requirements	4
1.3 Responsibilities	6
1.4 OMP Periodic Review	6
2. SITE SETTING	7
2.1 WTS location	7
2.2 Surrounding Topography	7
2.3 Sensitive Receptors	8
2.4 Local Wind Conditions	10
2.5 Other Sources of Odour in the Vicinity of the WTS	12
3. WTS PROCESS DESCRIPTION	15
3.1 Overview of Operations	15
3.2 Potential Sources of Odour Emissions	15
4. ODOUR PERFORMANCE CRITERIA	16
5. PHYSICAL AND OPERATIONAL ODOUR CONTROLS	17
5.1 Physical Controls and Site Features	17
5.2 Operational Controls	20
6. ODOUR MONITORING PROCEDURES	22
6.1 Commissioning Tests	22
6.2 Ongoing OMS Monitoring	22
6.3 Daily Site Inspections	22
6.4 Monthly Odour Surveys	23
6.5 Proactive Engagement	23
6.6 Investigations of Detected Offensive Odour	23
6.7 Complaints	24
7. INCIDENTS AND CONTINGENCY MEASURES	25
8. ODOUR AUDIT	29
APPENDIX A QUALIFICATIONS	30

1. Introduction

This Odour Management Plan (OMP) has been prepared to address potential odour issues associated with the operation of a putrescible Waste Transfer Station (WTS) and associated infrastructure at the Cleanaway Pty Ltd (Cleanaway) Enviroguard site at 85 - 87 Quarry Road, Erskine Park, NSW.

Once operational, the development will primarily comprise a putrescible WTS with a nominal daily volume of approximately 1,050 tonnes of waste per day (design capacity 300,000 tonnes per annum (tpa)). However, initially around 90,000 tpa of putrescible waste (30% of the design capacity) is expected to be received at the site. All waste will be transported off-site to an appropriately licensed waste management facility.

1.1 Scope and Objectives of the OMP

This OMP is the lead odour management document outlining the management structure and strategies for odour performance during the continued operation of the WTS. It has been developed to meet the requirements of relevant legislation and to protect the safety and welfare of employees, tenants, local residents and the public.

Specifically, this OMP is designed to satisfy Condition B10 *Odour Management Plan* of Schedule C of the Development Consent for Application Number SSD 7075. It is a working document to be updated as necessary. Cleanaway will be responsible for ensuring that their operations comply with the provisions and measures contained within this OMP.

The general objectives of this OMP are to:

- Minimise the release of odours to the environment during all meteorological conditions;
- Meet the EPA requirement of managing offensive odours beyond the boundary of the facility;
- Implement best management practice;
- Implement an effective program for the monitoring of odour emissions; and
- Minimise impacts on the local community during operation.

The OMP includes the following information:

- Description of the local setting of the site (**Section 2**);
- Details of the process and the sources of odour emissions, including potential abnormal operating conditions that could lead to increased levels of odour emissions (**Section 3**);
- Performance criteria relevant to the management of odour emissions from the WTS (**Section 4**);
- Control measures in place to mitigate the effect of odour released from the WTS (**Section 5**);
- Details of the site's odour monitoring program (**Section 6**); and
- Contingency plans to mitigate the effects of odour release during normal and abnormal operations (**Section 7**).

1.2 Development Consent Requirements

Condition B10 (Odour Management Plan) of the Development Consent states that *Prior to commencement of construction, the Applicant shall prepare an Odour Management Plan to the satisfaction of the Secretary.*

Table 1 outlines the Secretary's requirements and references to responses contained within this OMP.

Table 1 Development Consent Requirements – Odour Management Plan

Requirement	OMP Section Reference
The plan must be prepared by a suitable qualified and experienced person(s) in consultation with the EPA	Appendix A
Describe the measures that would be implemented on-site to ensure all reasonable and feasible measures are employed to minimise offensive odour emissions, including details of the air pollution control device(s) and all other operational odour mitigation measures	Section 5 , Physical and Operational Offensive Odour Controls
Describe the measures that would be implemented on-site to ensure compliance with the relevant conditions of this consent	Section 5 , Physical and Operational Offensive Odour Control measures and Table 3 presents contingency measures implemented to ensure compliance with relevant conditions of the Development Consent
Describe the measures that would be implemented on-site to ensure contingency measures are deployed to minimise impacts should adverse odour emissions occur or appear likely to occur	Table 3 presents identified events which have the potential to lead to adverse offensive odour emissions from the plant together with contingency measures for each identified event
Include an ongoing monitoring program	Section 6.1 outlines details of proposed commissioning tests, an ongoing monitoring program will be developed after an Environmental Protection Licence (EPL) is issued
Include well defined triggers for the deployment of odour mitigation and contingency measures	Table 3 presents identified events which have the potential to lead to adverse offensive odour emissions from the plant including triggers for deployment of contingency measures
Include a protocol to determine the occurrence of an exceedance of any criteria to the EPL should any exceedance occur	Section 6.3 , Section 6.4 and Section 6.5 detail measures put in place to identify and mitigate odour emissions before an exceedance to any criteria should occur
Include contingency measures for design of system failure	Section 6.6 details measures put in place to identify and respond to 'design of system failure'

Condition C4 (Management Plan Requirements) of the Development Consent states that *The Applicant shall ensure that the environmental management plans/strategies required under this consent are prepared in accordance with any relevant guidelines.* **Table 2** outlines the Secretary's requirements and references to responses contained within this OMP.

Table 2 Development Consent Requirements – Management Plan Requirements

Requirement	OMP Section Reference
Include detailed baseline data	Section 2.5 , describes other sources of odour in the vicinity of the WTS
Include a description of the relevant statutory requirements (including any relevant approval, licence or lease conditions)	Section 1.2 details the Secretary’s Requirements and Section 4 details the relevant performance measures/criteria
Include a description of and any relevant limits or performance measures/criteria	Section 4 , details the relevant performance measures/criteria
Include a description of the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the Development or any management measures	Section 6.1 outlines proposed commissioning tests. Section 6.2 – 6.4 provide a framework for ongoing odour monitoring to confirm the performance criterion is being achieved.
Include a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria	Section 5 details measures put in place to identify and mitigate odour emissions before an exceedance to any criteria should occur. An ongoing monitoring program will be developed after an EPL is issued.
Include a program to monitor and report on the impacts and environmental performance of the Development	Sections 6.1 - 6.4 detail proposed programs to monitor and report of the performance of the development.
Include a program to monitor and report on the effectiveness of any management measures	Section 6.1 outlines details of proposed commissioning tests, which are designed to ensure the effectiveness of odour management measures.
Include a contingency plan to manage any unpredicted impacts and their consequences;	Table 3 presents contingency measures implemented to ensure compliance with relevant conditions of the Development Consent
Include a program to investigate and implement ways to improve the environmental performance of the Development over time	Section 6 details measures put in place to investigate odour incidents and identify necessary measures for improving performance of the development over time.
Include a protocol for managing and reporting any: <ul style="list-style-type: none"> i. incidents; ii. complaints; iii. non-compliances with statutory requirements; iv. exceedances of the impact assessment criteria and/or performance criteria; and v. a protocol for periodic review of the plan. 	<p>Section 6.6 details measures put in place to identify and respond to incidents and exceedances of the impact assessment criteria.</p> <p>Section 6.7 details measures put in place to address complaints.</p> <p>Section 1.4 details the periodic OMP review protocol.</p>

1.3 Responsibilities

Cleanaway's Regional Manager has the primary responsibility for implementing the OMP during operations. This responsibility includes monitoring the OMP's effectiveness and rectifying any deficiencies in the OMP. The Regional Manager may delegate some responsibilities to other staff members as appropriate.

All employees at the WTS must comply with the terms and conditions of the OMP and adopt the specified procedures for management of odour nuisance impacts, including corrective actions.

1.4 OMP Periodic Review

This OMP is a live document that will be reviewed upon commissioning, and on an annual basis thereafter, as a minimum to ensure that it remains relevant to site operations and to determine whether improvements can be implemented. As a matter of course, the plan will be reviewed should the following occur:

- Significant changes to plant operational practices;
- Substantiated odour complaint; and
- Occurrence of significant odour emission (identified through daily site inspections or monthly odour surveys).

2. Site Setting

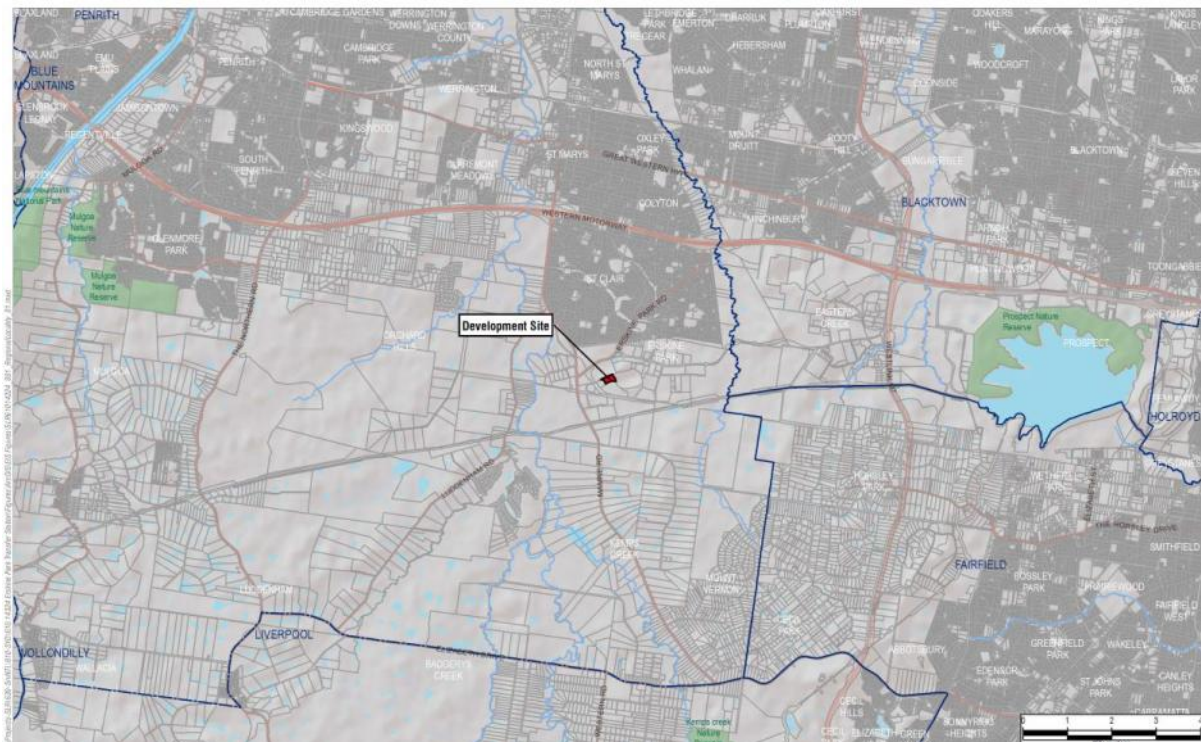
2.1 WTS location

The WTS is located at 85- 87 Quarry Road, approximately 42 kilometres (km) west of Sydney Central Business District (CBD), in the local government area of the City of Penrith and is part of the Greater Western Sydney region.

The WTS is located within the Erskine Park Industrial Precinct. Other industries also located in the Erskine Park Industrial Precinct include CSR Limited's glass processing plant. The precinct also contains warehouses for Sony DADC, BlueScope Steel, Koorong Bookstore, Hasbro, Ceva and a Woolworths Liquor distribution centre.

Adjacent land uses include a mix of farmland to the west, residential land to the north, and several schools to the south. The nearest residential premises are located along the western and northern boundaries of the Erskine Park Industrial Precinct. The location of the site is illustrated in **Figure 1**.

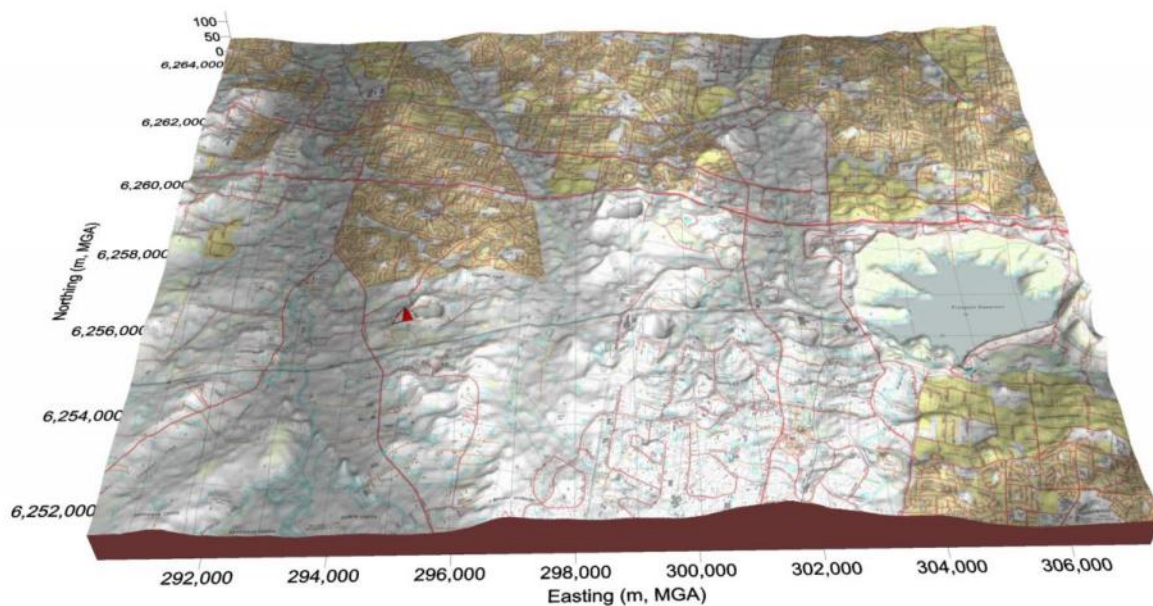
Figure 1 Site Location



2.2 Surrounding Topography

Topography is important as local atmospheric dispersion can be influenced by night-time katabatic (downhill) drainage flows from elevated terrain or channelling effects in valleys or gullies around the WTS.

A three dimensional representation of the area is given in **Figure 2**. The topography of the site is relatively flat, sloping gently to the west, with an elevation of approximately 60 metres Australian Height Datum (AHD).

Figure 2 Topography

2.3 Sensitive Receptors

A number of residences and sensitive receivers are located in the area surrounding the WTS. **Figure 3** illustrates the location of sensitive receptors in the vicinity of the site, while **Figure 4** depicts the Erskine Park Industrial Precinct and identifies many of Cleanaway's non-residential neighbours.

In **Figure 3**:

- The hatched areas show the location of residential areas;
- the yellow circles show the location of sensitive residential receptors scattered within the semi-rural areas surrounding the site; and
- The orange circles show the location of nearby schools and aged care centres.

Figure 3 Sensitive Receptor Locations

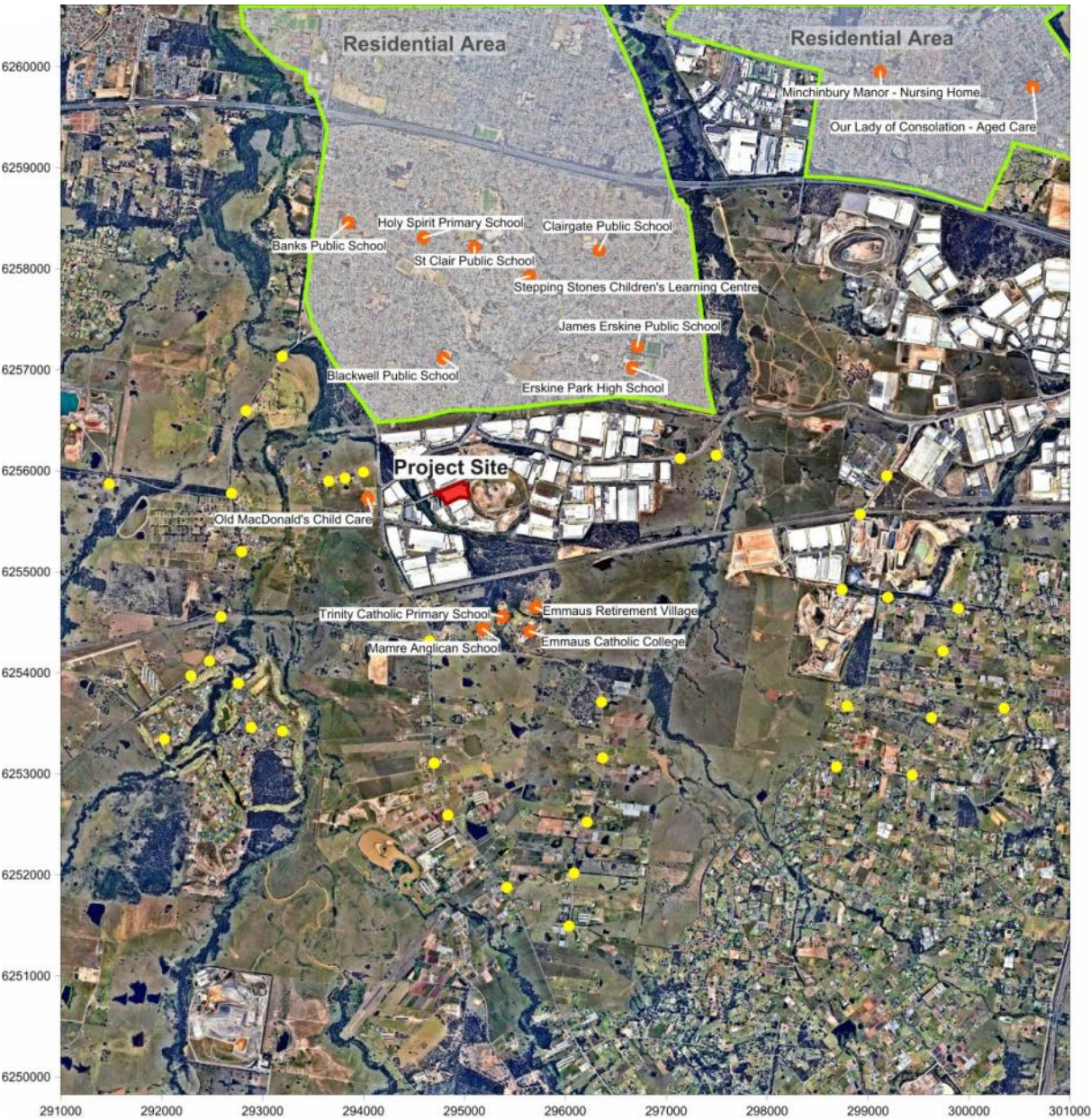


Figure 4 Erskine Park Industrial Precinct



2.4 Local Wind Conditions

A meteorological station will be installed at the WTS site to provide real-time data on local meteorological conditions relevant to the dispersion of odours. The parameters to be monitored are outlined in **Section 5.1**.

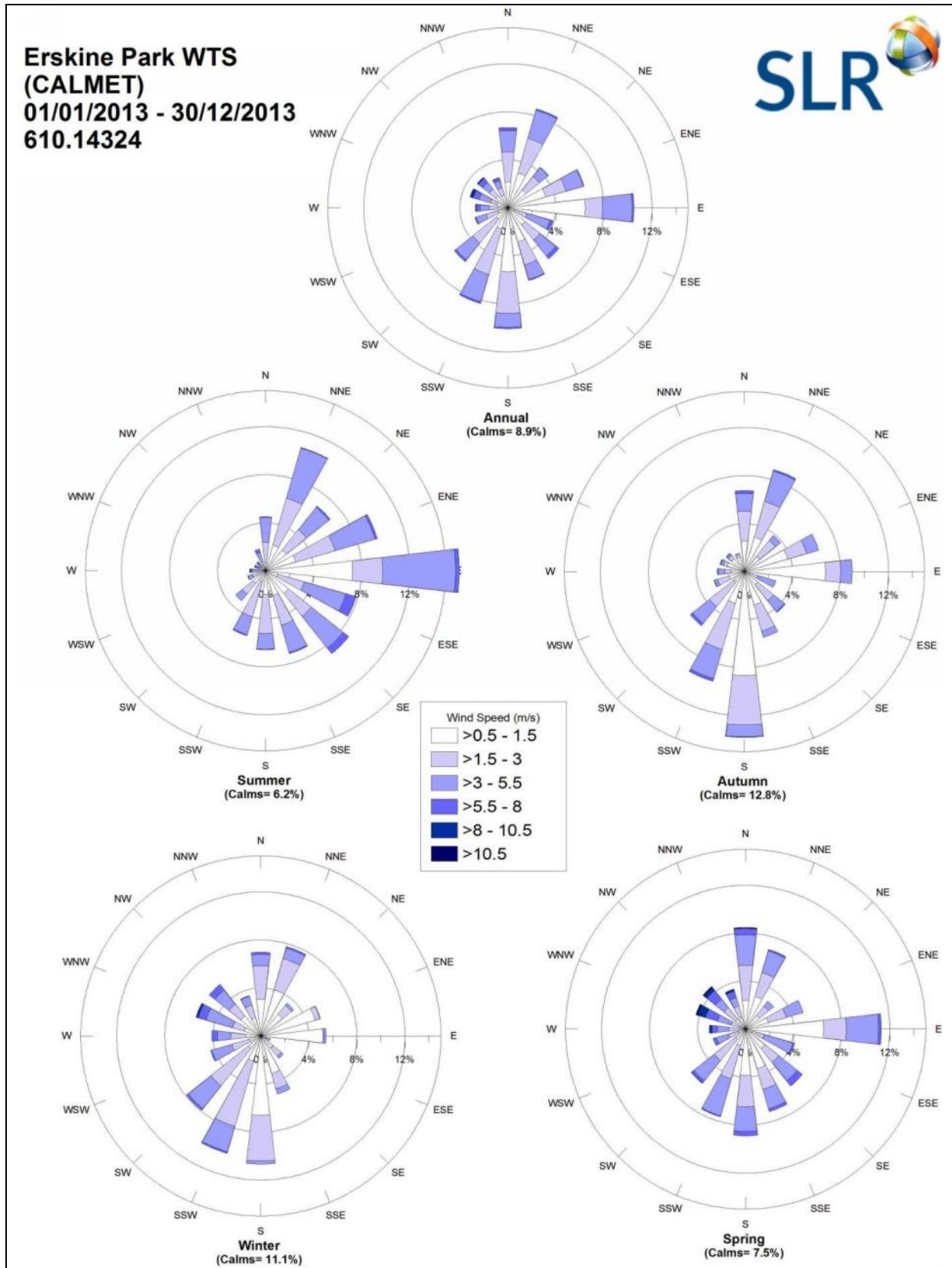
A summary of the annual wind behaviour at the WTS site, as presented in the SLR-prepared Air Quality Impact Assessment (2015), is presented as wind roses in **Figure 5**. **Figure 5** indicates that winds experienced at the site are predominantly moderate to high (between 1.5 m/s and 8 m/s) with a small percentage of strong winds (>10.5 m/s) and wind direction is seasonally dependent. Calm wind conditions (wind speed less than 0.5 m/s) were predicted to occur approximately 1% of the time throughout the modelling period.

The seasonal wind roses indicate that typically:

- In summer, winds are moderate to strong predominantly from between the north northeast and south southwest quadrant with very few winds from the western quadrant.
- In autumn, winds are moderate to high predominantly from the north northeast and southern quadrants with very few winds from the western quadrant.
- In winter, winds are moderate to high and are experienced predominantly from the north northeast and southern quadrants, with very few winds from the south eastern quadrant.
- In spring, winds are moderate to strong with high percentage of winds from northern, western and southern quadrants and strong winds experienced only from the north-western quadrant.

The wind roses presented in **Figure 5** indicate that any odours generated by the WTS would have the greatest potential to impact on sensitive receptors to the west and north of the site, given the higher frequency of light easterly and southerly winds.

Figure 5 Predicted Seasonal Wind Roses for the Erskine Park WTS (CALMET predictions, 2013)



2.5 Other Sources of Odour in the Vicinity of the WTS

In 2012, the NSW EPA commissioned the Western Sydney Regional Odour in response to a large number of odour complaints received by the NSW EPA in the Eastern Creek, Kemps Creek and Erskine Park Precinct areas¹. The study comprised:

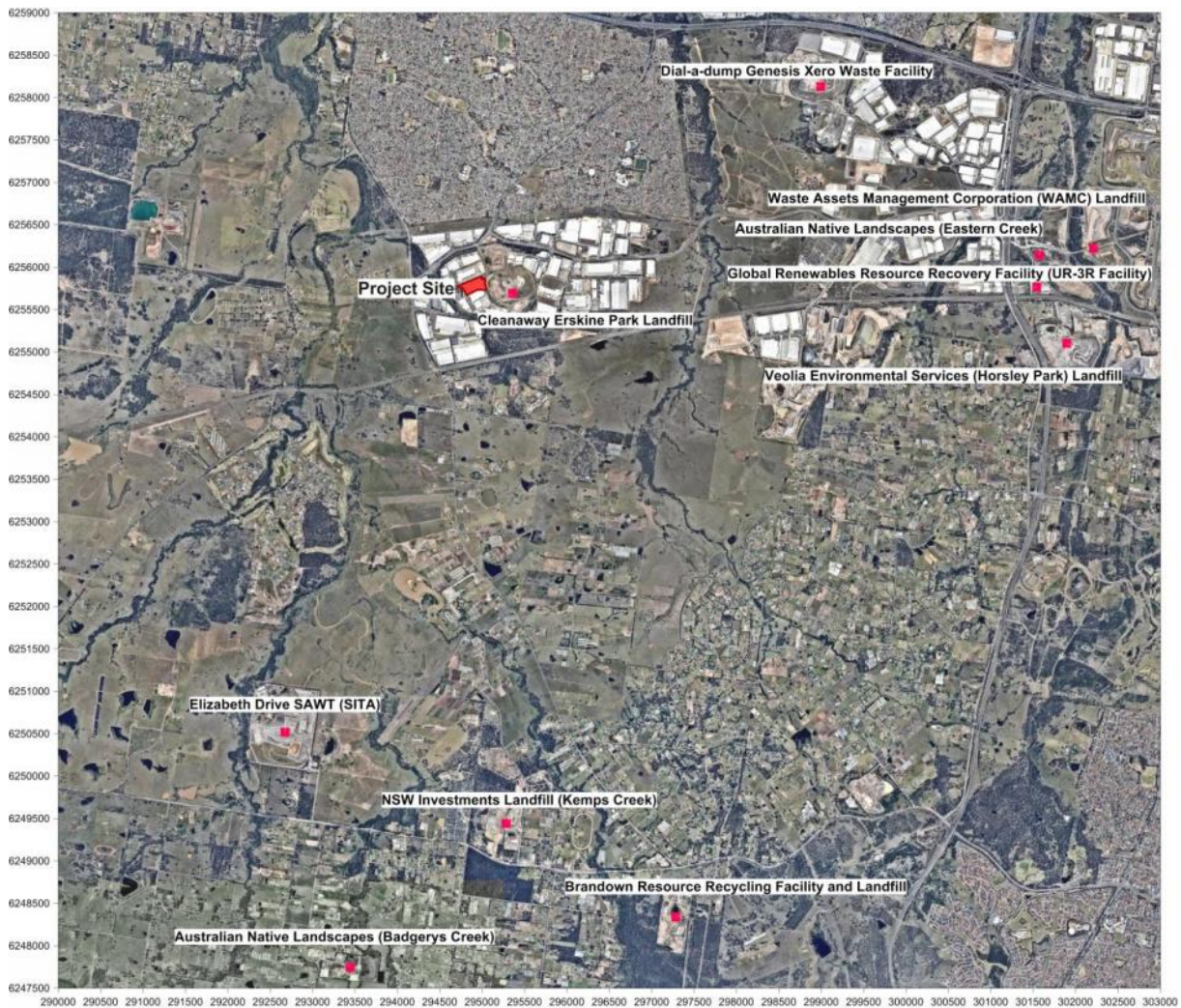
- A review of odour complaints, and other information held by the NSW EPA;
- A reconnaissance visit to the waste management sites that had the potential to contribute to the odour complaints;
- Performing a campaign of “field ambient odour assessments” during September 2012; and
- Various components of briefings and consultation.

The key findings of the assessment were as follows:

- Three waste facilities were identified to be emitting odours detectable at significant levels beyond the site boundary. These were (see **Figure 6**):
 - Global Renewables Facility Eastern Creek;
 - WAMC Landfill Eastern Creek; and
 - SITA (now Suez) SAWT Facility Kemps Creek.
- No odour that could be attributed to the facility was detected outside the boundary of:
 - Brandown Resource Recycling Facility and Landfill;
 - NSW Investments Landfill (Kemps Creek);
 - Dial-a-dump (Genesis) Landfill;
 - Transpacific Industries Landfill (Enviroguard) – now known as Cleanaway Erskine Park Landfill;
 - Veolia Environmental Services Landfill (Horsley Park); and
 - Australian Native Landscapes (Badgery’s Creek).
- The study also identified odours which could not be linked back to the facilities within the scope of this study. The odours detected in this instance were identified to be likely emanating from horticultural and farming activities occurring in the Eastern Creek and Kemps Creek precincts.

¹: <http://www.epa.nsw.gov.au/pollution/WestSydOdour.htm>.

Figure 6 Western Sydney Region Waste Facilities



A further program of ambient odour surveys was performed as part of the AQIA to determine the baseline odour conditions around the WTS site. The objectives of this campaign were to:

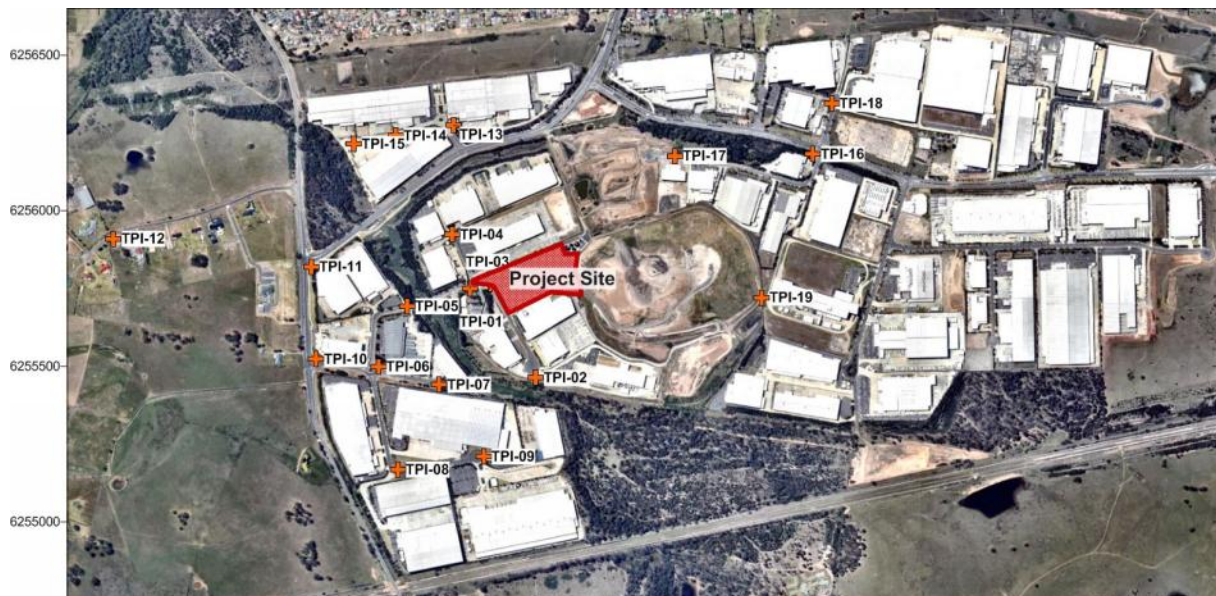
- Provide observational data to understand the odour impacts of existing Cleanaway operations;
- Understand the regional baseline odour conditions, upon which operations of the waste transfer station may contribute to enable an assessment of potential cumulative impacts;
- Provide a baseline assessment which could be replicated upon start of operations to provide an observation-based assessment of performance; and
- Provide a baseline for operational odour management.

Field odour assessments were performed over the period from 16 December 2014 to 16 February 2015. The following locations (depicted in **Figure 7**) were the principal observation locations:

- TPI-01 Main Gate House / Site Office;
- TPI-02 Quarry Road down towards Devondale (cul-de-sac);
- TPI-03 Driveway entrance 85 - 87 Quarry Road / Cleanaway Depot opposite at 48 Quarry Road;
- TPI-04 Hasbro DC driveway;
- TPI-05 Between Wetland/Creek & Cleanpak Quarry Road;

- TPI-06 Roundabout Quarry Road & James Erskine Drive;
- TPI-07 Cul-de-sac James Erskine Drive;
- TPI-08 Corner of Quarry Road & Sarah Andrews Close;
- TPI-09 Cul-de-sac Sarah Andrews Close (Woolworths DC);
- TPI-10 Corner Mamre Road & James Erskine Drive;
- TPI-11 Corner Mamre Road & Erskine Park Road ;
- TPI-12 Mandalong Close;
- TPI-13 Corner of Erskine Park Road and Goodmans building (ACR / Capral);
- TPI-14 Front of Capral up to Lenore Drive;
- TPI-15 Adjacent to Erskine Park Road;
- TPI-16 Corner of Lenore Drive and Tyrone Place;
- TPI-17 Cul-de-sac Tyrone Place;
- TPI-18 Cul-de-sac John Morphett Place; and
- TPI-19 TPI boundary near Blue Scope Steel.

Figure 7 Odour Survey Locations Used in the AQIA



The observations made during the field odour study confirmed that odour from the existing operations at the Cleanaway (formerly known as TPI) Erskine Park site were not contributing to odour nuisance in the community. Observations were made of odour being present on site but these were. Odour was detected from the Cleanaway skip bins storage area, located in the southwest of the Project Site only and was not observed to be detectable at the Project Site boundary.

The observations were concluded as being consistent with the Western Sydney Regional Odour Assessment findings that did not find any evidence linking Cleanaway landfill activities to the widely recognised long-standing odour issues in the region.

3. WTS Process Description

3.1 Overview of Operations

Waste delivery vehicles will enter the site, weighing on the incoming weighbridge located adjacent to the office building. Delivery vehicles will then proceed to the eastern side of the building where they will align with one of the five roller shutter door entrances on the eastern elevation. The vehicles will reverse through one of the rapid acting roller shutter doors which open and then close immediately after entering, discharge their waste and then drive out of the building activating rapid open/close door, down a ramp and proceed to the south of the transfer station towards the outgoing weighbridge, exiting the site onto Quarry Road.

Waste offloaded on the tipping floor will be consolidated and transferred into transfer vehicles by a wheel loader which will load the material into transfer vehicles in the load-out tunnel. Waste deemed recoverable will be sorted by a floor sorting process, with mobile plant (eg. hydraulic excavator/s and skip bins for recyclable metals etc.). The excavator will also be used to redistribute waste material in the loaded vehicles and to provide some compaction by packing waste down within the load out truck.

All received waste will then be transported off-site to an appropriately licensed waste management facility. Only waste compliant with the current EPL Number 4865 will be disposed of at the adjoining Cleanaway Erskine Park Landfill.

Site Capacity

The WTS will be able to accommodate a nominal daily volume of approximately 1,040 tonnes of waste per day, with an overall design capacity of 300,000 tpa. Although this represents the maximum annual throughput capacity of the plant, the facility is not expected to reach this throughput for a number of years.

Operating Hours

The Development Consent for the WTS allows the facility to operate 24 hours a day, seven days a week, however the majority of truck movements to and from the site will be typically between 7:00 am and 5:00 pm, under normal operation.

Waste Types

The majority of the material received is expected to be waste from commercial and residential waste collection trucks, stationary compactor (packer) hooklift loads and side-loader collections (e.g. 240 litre (L) mobile garbage bin collections from commercial and residential premises).

3.2 Potential Sources of Odour Emissions

Odour emissions from the site can occur during both normal and abnormal conditions. Under normal conditions, there are various stages of the process that have potential for odours to arise. These include:

- receipt and unloading of waste inside the WTS;
- temporary storage of waste material within the WTS; and
- handling of waste material within the WTS.

All putrescible waste has the potential to generate odours as the material breaks down over time; as such controls will be in place to prevent or minimise odours.

Without active management, odours would be allowed to build up within the WTS building and would be emitted in a fugitive manner through the door openings resulting in an unmanaged impact upon the local community. **Section 5** outlines the controls that are to be put in place to prevent such impacts from occurring.

4. Odour Performance Criteria

The Technical Framework *Assessment and Management of Odour from Stationary Sources in NSW* (NSW DEC, 2006) requires the application of odour performance goals to be 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.

This approach is implemented by adjusting the relevant odour concentration goal on a scale (from 7 OU to 2 OU) depending upon the size of the population being (potentially) exposed. In Metropolitan Sydney, the NSW EPA has adopted to use the most stringent end of that scale (2 OU) universally when assessing odour near to urbanised areas.

In terms of compliance, the compliance specification is to achieve the standard of odour control demanded by the NSW guidance which is to achieve no unacceptable offensive odour impacts in the community. In terms of an impact assessment criterion, this is expressed as the impacts not to exceed 2 odour units (OU) as the 99th percentile of 1-hour predictions (expressed as a 1-second nose response time). In this OMP, this is called the 'compliance standard'.

In simple terms, the odour concentration of 2 OU is to be achieved for 99 percent of the year. As impact assessment modelling is performed at a 1-hour time resolution, this would equate to achieving the compliance standard for $(99/100 \times 8,760)$ 8,672 hours per year, and for 88 hours of the year, the plant would not need to achieve the 2 OU criterion.

The NSW standard of 2OU as the 99th percentile has been developed to allow for unforeseen events, such as process malfunction, extreme weather or other factors that make practical odour management more problematic.

Supplementary to the compliance standard, which represents the standard that needs to be achieved to satisfy the requirements of the POEO Act and the relevant NSW guidance, Cleanaway has imposed a more stringent standard on the odour design for the WTS of 2 OU as the 100th percentile of 1-hour predictions (expressed as a 1-second nose response time). This criterion is to be applied at the boundary of the Erskine Park Industrial Precinct.

In simple terms, this design standard does not allow for any hours of operation that exceed the compliance standard. The objective of the design standard is to not give rise to odour at concentrations that would potentially lead to odour complaints (ie, above the 2 OU criterion) for any period of time.

Given the sensitivity of the receiving community to offensive odour, this OMP has been developed with the aim of achieving compliance with the 'design standard' during the operation of the WTS, including during emergencies and adverse weather conditions. Control measures put in place for achieving compliance with the design standard are detailed in **Section 5**. **Section 7** details contingency measures adopted to maintain compliance with the design standard in case of adverse offensive odour events and emergencies.

5. Physical and Operational Odour Controls

5.1 Physical Controls and Site Features

Whilst a number of potential odour sources have been identified (**Section 3.2**); they are all contained within the building and the air from the building will be extracted through the Odour Management System.

The proposed Odour Management System offers multiple levels of control that facilitate an integrated solution for emission control:

- **Containment:** containment of odour within the building fabric using fast acting doors and an air extraction system. The fan rate will be set to achieve the proposed extraction rate, although this may be varied to fit operational circumstances.
- **Maximum plume dispersion:** the use of dilution fans to maximise the dispersion and dilution of the extracted air.
- **Emission control:** the operation of a treatment system (wet scrubber) when required.

Scenarios and contingency responses are set out in **Table 3** in **Section 7**.

Containment

The principal method for the control of emissions from the Waste Transfer Station is containment. The building is designed to operate under negative pressure, which is recognised as a key method to minimise fugitive emissions (i.e. building leakage). Negative pressure will be achieved through the installation of fast-acting doors on the waste delivery doorways located on the eastern façade of the building and on the waste export doorways which are located on the lower level of the southern part of the building, as well as an extraction system at, or near, the internal ceiling height.

The fast acting doors will be operated by proximity sensors or pressure pads and will operate in the 'closed' position unless triggered by an approaching vehicle.

A continuous carbon monoxide (CO) monitoring system will be installed inside the WTS building in accordance with Australian Standards and Workcover requirements to monitor CO concentrations. The ventilation system air flow rate will be maintained to ensure that CO concentrations do not exceed occupational exposure criteria due to vehicle exhaust emissions within the building.

Maximum Plume Dispersion

The air in the building will be extracted by a legged extraction system installed in the internal roof space of the building equipped with variable speed fans which can be adjusted to achieve the required air extraction rate within the building. The air extraction rate during periods of normal operation will be three air changes per hour.

The extracted air will either:

- be exhausted to atmosphere via high plume dispersion stacks on the roof of building (if additional odour treatment is not required); or
- directed to the odour treatment system (wet scrubber) if the air needs to be treated prior to discharge via the dilution stacks on the roof of building.

High plume dispersion stacks are designed to offer enhanced emission control through the entrainment of additional air from the surrounding environment, so that dilution, mixing and discharge velocity are maximised. Three stacks will be installed during construction, with two being in operation as "duty" units and the third

available as redundant “standby” for backup. Design provision has been made for an additional dispersion stack to be installed in the future, if required.

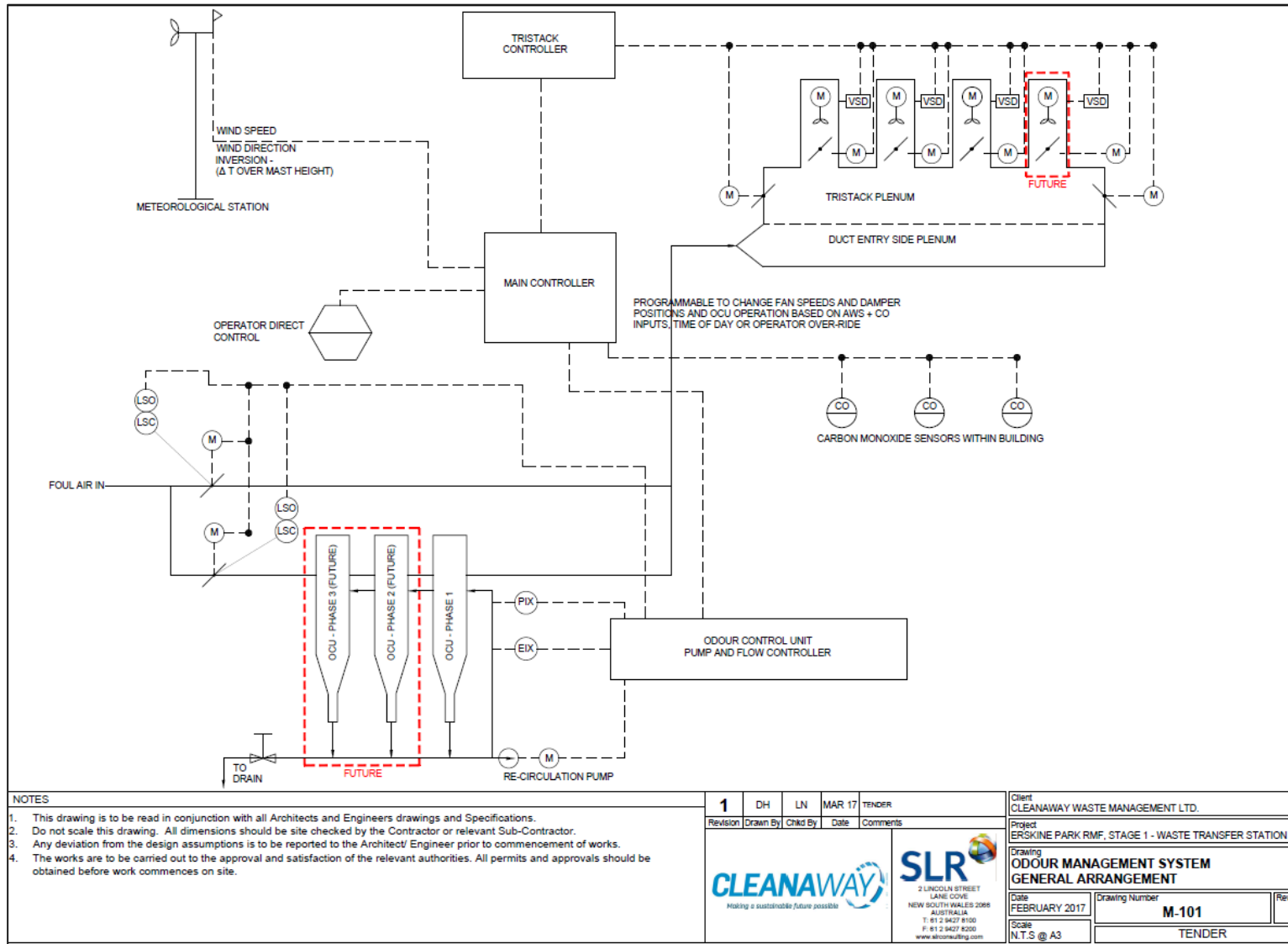
Odour Treatment

The odour treatment solution adopted is a wet scrubber system located externally to the northern façade of the building which will be installed in phases, as required, depending on the operating throughput of the WTS and effectiveness of the integrated Odour Management System. One scrubber will be installed during construction of the WTS with an air flowrate capacity of 15 m³/s. Provision has been made in the design for up to two more units (15 m³/s each) to be installed in the future, if required. After passing through the odour treatment system, the scrubbed air will be ducted to roof height for discharge through the high plume dispersion stacks located on the roof of the building.

As indicated above, the building ventilation system is designed so that the treatment system (scrubber) can come online when required as determined by the monitoring and verification process (see **Section 6.1**). (e.g. emissions may be discharged via a bypass of the scrubber when treatment is not required). Atmospheric dispersion modelling predictions of odour emissions from the Project Site (SLR 2015) indicate that the plant does not require any supplementary air pollution control to achieve the standards required under NSW legislation, neither does it require this until the plant is operating in excess of 90% of design throughput capacity. At a throughput of 90% or greater, an abatement efficiency of 40% or greater would achieve compliance with the design standard.

A schematic diagram of the OMS is provided in **Figure 8**. The detailed operation and maintenance procedures for the OMS are provided in the relevant Operation & Maintenance Manuals.

Figure 8 Odour Management System – General Arrangement Diagram



NOTES

1. This drawing is to be read in conjunction with all Architects and Engineers drawings and Specifications.
2. Do not scale this drawing. All dimensions should be site checked by the Contractor or relevant Sub-Contractor.
3. Any deviation from the design assumptions is to be reported to the Architect/ Engineer prior to commencement of works.
4. The works are to be carried out to the approval and satisfaction of the relevant authorities. All permits and approvals should be obtained before work commences on site.

1	DH	LN	MAR 17	TENDER	Client CLEANAWAY WASTE MANAGEMENT LTD.
Revision	Drawn By	Chkd By	Date	Comments	Project ERSKINE PARK RMF, STAGE 1 - WASTE TRANSFER STATION
					Drawing ODOUR MANAGEMENT SYSTEM GENERAL ARRANGEMENT
					Date FEBRUARY 2017
Scale N.T.S @ A3					TENDER

Weather Station

In addition to the OMS, a weather station will be installed on-site in order to record local meteorology conditions. The parameters recorded by the weather station include:

- Rainfall;
- Wind speed (10 m);
- Wind direction (10 m);
- Temperature;
- Relative humidity; and
- Solar radiation.

This will assist in identification of adverse weather conditions and will be a fully integrated system whereby the weather station communicates with the OMS. This will allow additional levels of control, so that the system can be optimised to suit prevailing weather conditions. In addition, the observational data will be logged and stored in a database for use in:

- Complaints investigations; and
- Any air dispersion modelling studies that are required to be performed for the WTS in the future.

5.2 Operational Controls

The following operational controls will be implemented at the site to control odours.

Control Type	Issue	Control Measure
Housekeeping	Spillage	<ul style="list-style-type: none"> • All waste handling operations will take place within the WTS building. • The waste will be transported on and off-site in appropriate vehicles. • Plant walkways will be cleaned daily. • Sweeping will be undertaken regularly with particular focus on high use areas such as the weighbridge and waste reception areas • Roadways will be inspected regularly and cleaned as required. • All vehicles carrying loads will arrive and depart with covers in place to prevent fugitive emissions and littering. • Vehicles carrying loads will be visually inspected prior to leaving the WTS building, to ensure that any debris is not transferred out of the WTS building onto public roads.
	Cleaning	<ul style="list-style-type: none"> • Good housekeeping will be maintained, to include the cleaning down of all areas within the building including floors and bay walls to ensure the removal of any residues or debris and reduce the potential for odour. • Where possible, it is anticipated that the WTS will be cleared of putrescible waste on a daily basis. • The internal areas have been designed so as to reduce the amount of inaccessible areas for cleaning, and the push walls will be sealed and flashed to prevent waste accumulation behind them. • Flashing is to be installed at top of push wall to prevent waste overtopping into void between push wall and building envelope. • All drainage systems on site will be regularly maintained to ensure they are free of detritus.
Operational	Waste acceptance/rejection	<ul style="list-style-type: none"> • Delegated staff will ensure that capacity is available on-site before accepting waste. • Loads will not be accepted unless they are weighed, sufficient storage capacity exists and there are no existing issues compromising the effectiveness of odour management systems on site.

Control Type	Issue	Control Measure
		<ul style="list-style-type: none"> All waste types will be subject to visual inspection upon arrival and where a waste load is not in line with accepted waste types under the environmental licence, or is deemed too odorous, it will be transferred and removed from site as quickly as possible to prevent further degradation and minimise potential generation of odour. A note of the load rejection will be made in the site diary and a load rejection form will be completed, with a copy of this form kept on site. Any sources of waste which persistently do not meet acceptance requirements will require remedial action to be taken.
	Storage times	<ul style="list-style-type: none"> A second inspection of material will take place within the WTS building of the WTS. Any waste discharged within the WTS which is found to be excessively malodorous by the WTS operatives will be 'quarantined' and arrangements made for it to be immediately removed from site. Information regarding such loads will be recorded within the site diary. In all other cases, all putrescible waste will be removed within 48 hours of receipt on site. Given the low odour potential, the non-putrescible dry recyclate waste fraction may be stored on site for longer. Waste material will be moved in a regular and consistent manner and the site will generally operate a first in and first out (FI-FO) policy on putrescible waste streams ensuring that offensively odorous waste is removed from site as quickly as possible to prevent further degradation and minimise potential generation of odour.
	Fugitive emissions from doorways	<ul style="list-style-type: none"> All personnel access and fire doors will be kept shut except in case of fire. The fast-acting doors on the waste delivery/export doorways are to be operated in accordance with manufacturer's specifications and not deactivated to be held in an open position unless the secondary containment door is closed. A programme of regular inspection (every quarter or as agreed with the door manufacturer) and maintenance is in place for the roller shutter doors and their opening/closing mechanism. Maintenance required on doors will be undertaken as quickly as possible.
Wastewater		<ul style="list-style-type: none"> Leachate (liquor from putrescible waste), will be collected in the onsite drainage system.
Staff Training	Internal training	<ul style="list-style-type: none"> In addition to general environmental awareness training, specific training will be provided to relevant staff, which will include: <ul style="list-style-type: none"> The regulatory requirements associated with the EPL; Potential environmental impacts which may be caused by the plant under their control during normal and abnormal circumstances; Prevention of accidental emissions and actions to be taken when accidental emissions occur; and Procedures for compliant handling, investigation, resolution and reporting back to the complainant and EPA. All employees will be instructed to remain vigilant to and report any unusual odour around the plant, yard or vehicles immediately to the site manager.

6. Odour Monitoring Procedures

6.1 Commissioning Tests

A rigorous monitoring and verification process will be performed within the first 6 months of operations, when waste tonnages at the plant are well below design capacity, to:

- perform efficiency trials on the Odour Management System;
- verify predicted odour concentrations; and
- refine odour management measures included in this OMP.

Commissioning tests will be carried out by an accredited laboratory in accordance with AS4323.3: 2001 and the NSW Department of Environment and Climate Change (DEC) *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* dated December 2006.

6.2 Ongoing OMS Monitoring

Cleanaway will also undertake follow-up monitoring on the OMS during the operational lifetime of the WTS, on a basis to be agreed with the relevant authorities. This OMP will be updated once details of the monitoring program have been finalised.

6.3 Daily Site Inspections

Daily site inspections will be undertaken in order to identify and mitigate offensive odours from the WTS before the odours can lead to exceedances of the adopted criteria. These will be undertaken by trained operational staff, with verified odour sensitivity who will typically be personnel not normally exposed to the interior of the WTS building.

The daily site inspections will involve a walk-over of the WTS site, including the perimeter fenceline, along an agreed route (to be confirmed prior to commissioning) that coincides with some of the specific observation points shown in **Figure 7**.

The following information will be noted on a field sheet during each daily site inspection:

- The time and date of the inspection;
- The weather conditions at the time of the inspection;
- Any unusual activities occurring on site with potential for offensive odour generation;
- The status of the treatment system (ie, scrubber on/off);
- Any odours observed, including the character, location and strength; and
- Any sources of the odours identified during the walk over (eg, parked trucks, bin areas).

The findings of the daily walk overs will be reviewed after three months from commissioning to assess whether the frequency of the inspections should be changed to weekly etc.

In addition to the daily self-inspections, all employees will be reminded on a regular basis to report any perceived offensive external smells around the plant immediately to the delegated staff.

Any offensive odours identified through the daily inspections that are confirmed to originate from the site will be mitigated in accordance with this OMP.

6.4 Monthly Odour Surveys

Initially, monthly odour surveys will be undertaken to confirm the site is operating in compliance with the adopted criteria. These surveys will be undertaken by an independent contractor.

The objectives of the monthly odour surveys will be to:

- Provide observational data to understand the odour impacts of the WTS operations as well as other odour sources within the Erskine Park Industrial Precinct and the surrounding area; and
- Provide data that can be assessed against the baseline assessment performed as part of the AQIA for the WTS to identify if there has been an increase or decrease in offensive odour over time.

To provide data that can be related to the baseline odour surveys performed as part of the AQIA, as depicted in **Figure 7**.

The results of the monthly odour surveys will be reviewed after three months from commissioning to assess whether the frequency of the surveys should be changed to quarterly or other frequency.

6.5 Proactive Engagement

As outlined in **Section 4**, a 'design standard' beyond the required 'compliance standard' has been adopted for the facility. This design standard of 2 OU as the 100th percentile of 1-hour predictions does not allow for any hours of operation that exceed the compliance standard. The objective of the design standard is to not give rise to odour at concentrations above the 2 OU criterion at any time in any area beyond the boundary of the Erskine Park Industrial Precinct.

The identification of conditions under which low level but detectable offensive odours are emitted from the WTS could assist in identifying potential future problems at an early stage. To do this, WTS management will develop a relationship with adjacent sites within the Erskine Park Industrial Precinct so that neighbours are encouraged to report any offensive odours they observe coming from the WTS.

6.6 Investigations of Detected Offensive Odour

In the event that an offensive odour is detected through self-inspections or reported through proactive engagement, immediate investigation will take place. Such investigations would also be undertaken in response to any complaints that may be received.

As part of odour investigations, the characteristic of the offensive odour detected, together with prevailing wind conditions at the time of detection will be used to confirm the possibility of the offensive odour originating from the WTS. If the reported offensive odour character and prevailing wind conditions suggest that the offensive odour may originate from the WTS, the following checks will be made:

- Check site for spillages;
- Check the WTS floor for any highly odorous waste;
- Check building/shutter door integrity;
- Check ducts for leaks;
- Check air extraction system;
- Check odour treatment system operational parameters; and
- Check Odour Management System control parameters.

If any issues are identified through the checks outlined above, immediate remedial action will be taken in accordance with Section 7 of this OMP.

If off-site odours are reported to the site after the incident occurred, the waste acceptance logs will also be reviewed to identify if any potentially highly odorous loads were accepted on the day of the incident (or the day prior), in addition to the checks listed above.

If no issues are identified through the checks outlined above and it is confirmed through analysis of on-site wind data that the odours have most likely originated from the plant, further investigations will be performed to identify if the following operational modifications to the OMS should be implemented:

- Increasing the high plume dispersion stack fan speeds;
- Operation of the “redundant standby” high plume dispersion stack;
- Modification of the trigger points for switching on the treatment system (scrubber/s).

If these measures do not resolve the issue, further investigations will be performed to identify if any structural modifications to the OMS are required. Examples may include:

- Installation of a third “duty” high plume dispersion stack;
- Expansion of treatment capacity via installation of a second scrubber (OCU Phase 2, See **Figure 8**);
- Expansion of treatment capacity via installation of a third scrubber (OCU Phase 3, See **Figure 8**).

In the interim, the receipt of waste materials will be temporarily limited to levels that will not lead to exceedances of the design standard beyond the boundary of the Erskine Park Industrial Precinct until the issue is resolved.

6.7 Complaints

A company representative shall respond as soon as possible after any complaints are received so that effective appraisal of the complaint can be carried out by subjective assessment. This assessment will include travel to the location of the complaint in order to verify source of odour and will be carried out in accordance with Cleanaway’s complaints handling procedures outlined in the Environmental Management Plan (EMP).

7. Incidents and Contingency Measures

Cleanaway has designed redundant capacity in the odour control system so that any unexpected increase in odour emissions can be managed. However, incidents that might adversely affect the control of odour at the plant have been considered. Measures have been put in place to reduce the likelihood of an incident occurring, minimise any impacts if an incident were to occur, and recover control of the process as quickly as possible. This plan considers those events which could lead to circumstances under which satisfactory odour control cannot be achieved through the measures outlined in this plan and can cause an exceedance to the adopted design criterion (**Section 4**) and short term impact on the residential receptors (**Section 2.3**).

Table 3 presents identified events which have the potential to lead to adverse odour emissions from the plant, together with contingency measures for each identified event.

In preparing this plan, the following have been considered:

- Investigation and substantiation of odour complaints in accordance with **Section 6.6** of this OMP;
- Possible process or control failures or abnormal situations which could lead to an increased level of offensive odour emissions;
- Potential outcomes of different failure scenarios;
- The actions to be taken to mitigate the effect of odour release; and
- Contingency plan to mitigate the effects of offensive odour release should initial actions taken to mitigate the effect of offensive odour release fail.

In assessing possible risks of odour release, four main types of failure have been considered:

- Those with the potential to affect the process and hence generation of offensive odour;
- Those which affect the ability to abate offensive odour release;
- Those which affect the ability to contain odour; and
- Those affecting dispersion between the release point and sensitive receptors.

Table 3 Abnormal Events and Contingency Measures

Event	Prevention Measures	Trigger Point	Contingency 1	Contingency 2
<p>Breakdown of waste handling equipment <i>Front end loaders, excavators and waste sorting equipment will be used for sorting of received waste and loading onto trucks</i></p>	<ul style="list-style-type: none"> • Appropriate selection of mobile equipment with waste handling specification • Routine monitoring and maintenance of all equipment • Not overloading equipment • Maintain critical spares • Minimise storage of waste on site • Roller shutter doors normally closed in order to contain odours inside WTS building 	<ul style="list-style-type: none"> • Report of breakdown • Detection of offensive odours at industrial precinct boundary 	<ul style="list-style-type: none"> • Movement of waste on the WTS floor will be minimised • Review building ventilation rates and adjust if necessary • Backup (mobile equipment) hired in 	<ul style="list-style-type: none"> • All elements of OMS activated • Receipt of waste material temporarily halted, if a backup machine is not available to continue load-out of waste
<p>Breakdown of roller shutter doors <i>Fast acting doors operated by proximity sensors or pressure pads will operate in the 'closed' position unless triggered by an approaching vehicle.</i></p>	<ul style="list-style-type: none"> • Routine monitoring and maintenance of doors • Negative pressure ventilation system • Maintain critical spares • Minimise storage of waste on site • Secondary containment doors installed in WTS to be closed in event of fast acting door failure. 	<ul style="list-style-type: none"> • Report of breakdown • Detection of offensive odours at industrial precinct boundary 	<ul style="list-style-type: none"> • Secondary steel roller shutter door/s closed in affected door openings • Fast acting door affected by breakdown closed manually if possible in order to contain odours inside WTS building • Trucks delivering waste to the WTS directed to only use fast acting door entrances that are still in operation. 	<ul style="list-style-type: none"> • Review building ventilation rates • All elements of OMS activated • All waste material transported off-site • Receipt of waste material temporarily halted
<p>Breakdown of dispersion fan system <i>Dispersion stacks are designed to offer substantially enhanced emission control through the entrainment of additional dilution air from the surrounding environment, so that the odour is diluted and mixed at the point of discharge and the emission velocity is enhanced.</i></p>	<ul style="list-style-type: none"> • Routine monitoring and maintenance of dilution fan system • Maintain critical spares • Minimise storage of waste on site • Redundant standby dispersion stack installed and operable • Carbon monoxide monitoring system installed in WTS building 	<ul style="list-style-type: none"> • Report of breakdown • Detection of offensive odours at industrial precinct boundary 	<ul style="list-style-type: none"> • Commence operation of redundant standby unit • Wet scrubber system activated (if required) • Number of air changes per hour decreased to 2 	<ul style="list-style-type: none"> • Review building ventilation rates • All elements of OMS activated • All waste material transported off-site • Receipt of waste material temporarily halted

Event	Prevention Measures	Trigger Point	Contingency 1	Contingency 2
<p>Breakdown of wet scrubber system <i>The wet scrubber system is on standby and activated during periods of high waste throughput, adverse weather conditions and/or emergency scenario.</i></p>	<ul style="list-style-type: none"> Routine monitoring and maintenance of wet scrubber system; Maintain critical spares Minimise storage of waste on site Redundant standby high plume dispersion stack installed and operable 	<ul style="list-style-type: none"> Report of breakdown Detection of odours at industrial precinct boundary 	<ul style="list-style-type: none"> Review building ventilation rates and adjust if necessary Dilution fan rates increased in order to assist with dilution of odorous emissions Commence operation of redundant standby dispersion stack (if required) Minimise waste handling and disturbance of odorous material 	<ul style="list-style-type: none"> Number of air changes per hour decreased to 2 Receipt of waste material temporarily limited/halted if volume of waste inside WTS building approaches quantity modelled in "emergency" scenario (1,040 tonnes on floor)
<p>Escape of incoming waste <i>Spillage of waste on site may promote elevated levels of odour.</i></p>	<ul style="list-style-type: none"> Good housekeeping Mandatory covering of all incoming and outgoing trucks carrying loads Staff training. 	<ul style="list-style-type: none"> Spill Loss of containment 	<ul style="list-style-type: none"> Immediate removal of waste Clean-up affected area 	
<p>Breakdown of air extraction system <i>The ventilation rate within the waste reception hall during periods of normal operation will be three air changes per hour</i></p>	<ul style="list-style-type: none"> Routine monitoring and maintenance of extraction system; Maintain critical spares; Minimise storage of waste on site. 	<ul style="list-style-type: none"> Detection of odours at industrial precinct boundary 	<ul style="list-style-type: none"> Roller shutter doors closed in order to contain odours inside the WTS building. Receipt of waste material temporarily halted 	<ul style="list-style-type: none"> All waste material transported off-site
<p>Abnormal traffic conditions <i>To help minimise odour emissions associated with the breakdown of organic materials over longer time periods, all waste will be transported off-site within 48 hours of receipt</i></p>	<ul style="list-style-type: none"> Outside the control of the operator Emergency scenario modelled Integrated Odour Management System includes treatment step (wet scrubber) Carbon monoxide monitoring system installed in WTS building for occupational exposure management 	<ul style="list-style-type: none"> Waste cannot be transferred from the WTS (eg. temporary closure of approved transport route) 	<ul style="list-style-type: none"> Review building ventilation rates and adjust if necessary All levels of odour control system (i.e. wet scrubber, as well as dilution fans) activated. 	<ul style="list-style-type: none"> The number of air changes per hour decreased to 2, Operations within the WTS building may continue at reduced air changes, with CO monitoring system driving minimum air extraction rate. Receipt of waste material temporarily halted once the capacity of the WTS building is reached.
<p>Power outage <i>Ventilation, wet scrubber, dilution fan and rapid acting roller shutter door systems are dependent on electricity.</i></p>	<ul style="list-style-type: none"> Outside the control of the operator 	<ul style="list-style-type: none"> Emergency shutdown, including odour control system 	<ul style="list-style-type: none"> Roller shutter doors manually closed in order to contain odours inside WTS building. Receipt of waste material temporarily halted when capacity of WTS building 	<ul style="list-style-type: none"> Backup generator procured to keep odour control system operational Operations resume under temporary power supply if all air handling systems operational

Event	Prevention Measures	Trigger Point	Contingency 1	Contingency 2
Abnormal meteorological conditions <i>Abnormal meteorological conditions may promote elevated levels of odour.</i>	<ul style="list-style-type: none"> Outside the control of the operator 	<ul style="list-style-type: none"> Forecast of extreme winds and gales which can potentially overcome negative air pressure of WTS building 	<p>reached (per emergency scenario)</p> <ul style="list-style-type: none"> Review building ventilation rates and adjust if necessary Ventilation rate increased, all doors shut as best as possible Wet scrubber system automatically activated 	<ul style="list-style-type: none"> If Contingency 1 measures ineffective, receipt of waste material temporarily limited/halted
	<ul style="list-style-type: none"> Outside the control of the operator 	<ul style="list-style-type: none"> Forecast of meteorological conditions which modelling has shown could lead to poor dispersion of emissions and exceedances of the criterion at sensitive receptors if emission not treated. 	<ul style="list-style-type: none"> Review building ventilation rates and adjust if necessary All elements of Odour Management System (i.e. wet scrubber, as well as dilution fans) activated. Wet scrubber system automatically activated 	<ul style="list-style-type: none"> If Contingency 1 measures ineffective, receipt of waste material temporarily limited/halted

End of Document

8. Odour Audit

In order to address Condition B12 (Odour Audit) of the Development Consent, Cleanaway will engage a suitably qualified expert to complete an odour audit within 6 months of operation. The odour audit will be carried out when large amounts of putrescible waste are present on the Site and will be timed to coincide with the receipt of putrescible waste.

Condition B12 of the Development Consent states that *the audit must:*

- a) *be carried out by a suitably qualified and experienced expert whose appointment has been endorsed by the Secretary;*
- b) *audit the Development whilst it is in full operation;*
- c) *include a summary of air and odour emission related complaints and any actions that were carried out to address the complaints;*
- d) *validate the Development against the odour predictions in the RTS;*
- e) *if, as part of the Odour Audit, or as the result of any other odour monitoring, the odour predictions are demonstrated to be inaccurate, initiate an action plan as per B12 (h);*
- f) *if odour complaints are received, the Applicant must review the meteorological data for the Site and the region to establish the likelihood that the source of the odour originated from the Site. If it is likely that the odour originated from the site it must be reported in accordance with condition C6;*
- g) *review design and management practices of the Development against industry best practice for air emissions and odour management; and*
- h) *include an action plan that identifies and prioritises additional air and odour emission mitigation measures that may be necessary to reduce air and odour emissions.*

Appendix A Qualifications

This OMP has been prepared by Kirsten Lawrence of SLR Consulting Australia Pty Ltd on behalf of Cleanaway.

Kirsten Lawrence

Kirsten is a process engineer with over twenty years of experience as an environmental consultant specialising in air quality. During this time she has worked for a wide range of clients, including industry and government, in both Australia and New Zealand. Her particular expertise is in the assessment of the environmental effects of air discharges, emission inventories, atmospheric dispersion modelling and air monitoring.

Kirsten has been responsible for managing large-scale environmental projects for blue-chip clients. She has completed major projects for waste management facilities, CSG developments, power stations, oil refineries, open cut and underground coal and metalliferous mines, and chemical manufacturing plants. She is experienced in the use of air dispersion models such as TAPM, CALPUFF, AERMOD and the dense gas model SLAB and has assessed air quality impacts from emissions of odour, particulate matter, criteria pollutants and air toxics. She is also experienced in the compilation of greenhouse gas emission inventories, and preparation of greenhouse gas assessments.

In addition to her technical skills and her in-depth understanding of environmental policies, Kirsten is also highly regarded for her project management and communication skills and is experienced in giving presentations to stakeholders, including both regulatory authorities and local community members.



13 April 2017

Secretary
Department of Planning and Environment
320 Pitt Street
Sydney NSW 2001

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Attention: Carolyn McNally

Dear Carolyn

Erskine Park Waste Transfer Station Odour Management Plan – Endorsement of Suitably Qualified and Experienced Persons

To satisfy Schedule C, Part B, Condition B10 of Development Consent SSD-7075, Cleanaway Pty Ltd (Cleanaway) must prepare and submit an Odour Management Plan to the Department of Planning and Environment (DPE) prior to undertaking construction activities associated with the Stage 1 Erskine Park Waste Transfer Station (WTS) Project.

The Plan must be prepared by suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary. To satisfy this requirement, Cleanaway are seeking the endorsement of SLR Consulting Australia Pty Ltd (SLR) to prepare the Odour Management Plan.

SLR is a leading international environmental consultancy with a reputation for providing expert, tailored services. SLR has extensive experience in the preparation of environmental management plans for infrastructure projects in New South Wales (NSW). Please find below details of SLR project staff and capabilities relevant to the project for consideration by the Secretary.

Kirsten Lawrence – Air Quality Technical Discipline Manager

Kirsten is a Technical Discipline Manager of SLR's air quality team and has over 20 years-experience as an environmental consultant specialising in air quality. Kirsten has extensive experience in the waste management and infrastructure sector, including project management, assessment of air quality and greenhouse gas impacts, compilation of greenhouse gas emission inventories, and preparation of odour management plans. Kirsten also has experience in use of air dispersion models and experience in government and stakeholder consultation.

Her experience includes the preparation and delivery of various air quality impact assessments for built infrastructure and waste management projects; Odour Management Plans. Clients include Cleanaway, Orica, CSG, Santos and Caltex.

Kirsten has significant experience in the waste management sector and the preparation of odour management plans. Kirsten is very familiar with the Erskine Park Project having worked on air quality and greenhouse gas assessments for Stage 1 of the development.

Kirsten will be the primary author of the Odour Management Plan.

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Tracey Ball – Associate Consultant

Tracey is an Associate Consultant with SLR’s Environmental Management, Planning and Approvals (EMPA) team and has over 12 years’ experience in various environmental consulting roles. Tracey has significant experience in the infrastructure and waste management sector, including project management, environmental impact assessments and post-consent management plans. Tracey also has experience in government and stakeholder consultation, sub-consultant engagement and management, environmental management planning and environmental risk assessments.

Relevant infrastructure and waste management project experience includes the preparation and delivery of various environmental impact assessments for built infrastructure and waste management projects; Construction Environmental Management Plans and Environmental Management Plans. Clients include Cleanaway, Doray, Nakheel Developments, Tamouh Investments and Department of Health.

Tracey also has significant experience in built infrastructure projects and the preparation of environmental management plans.

Tracey will review the Odour Management Plan and will be undertaking day-to-day project management.

Personal resumes for Kirsten Lawrence and Tracey Ball are available upon request.

We trust that our experienced and qualified consultants meet the Secretary’s approval and we look forward to a favourable response at your earliest convenience.

If you would like any additional information or you would like to discuss this matter further, please do not hesitate to contact myself on (07) 3866 8948 or Martin.Gravett@cleanaway.com.au.

Yours faithfully



Martin Gravett
Project Manager - Resource Recovery & Post Collection | Major Programs

Appendix I - Erosion and Sediment Control Plan

9 June 2017

610.15771 Erskine Park ESCP FINAL.docx

Cleanaway Pty Ltd

Attention: Martin Gravett

Dear Martin

Erskine Park Waste Stage 1 - Waste Transfer Station

1 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) was engaged by Cleanaway Pty Ltd to prepare a Construction Environmental Management Plan (CEMP) for the development of a Waste Transfer Station (WTS) on a site adjacent to its existing landfill operation at 85 - 87 Quarry Road, Erskine Park. These works are form Stage 1 of the overall site development with the second (Stage 2) being a Resource Recovery Facility (RRF).

The ESCP has been developed in accordance with the key principles outlined within the 'Blue Book' Managing Urban Stormwater: Soils and Construction Vol. 1, 4th edition (Landcom, 2004). There are currently no licenced discharge points within the Development site under the existing Environment Protection Licence 4865 which covers the wider Erskine Park landfill.

1.2 Objectives

The Erosion and Sediment Control Plan (ESCP) has been prepared to support the CEMP for Stage 1 and to address the following development consent conditions:

- Part B B20: The applicant shall implement erosion and sediment control measures on-site in accordance with Managing Urban Stormwater: Soils and construction Vol. 1 (Landcom, 2004).

The ESCP has also been prepared to address a number of commitments from the Environmental Impact Statement (EIS) including:

- An Erosion and Sediment Control Plan (ESCP) will be prepared as part of the CEMP setting out detailed measures for the management of erosion and sediment.
- A sediment basin will be constructed within the proposed basin location at the commencement of the earthworks program to provide sediment control throughout the construction phase.
- Erosion and sediment control measures will be implemented in accordance with Managing Urban Stormwater: Soils and Construction Vol. 1 (Landcom, 2004).

- Water quality monitoring of water within the sediment basins will be carried out during the construction phase in accordance with the CEMP.
- Sediment fences and clean water diversion bunds will be established around stockpiles and earthworks areas to reduce and capture sediments in stormwater runoff. Check dams, temporary ground stabilisation and site regrading will be implemented if appropriate.
- Sediment basins will be provided as needed or by grass-lining the proposed stormwater basin to remove sediment from stormwater prior to discharge offsite.
- Treatment measures will be applied to water collected in the sediment basin(s), including settling of coarse sediments, the use of flocculation for finer sediments and pH correction.
- Exclusion zones will be designated to limit disturbance and promote ground stability.
- Ground stability will be re-established as soon as practicable following the completion of construction.

1.3 Potential Sources of Erosion and Sedimentation

The following activities have been identified as activities that could cause soil erosion and generate sediment unless controlled:

- Stripping of vegetation, subsoil and topsoil;
- Stockpiling of subsoil and topsoil;
- Construction of water management structures;
- Construction/maintenance of any roads and surface facilities; and
- Vehicle and machinery movements.

2 General Erosion and Sediment Controls and Management Principles

The proposed ESC measures have been designed to minimise the potential impact on soil erosion and downstream water quality. Wind and water erosion from disturbance areas cannot be eliminated completely however, the following measures will be undertaken to minimise their impact (in accordance with the Blue Book):

- Minimising the disturbance footprint;
- Separation/diversion of 'clean' water catchment runoff from disturbed runoff areas to minimise sediment-laden water volumes for management;
- Minimising soil erosion (i.e. rehabilitation, drainage and erosion control measures) at the source, rather than trapping resultant sediment. Where this is not practicable, then all reasonable measures will be made to trap sediment by implementing sediment control measures compliant with the required treatment standards. Upslope and downslope erosion and sediment controls shall be installed prior to any ground disturbance (refer to **Drawing SK01**);
- Conducting best practice land clearing procedures for all proposed disturbance areas;
- It is proposed to stage the construction works to minimise the area of disturbance at any one time and to reduce the potential for erosion to occur;
- Sediment fences will be utilised to control sheet flow from disturbance areas during the construction works (refer to the standard drawings in **Appendix A**). Where sediment fences cannot be installed due to impermeable surfaces, alternate sediment control measures such as sandbags, filter socks, coir logs etc will be implemented to trap mobilised sediment;
- Where there is potential for sediment laden runoff to enter stormwater pits suitable inlet protection measures will be installed around the pit inlets. Refer to the standard drawings in **Appendix A**;

- Stabilised rock pads will be installed at all site entry / exit points during the construction works (refer to the standard drawings in **Appendix A**);
- Appropriate storage of soil stockpiles in areas away from roadways and other drainage lines. Suitable sediment control measures will be installed downslope of soil stockpiles and upslope clean water runoff diverted (where possible). Refer to the standard drawings in **Appendix A**;
- Sealing or revegetation of disturbed areas as soon as possible. Stabilisation of disturbed areas shall be achieved by hydromulching, and include a seasonal temporary crop to establish rapid vegetative cover, plus a permanent grass cover;
- The use of Ecosol litter baskets in permanent stormwater pits located downslope of unsealed roads;
- Any plant species used are to be appropriate for the site conditions, including compatibility with local environmental values, and anticipated erosive forces;
- Effective dust suppression measures. Water for dust suppression can be sourced from the sediment dams (if available) or from potable water sources (potable water connection or trucked-in). The sediment dams can also be made larger than what is required to provide additional capacity for water storage;
- Barrier fencing shall be installed for each stage of construction to delineate no go areas and to maintain disturbance areas and traffic movement to the designated areas;
- The use of sand-bags to protect exposed sub-grades and pavement works from scouring caused by concentrated surface flows at various stages during construction; and
- Implementing an effective monitoring and maintenance program for the site.

3 Site Specific ESC Management

A number of disturbance areas are proposed for the Stage 1 construction works including the removal of existing impervious areas and the stripping of grassed areas. Where practical, it is proposed to manage the sediment laden runoff from these areas by utilising the existing dam (Dam 1) and the construction of a small temporary sediment dam (Dam 2) as shown in **Drawing SK01**.

The capacity of Dam 1 will be increased as part of the proposed stormwater management strategy where it will be augmented into a bio-retention basin. It is proposed that the Dam 1 capacity be increased prior to the ground disturbance works and maintained as a sediment dam until the construction works have been completed, at which time the bio-retention system will be installed within the dam. During large rainfall events Dam 2 will overflow into Dam 1.

SLR undertook calculations to determine the required capacity of the interim sediment dams. The required storage capacity of these dams was determined in accordance with the requirements of the Blue Book with the following design criteria and assumptions:

- Capacity calculations based on a 5 day, 80th percentile rainfall depth of 24.6mm as listed in Table 6.3a of the Blue Book for Blacktown (closest listed location). This design criteria assumes that disturbance areas will be sealed or rehabilitated within 3 years;
- The dams were type F/D dams based on the typical soil types within the area;
- Disturbed runoff coefficient of 0.5 in accordance with Table F2 of the Blue Book for a type D hydrological group with rainfall between 21 - 25mm;
- 'Clean' water runoff coefficient from undisturbed and rehabilitated areas of 0.3; and
- The Sediment Storage Zone was calculated based on 50% of the Settling Zone Volume in accordance with the Blue Book.

The results of the dam capacity calculations are provided in **Table 1**.

Table 1 Erskine Park Construction Phase Sediment Dam Capacity Details

Dam	Catchment Area (ha)	Settling Zone Volume (m3)	Sediment Zone Volume (m3)	Total Dam Storage Volume (m3)
Dam 1	1.89	233	116	349
Dam 2	0.64	79	39	118

Runoff from disturbance areas that cannot be directed to either of the two sediment dams will be directed to other temporary ESC devices (such as sediment fences, coir logs, sandbags etc) and managed in accordance with the general ESC principles detailed in **Section 2** above. Three stabilised rock pads are proposed at the site entrances/exits (as shown in **Drawing SK01**) to minimise the potential for sediment laden runoff to leave the site.

4 Monitoring and Maintenance

4.1 Monitoring

The performance of ESC devices will decline if they are not maintained. All ESC devices will be inspected regularly to ensure that they are functioning effectively. These inspections will be undertaken fortnightly or following significant rainfall events (i.e. >10mm in a 24hr period).

Inspections of the proposed sediment dams, once constructed, will include the general condition of the dam, evidence of overflow, water colour, evidence of eroding surfaces, approximate retained capacity recorded and whether any desilting is required (if sediment has accumulated to the Sediment Storage Zone). Water quality sampling shall also be undertaken during these inspections and prior to any controlled release of water to ensure that the water quality is suitable for release. Generally accepted water quality limits for offsite release are provided in **Table 2** below however these limits (and limits for other water quality parameters) should be verified with the EPA prior to any discharge.

Table 2 Erskine Park Construction Phase Sediment Dam Water Quality Monitoring Program

Quality Characteristic	Limit	Frequency
Total Suspended Solids (TSS)	50 mg/L	Fortnightly or following significant rainfall events (i.e. >10mm in a 24hr period).
pH	6.5-8	
Oil and grease	15 mg/L	

Flocculation of the water contained within the sediment dams can be undertaken with an approved flocculant to improve the TSS of the water prior to release. Similarly pH dosing with approved substances can also be undertaken to improve the pH of the water prior to release.

The dams are to be regularly drawn down following rainfall (within 5 days) and desilted (if required) to ensure that the Settling Zone Volume is available within the dam to accept runoff from future rainfall events. This is to ensure the dams are operated in accordance with the requirements of the Blue Book to minimise the chances of an uncontrolled discharge. It is unlikely that the sediment will build up to the Sediment Zone Volume during the construction works however if it does then the dam will need to be desilted and disposed of in a suitable manner.

4.2 Maintenance

All erosion and sediment control measures will be maintained in a functioning condition until individual areas have been deemed “successfully” sealed or rehabilitated. Where controls are observed to not be functioning correctly, they will be restored to meet the required standard. Where significant erosion is observed to be occurring on a regular basis, additional controls will be implemented.

5 Training

ESC and soil management training will be provided to all operators and site contractors to ensure that ESC structures and features are properly managed at the site. The training will include inductions and toolbox talks. Specific training should also be provided to operators and site contractors prior to soil stripping and stockpiling to ensure effective management of soils. Any environmental issues discovered as part of the monitoring program, should be raised at the toolbox meetings.

6 Limitations of this report

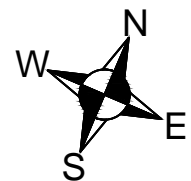
This plan is intended to be part of the CEMP for Stage 1, and sets out minimum requirements. The Principal Contractor will need to review the appropriateness of erosion and sediment controls on site at each stage of construction, and may be required to adjust erosion and sediment controls to ensure that they are appropriate at all times to prevent harm to the environment as site conditions change over time.

If you have any questions please do not hesitate to contact me.

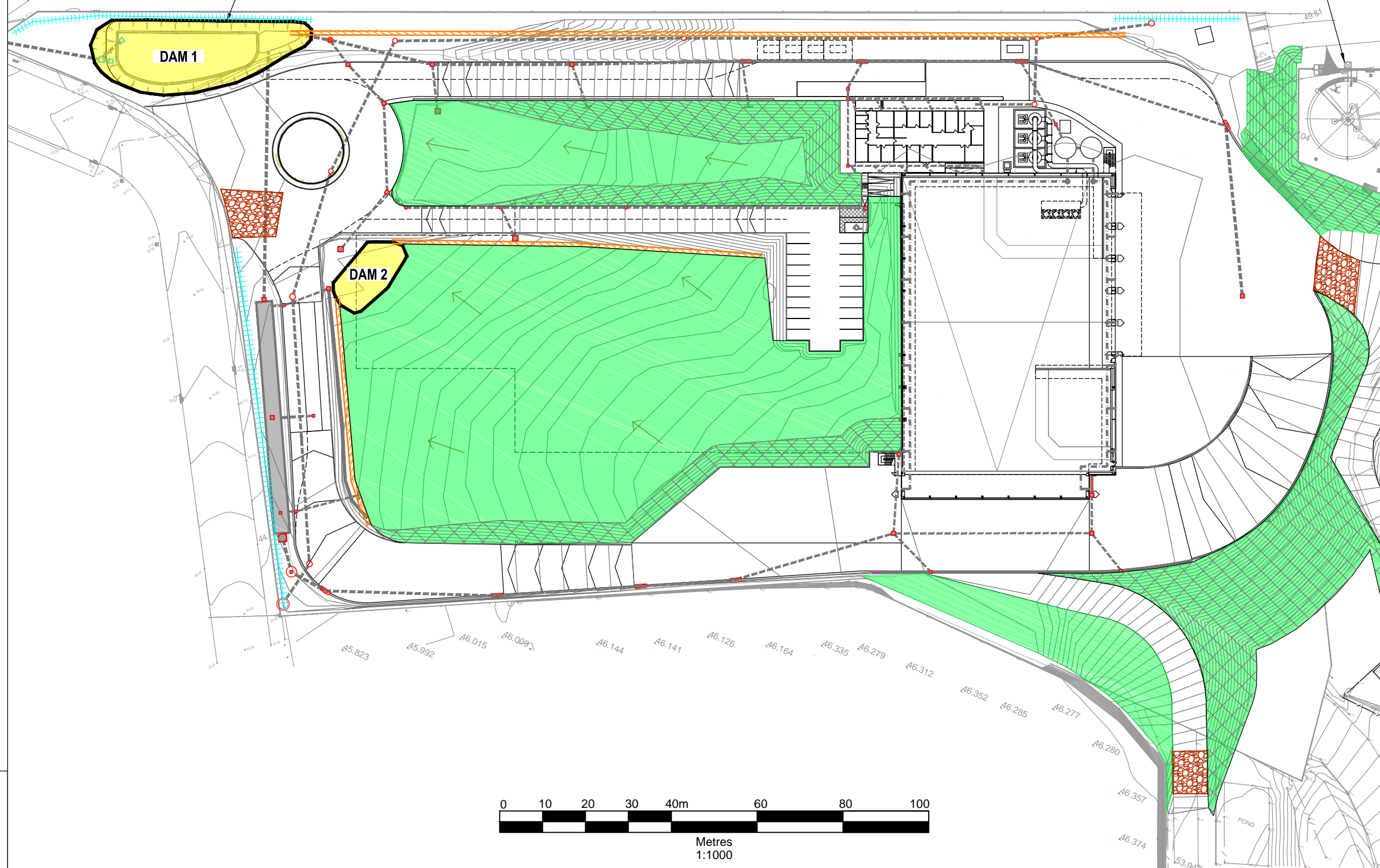
Yours Sincerely,
SLR Consulting



Duncan Barnes
Senior Environmental Engineer
CPESC Certified (Cert No. 8494)



DAM 1 SHALL ACT AS A SEDIMENT DAM UNTIL THE UPSLOPE CATCHMENT AREA HAS BEEN EITHER SEALED OR REHABILITATED. ONCE THIS HAS OCCURED THEN THE BIO-RETENTION SYSTEM SHALL BE INSTALLED.



LEGEND

- DESIGN CONTOURS (0.5m INTERVALS)
- SEDIMENT DAM
- DIVERSION BUND
- STABILISED SITE ENTRY/EXIT
- INDICATIVE DIRTY WATER FLOW DIRECTION
- SEDIMENT FENCE
- STORMWATER PIT WITH SUITABLE INLET PROTECTION MEASURES
- DENOTES AREA TO BE REVEGETATED
- DENOTES AREA TO BE HYDROMULCHED

NOTES

1. THE ESC MEASURES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE 'BLUE BOOK' MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION VOL. 1, 4th EDITION (LANDCOM, 2004).
2. ESC MEASURE LOCATIONS ARE INDICATIVE ONLY. FINAL LOCATION TO BE DETERMINED DURING CONSTRUCTION.
3. ALL ESC MEASURES SHALL BE INSPECTED ON A DAILY BASIS AND MAINTAINED AS REQUIRED THROUGHOUT THE COURSE OF THE WORKS AND FOLLOWING EACH INCIDENCE OF RAIN.
4. ALL SEDIMENT COLLECTED SHALL BE REGULARLY REMOVED AND IF UNSUITABLE FOR REUSE DISPOSED OF IN AN APPROVED MANNER.
5. ESC MEASURES SHALL BE INSTALLED PRIOR TO ANY GROUND DISTURBANCE.
6. ALL TEMPORARY ESC MEASURES SHALL BE REMOVED WHEN NO LONGER REQUIRED.
7. WHERE THERE IS POTENTIAL FOR SEDIMENT LADEN RUNOFF TO ENTER STORMWATER PITS DURING THE CONSTRUCTION WORKS SUITABLE INLET PROTECTION MEASURES SHALL BE INSTALLED AROUND THE PIT INLETS.
8. STOCKPILES ARE TO BE PLACED IN AREAS AWAY FROM ROADWAYS AND OTHER DRAINAGE LINES. SUITABLE SEDIMENT CONTROL MEASURES WILL BE INSTALLED DOWNSLOPE OF SOIL STOCKPILES AND UPSLOPE OF CLEAN WATER RUNOFF DIVERTED (REFER TO STANDARD DRAWING SD4-1)
9. ALL DISTURBANCE AREAS SHALL BE SEALED OR REVEGETATED AS SOON AS POSSIBLE.
10. SUITABLE OVERFLOW STRUCTURES / SPILLWAYS SHALL BE CONSTRUCTED ON ALL SEDIMENT DAMS
11. WITHIN 5 DAYS OF A RAINFALL EVENT, THE AVAILABLE STORAGE CAPACITY WITHIN EACH SEDIMENT DAM MUST BE RETURNED TO AT LEAST EQUAL TO THE THE SETTLING ZONE VOLUME. THE SEDIMENT VOLUME WITHIN THE SEDIMENT DAMS MUST NOT EXCEED THE SETTLING ZONE VOLUME. IF THE SEDIMENT VOLUME IS EXCEEDED, THE SEDIMENT MUST BE REMOVED FROM THE DAM AND DISPOSED OF IN A MANNER THAT WILL NOT CAUSE ENVIRONMENTAL HARM.

NOTES

SEDIMENT DAM VOLUMES				
DAM	CATCHMENT AREA (ha)	MINIMUM SETTLING ZONE VOLUME (m³)	MINIMUM SEDIMENT ZONE VOLUME (m³)	MINIMUM TOTAL DAM STORAGE VOLUME (m³)
DAM 1	1.89	233	116	349
DAM 2	0.64	79	39	118

1	MS	DB	05.06.17	TENDER
Revision	Drawn By	Chkd By	Date	Comments

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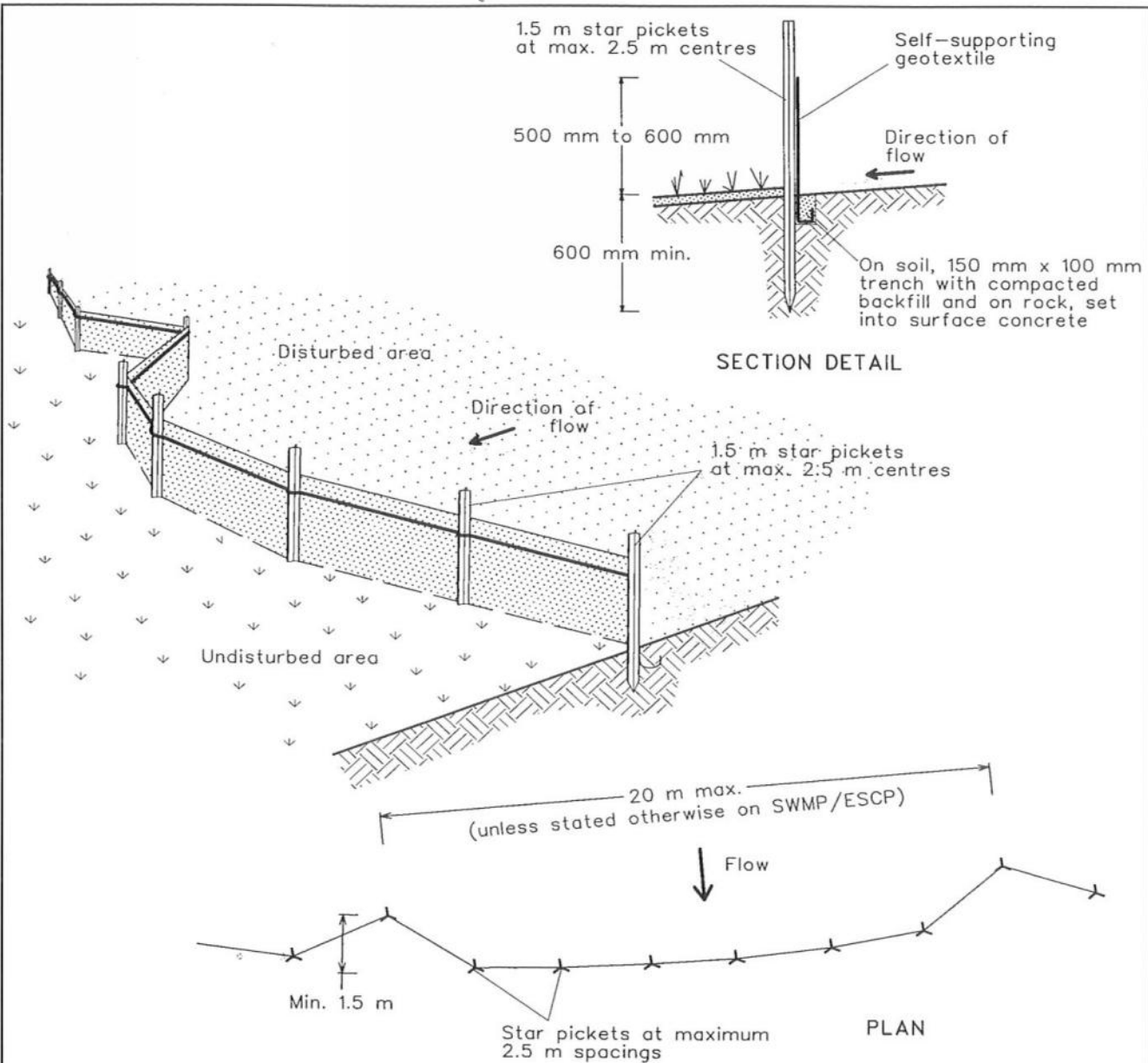
Client CLEANAWAY WASTE MANAGEMENT LTD.		
Project ERSKINE PARK RMF, STAGE 1 - WASTE TRANSFER STATION		
Drawing PROPOSED STAGE 1 ESC PLAN		
Date MAY 2016	Drawing Number 610.15771-SK01	Revision 1
Scale 1:1000 @ A3		
TENDER		

610.15771-SK01 & SK02.dwg



Appendix A

ESC Standard Drawings

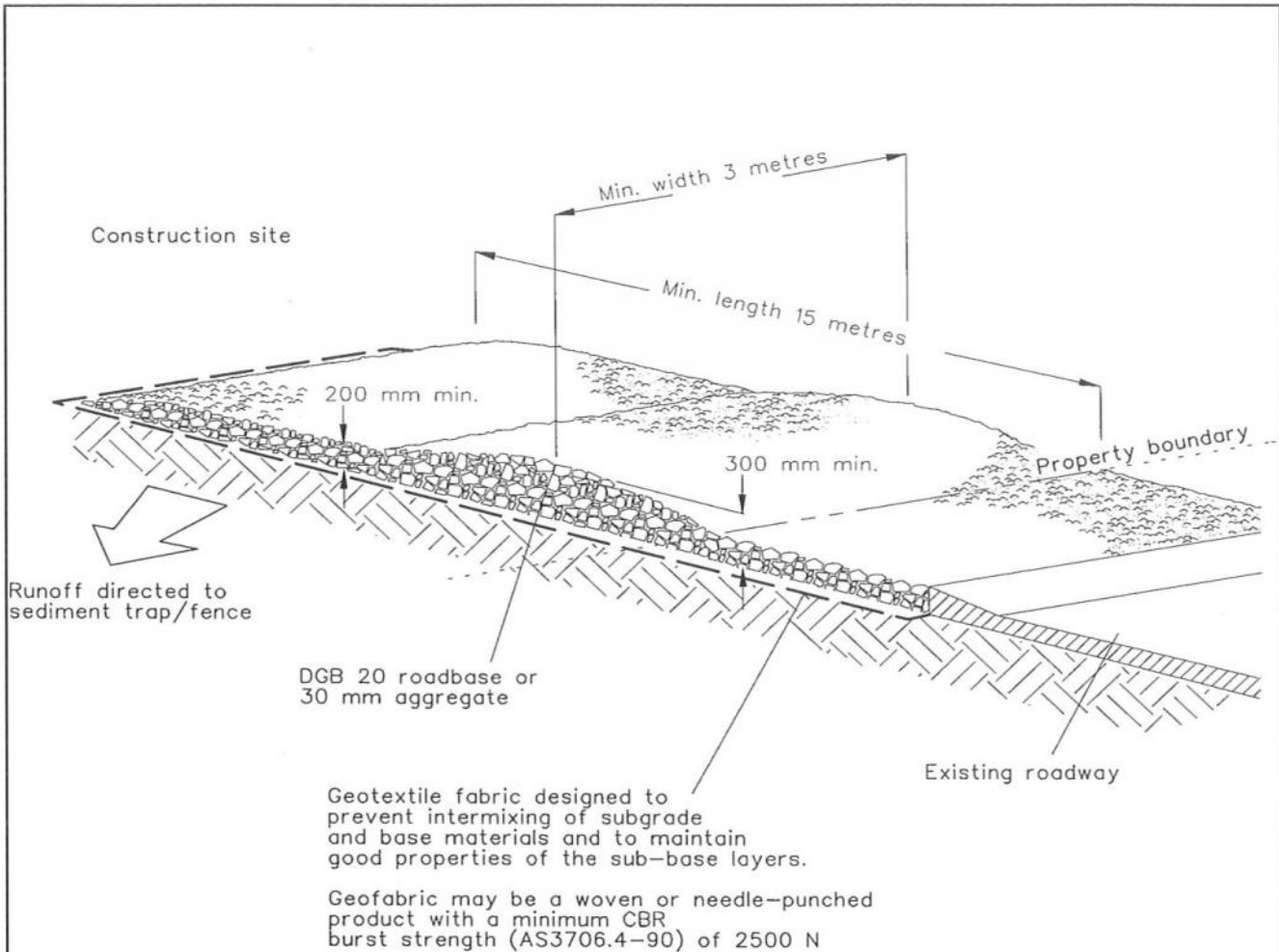


Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE

SD 6-8

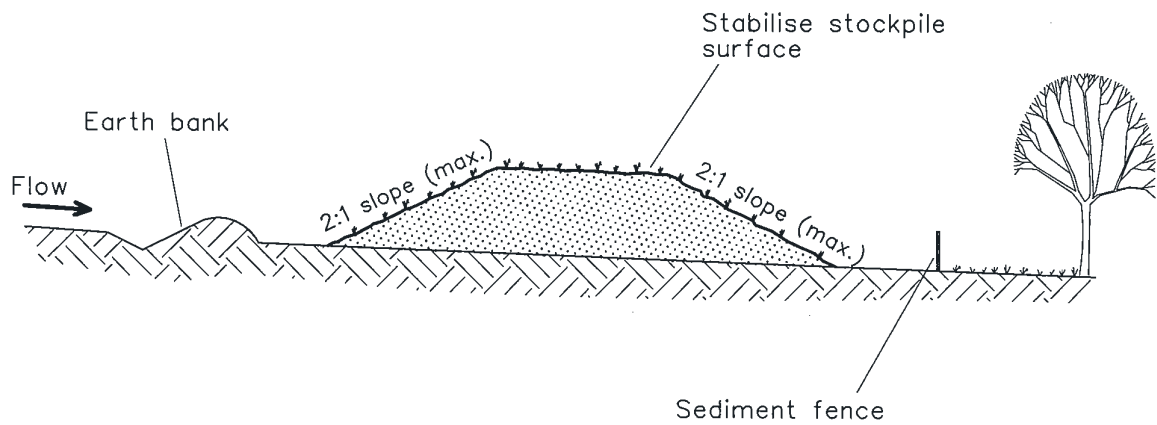


Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS

SD 6-14

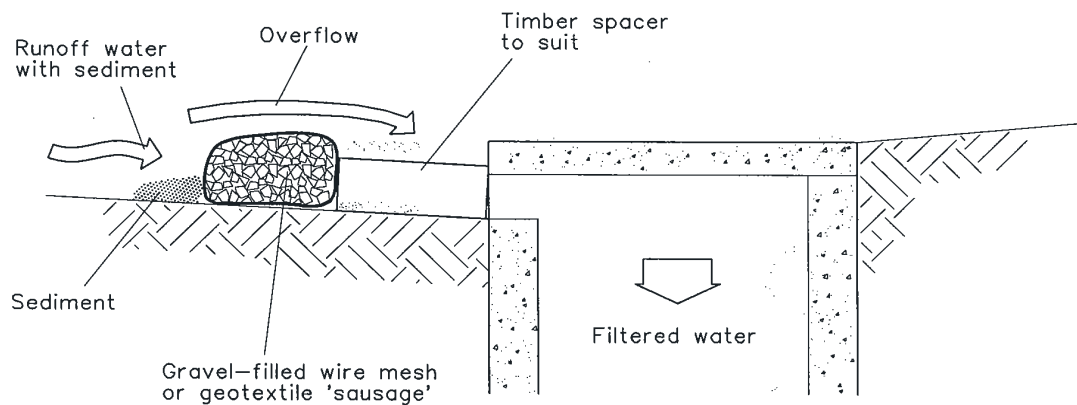
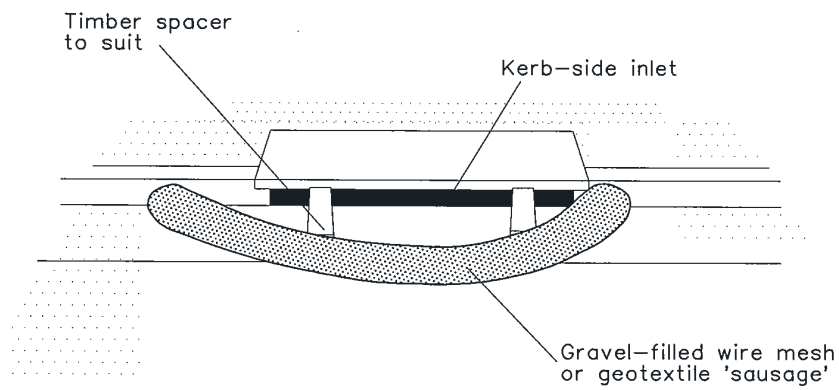


Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

STOCKPILES

SD 4-1



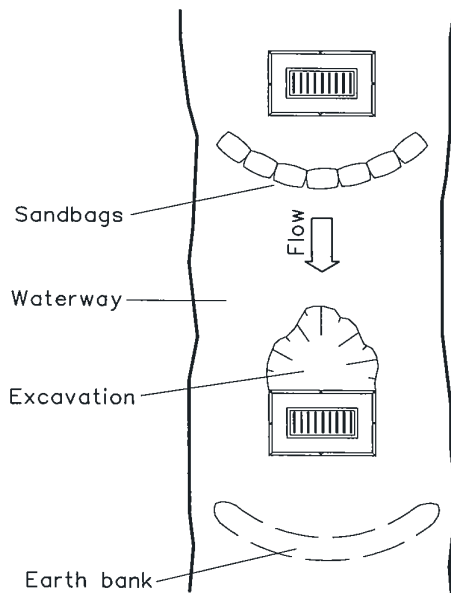
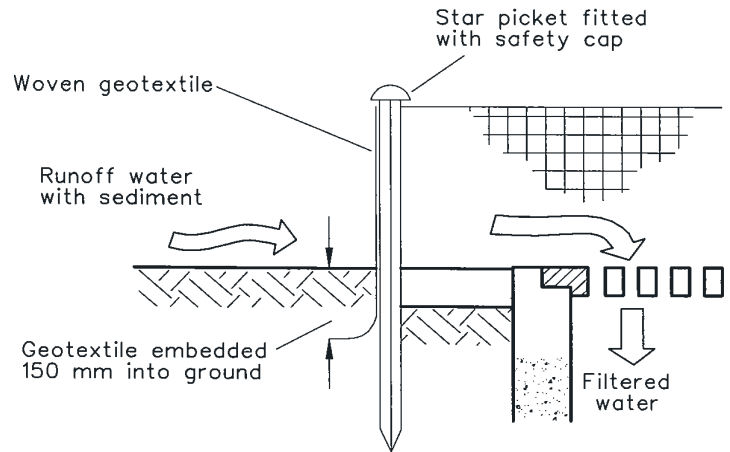
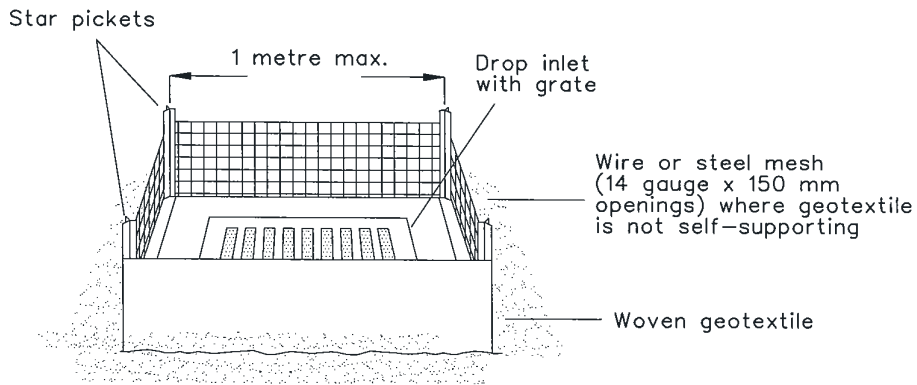
NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

1. Install filters to kerb inlets only at sag points.
2. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit and fill it with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening leaving at least a 100-mm space between it and the kerb inlet. Maintain the opening with spacer blocks.
5. Form a seal with the kerb to prevent sediment bypassing the filter.
6. Sandbags filled with gravel can substitute for the mesh or geotextile providing they are placed so that they firmly abut each other and sediment-laden waters cannot pass between.

MESH AND GRAVEL INLET FILTER

SD 6-11



For drop inlets at non-sag points, sandbags, earth bank or excavation used to create artificial sag point

Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-7 and Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

Appendix J - Landscape Plan

PROJECT SPECIFICATION: ERSKINE PARK RMF STAGE 1

LANDSCAPE SPECIFICATION.

ERSKINE PARK RMF- STAGE 1.

PROJECT NO 17-016

Issue No.	A		
Date	22.06.17		
Checked	J.R.		
Verified	J.R.		
Approved	J.R.		

NATSPEC SUBSCRIBER ID 94031112

Contents

Project Specification: Erskine Park RMF Stage 1	1
0221 Site preparation	4
1 General	4
1.1 Responsibilities	4
1.2 Cross references	4
1.3 Interpretation	4
1.4 Submissions	4
1.5 Inspection	4
2 Execution	4
2.1 Existing services	4
2.2 Site clearing	5
2.3 Stormwater and sediment control	5
2.4 Existing works to be retained	5
2.5 Trees to be removed	5
2.6 Completion	5
0241 Landscape –edging	6
1 General	6
1.1 Responsibilities	6
1.2 Cross references	6
1.3 Inspection	6
2 Products	6
2.1 Timber	6
2.2 Edging	6
3 Execution	6
3.1 General	6
3.2 Edging	6
0250 Landscape – gardening	7
1 General	7
1.1 Responsibilities	7
1.2 Cross references	7
1.3 Interpretation	7
1.4 Submissions	7
1.5 Inspection	7
2 Products	8
2.1 Topsoil	8
2.2 Grass	9
2.3 Fertiliser	9
2.4 Plants - general	9
3 Execution	10
3.1 Preparation	10
3.2 Subsoil	10

3.3	Grass seeding	11
3.4	Turfing	12
3.5	Planting	13
3.6	Mulching	13
3.7	Spraying	13
3.8	Stakes and ties	13
4	Selections	14
4.1	Topsoil	14
4.2	Fertiliser	14
4.3	Grassing	15
4.4	Mulching	15
4.5	Plant material: REfer to plant schedules.	15
0256	Landscape – establishment	16
1	General	16
1.1	Responsibilities	16
1.2	Cross references	16
1.3	Interpretation	16
1.4	Submissions	16
1.5	Inspection	16
2	Execution	17
2.1	General	17
2.2	Planting works	17
2.3	Grass	17
2.4	Garden beds	18
2.5	Control measures	18
2.6	Watering	18
2.7	Compliance	19

0221 SITE PREPARATION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide site preparation, as documented.

Outline of the works: supply and install of landscape soft surfaces- turfed, grass seeded & planted areas, with associated imported soils and mulches.

Incidental works

Generally: Undertake the following:

- Reinstatement: Reinstatement undeveloped ground surfaces to the condition existing at the commencement of the contract.
- Minor trimming: As required to complete the works, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Authorities: Any authority or agency covering statutory requirements relating to the project, including clearances for work in that particular area.
- Clearances: A formal certificate, approval or condition issued by an authority to allow work to be carried out in a particular area.
- Network Utility Operator: The entity undertaking the piped distribution of drinking water or natural gas for supply or is the operator of a sewerage system or external stormwater drainage system.

1.4 SUBMISSIONS

Execution details

Requirement: Submit details of methods and equipment proposed for the following:

- Clearing and grubbing.
- Tree removal and transplanting.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Trees to be removed.

2 EXECUTION

2.1 EXISTING SERVICES

General

Requirement: Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables.

Excavation: Do not machine excavate within 1 m of existing underground services.

Existing service lines: If required, divert services detected during excavation to new routes, clear of the building, and reconnect to the Network Utility Operator's requirements.

2.2 SITE CLEARING

Extent

Requirement: Clear only areas to be occupied by works such as structures, paving, excavation, regrading and landscaping or other areas designated to be cleared.

Contractor's site areas: If not included within the areas documented above, clear generally only to the extent necessary for the performance of the works.

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas. Backfill holes remaining after grubbing with sand material to prevent ponding of water. Compact the material to the relative density of the existing adjacent ground material.

Redundant/decommissioned works: Remove works, including slabs, foundations, pavings, drains and access chambers covers found on the surface.

Surplus material

Topsoil and excavated material: Continually remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

2.3 STORMWATER AND SEDIMENT CONTROL

General

Erosion and sediment control measures: To *0172 Environmental management*.

2.4 EXISTING WORKS TO BE RETAINED

Marking

Requirement: Mark out works with 1 m high 50 x 50 mm timber stakes with yellow plastic tapes attached to prevent accidental damage.

2.5 TREES TO BE REMOVED

Designation

Marking: Mark trees and shrubs to be removed 1000 mm above ground level.

Extent: refer to Landscape plans for trees to be removed.

2.6 COMPLETION

Clean up

Progressive cleaning: Keep the work included in the contract clean and tidy as it proceeds and regularly remove from the site waste and surplus material arising from execution of the work, including any work performed during the defects liability period or the plant establishment period.

Removal of plant: Within 10 working days of the date of practical completion, remove temporary works, construction plant, buildings, workshops and equipment which does not form part of the works, except what is required for work during the defects liability period or the plant establishment period. Remove these on completion.

Waste disposal: To *0172 Environmental management*.

Vermin management

Requirement: Employ an approved firm of pest exterminators and provide a certificate from the firm stating that the completed works is free of vermin.

0241 LANDSCAPE –EDGING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide edging, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Setting out before commencement of construction.

2 PRODUCTS

2.1 TIMBER

Hazard class

General: As defined in AS 1604.1.

Preservative treatment

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

2.2 EDGING

Sawn timber

Timber: ACQ treated pine

Size: 3000 x 150 x 50mm

Pegs: 50 x 50 x 400 mm long.

3 EXECUTION

3.1 GENERAL

Set-out

General: Set out the positions of edging.

3.2 EDGING

Sawn timber

Installation: Set edgings flush with adjoining surfaces. Drive pegs into the ground at 1200 mm centres on the planting side of the edging and on both sides of joints between boards, with peg tops 15 mm below top of edging. Fix the pegs with galvanised nails, two per fixing.

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 15 mm if required to enable it to be bent.

0250 LANDSCAPE – GARDENING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaped gardening, as documented.

Plants: Provide plants that have been grown to a standard that allows them to establish rapidly and grow to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

Program: Provide a suitable irrigation, pruning, fertiliser and monitoring program for all plant materials held by the supplier. Take any other precautions required to safeguard the health and well-being of all plant materials before and including their delivery to site.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- Imported topsoil: suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 Appendix 1, as follows:
 - . Fine: Clay loam, fine sandy loam, sandy clay loam, silty loam, loam.
 - . Medium: Sandy loam, fine sandy loam.
 - . Coarse: Sand, loamy sand.

1.4 SUBMISSIONS

Materials

Supplier's data: Submit supplier's data including the following:

- Material source of supply for topsoil and mulch.

Replacement plants

Species: Submit written certification that all plant material is true to the required species and type.

Samples

General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: Submit a 5 kg sample of each type specified. Submit bulk material samples, with required test results, at least 5 working days before bulk deliveries.

Suppliers

Statements: Submit statements from suppliers, giving the following, where applicable:

- Particulars of the supplier's experience in the required type of work.
- Production capacity for material of the required type and quantity.
- Lead times for delivery of materials to the site.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Setting out completed.
- Subgrades cultivated or prepared for placing topsoil.

- Topsoil spread before planting.
- Grassing bed prepared before turfing and seeding.
- Grassing or turfing completed.
- Plant holes excavated and prepared for planting.
- Plant material set out before planting.
- Planting, staking and tying completed.
- Completion of planting establishment work.

2 PRODUCTS

2.1 TOPSOIL

Standard

Imported topsoil: To AS 4419.

Composts, soil conditioners and mulches: To AS 4454.

Source

General: provide imported topsoil.

Imported topsoil

General: Provide imported topsoil as documented in the **Imported topsoil schedules**.

Topsoil particle size table (% passing by mass)

Sieve aperture (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Topsoil nutrient level table

Nutrient	Unit	Sufficiency range
Nitrate-N (NO ₃)	mg/kg	> 25
Phosphate-P (PO ₄) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO ₄) – P sensitive	mg/kg	< 28
Phosphate-P (PO ₄) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulphate-S (SO ₄)	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

Method References

pH in H₂O (1:5), pH in CaCl₂ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1

Nutrient	Unit	Sufficiency range
Soluble Nitrate-N by APHA 4500		
Soluble Chloride by Rayment & Higginson (1992) modified method 5A2		
Extractable P by Mehlich 3 – ICP		
Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP		
Extractable S by Mehlich 3 – ICP		
Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP		

2.2 GRASS

Seed mixtures

Description: Fresh, clean, uncoated new seed, thoroughly pre-mixed with a bulking material such as safflower meal.

Unacceptable seed: Wet, mouldy or otherwise impaired.

Purity (minimum): 98%.

Germination viability (minimum): 86%.

Age (maximum) from date of harvest: 2 years.

Handling: Deliver to the site in bags marked to show weight, seed species and supplier's name.

Turf

Description: Cultivated turf of even thickness, free from weeds and other foreign matter.

Supplier: A specialist grower of cultivated turf.

2.3 FERTILISER

General

Description: Proprietary fertilisers, delivered to the site in sealed bags marked to show manufacturer or vendor, weight, fertiliser type, N:P:K ratio, recommended uses and application rates to **Fertiliser schedule**.

2.4 PLANTS - GENERAL

Supply

Supply trees with the following properties:

- Free from injury.
- Self-supporting.
- With calliper at any given point on the stem greater than the calliper at any higher point on the stem.
- Health: Foliage size, texture and colour at time of delivery consistent with that of healthy specimens for the nominated species.
- Vigour: Extension growth consistent with that exhibited in vigorous specimens of the species nominated.
- Damage: Free from damage and from restricted habit due to growth in nursery rows.
- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery.
- Root development: Grown in their final containers for the following periods:
 - . Plants < 25 L size: More than 6 weeks.
 - . Plants > 25 L size: More than 12 weeks.
- Pests and disease: Free from attack by pests or disease.

Labelling

General: Clearly label individual plants and batches.

Label type: To withstand transit without erasure or misplacement.

Root system

Requirement: Supply plant material with a root system that is:

- Well proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If inspection is by the removal of soil test, such as investigative inspection, sample as follows:

- For > 100 samples: Inspect 1%.
- For < 100 samples: Inspect 1 sample.

Sample plants: Replace plants used in investigative inspection.

Defective samples: remove from site.

Rejection: Do not provide root bound stock.

3 EXECUTION

3.1 PREPARATION

Weed eradication

Herbicide: Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any of its registered formulae, at the recommended maximum rate.

Manual weeding: Remove rubbish and weed growth throughout grassed, planted and mulched areas by hand, regularly. Remove weed growth from an area of 750 mm diameter around the base of the trees in grassed areas. Continue eradication throughout the course of the works and during the planting establishment period.

Vegetative spoil

Disposal: Remove vegetative spoil from site. Do not burn.

3.2 SUBSOIL

Ripping

General: Rip parallel to the final contours. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Ripping depths: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Planting beds

Excavated: Excavate to bring the subsoil to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains where required. Break up the subsoil to a further depth of 100 mm.

Cultivation

Minimum depth: 100 mm.

Cultivation depths (mm):

- Grassed areas (seeded, turf): 100mm
- Planting areas: 150mm

Services and roots: Do not disturb services or tree roots. If required cultivate these areas by hand.

Cultivation: Mix in materials required to be incorporated into the subsoil. Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented in the **Subsoil additives schedule**.

Gypsum: Incorporate at the rate of 0.25 kg/m².

Topsoil

Placing topsoil

General: Spread the topsoil on the prepared subsoil and grade evenly, making the necessary allowances to permit the following:

- Required finished levels and contours may be achieved after light compaction.
- Grassed areas may be finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Spreading: On steep batters, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without pending, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting, turfing or grass seeding.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:
 - . If using organic mulch: 225 mm.
- Turf areas generally: 75 mm.

Surplus topsoil

General: Spread surplus topsoil on designated areas on site or dispose off-site.

Designated areas: as directed by Cleanaway.

3.3 GRASS SEEDING

Preparation

General: If a prepared area becomes compacted before sowing can begin, rework the ground surface before sowing.

Scarify the area for seeding and provide a firm friable seed bed. Place any topsoil before scarifying.

Application

General: To the **hydromulching schedule**.

Method: Apply as follows:

- Moisten the topsoil to full depth before applying the slurry.
- Spray the slurry mixture under pressure, using high pressure pumping equipment.
- Maintain a thoroughly mixed supply.
- Evenly distribute the slurry mixture along the operating front.
- Complete each front before starting the next.

Watering

Before germination: Water the seeded area with a fine spray until the topsoil is moistened to its full depth. Until germination, keep the surface damp and the topsoil moist but not waterlogged.

After germination: Water to maintain a healthy condition, progressively hardened off to the ambient climatic conditions.

Application

General: To the **Grass seeding schedule**.

Ambient conditions: Do not sow in periods of extreme heat, cold or wet or when wind velocities exceed 8 km/h or if frost is likely before the grass is established.

Method: Evenly distribute the seed using purpose-made sowing machinery. Lightly rake the surface to cover the seed.

Rolling: Roll the seed bed immediately after sowing.

- Roller weight (maximum):
 - . Clay and packing (heavy) soils: 90 kg/m width.

Reseeding: If germination has not occurred within one month, reseed the sown areas.

Establishment

General: Maintain sown areas until there is a dense continuous sward of healthy grass over the whole of the seeded area, evenly green and of a consistent height.

Protection: Protect the newly sown areas against traffic until established.

Weeding: Remove weeds from the sown areas. If required, spray with a selective herbicide for broad leaved weeds. Do not spray grass seeded areas within 3 months of germination.

Fertilising after germination: As follows:

- Six weeks after germination: Spread fertiliser evenly over the sown area and water in. Do not apply fertiliser to wet grass.
- Ten weeks after grass germination: If the planting establishment period occurs during the summer months, spread pelleted sulphate of ammonia at the rate of 250 kg/ha.

Mowing: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing not more than 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

3.4 TURFING

Supply

Elapsed time: Deliver the turf within 24 hours of cutting, and lay within 36 hours of cutting. Prevent turf from drying out between cutting and laying. If not laid within 36 hours of cutting, roll turf out on a flat surface with the grass up, and water as required to maintain a good condition.

Application

General: To the **Turfing schedule**.

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- Finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.
- Rolling: Lightly roll to an even surface immediately after laying.

Watering

General: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

Establishment

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Fertiliser: Apply lawn fertiliser at the completion of the first and last mowings, and at other times as required to maintain healthy grass cover.

Mowing: Mow to maintain the grass height within the required range. Do not remove more than one third of the grass height at any one time. Carry out the last mowing not more than 7 days before the end of the planting establishment period. Remove grass clippings from the site after each mowing.

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

3.5 PLANTING

Individual plantings in grassed areas

Method: Excavate a hole twice the diameter of the root ball and at least 100 mm deeper than the root ball. Break up the base of the hole to a further depth of 100 mm, and loosen compacted sides of the hole to prevent confinement of root growth.

Locations

General: If it appears necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions

Weather: Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Watering

Timing: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

Placing

Method: Remove the plant from the container with minimum disturbance to the root ball. Make sure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant root ball level with the finished surface of the surrounding soil.

Fertilising

Pellets: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Backfilling

General: Backfill with topsoil mixture. Tamp lightly and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the root ball, so the plant stem remains the same height above ground as it was in the container.

Watering basins for plants in grass

Method: Except in irrigated grassed areas and normally moist areas, construct a watering basin around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.6 MULCHING

Placing mulch

General: Place mulch to the required depth, clear of plant stems, and rake to an even surface flush with the surrounding finished levels. Spread and roll mulch so that after settling, or after rolling, it is smooth and evenly graded between design surface levels sloped towards the base of plant stems in plantation beds, and not closer to the stem than 50 mm in the case of gravel mulches.

In mass planted areas: Place after the preparation of the planting bed but before planting and other work.

Extent: Provide mulch to 750 mm diameter, to surrounds of trees planted in grass areas.

Depths: Spread organic mulch to a depth of 75 mm.

3.7 SPRAYING

Notice

Requirement: Immediately give notice of evidence of insect attack or disease amongst plant material.

Pesticide

Product: Spray with insecticide, fungicide or both, as required.

3.8 STAKES AND TIES

Stakes

Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one third of their length, avoiding damage to the root system.

Stake sizes: refer to Street tree planting detail for staking to street trees.

Ties

General: Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely so as not to restrict plant growth.

Tie types:

- For plants ≥ 2.5 m high: 50 mm hessian webbing stapled to the stake, installed around stake and stem in a figure of eight pattern.

Completion

Cleaning

Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

Warranties

Parties: Supplier(s) to the principal.

Form: All the plants supplied under these works are true-to-species and type, and free of disease, fungal infection and/or any other impediment to their future growth and that they have been fully acclimatised for the conditions of the site.

Submission of warranty: At the time of each delivery.

4 SELECTIONS

4.1 TOPSOIL

Imported topsoil schedule

Property	A- Mass planted areas	B- Individual trees in turf	C- Turf areas
Type	ANL "Greenlife Garden mix" or equal	ANL 'Greenlife Garden mix" or equal	ANL "turf underlay" or equal
Texture	Medium	Medium	Coarse
Soil pH	6.0- 8.0	6.0 – 8.0	6.0- 7.1
Organic content by mass	20 – 28%	20 – 28%	12- 17%
Fertiliser (N:P:K)	13:11:13	13:11:13	8:3:8
Plant sensitivity to phosphorus	N/A	N/A	N/A

4.2 FERTILISER

Fertiliser schedule

Property	A- Mass planted areas	B- Individual trees in turf	C
Location	As shown on plans	As shown on plans	As shown on plans
N:P:K ratio	13:11:13 equal to Nutricote Total	13:11:13 equal to Nutricote Total	8:3:8 equal to Nutricote Healthy Grow
Application rate	As recommended by manufacturer	As recommended by manufacturer	3-6kg per 100m2

4.3 GRASSING

Hydromulching schedule

Property	A-refer to plans for extent		
Seed mix and type	"Parkland Blend" or equal		
Mulch type	Wood fibre with green dye		

" Parkland Blend"- 56% turf type fescue, 30% perennial rye, 5% couch, 9% creeping red fescue.

Turfing schedule

Property	A		
Species or variety	Kikuyu		
Minimum thickness	75mm		
Turf roll size (mm)	1000mm		
Mowing height (mm)	50mm		

4.4 MULCHING

Mulching schedule

Property	A- Mass planted areas	B- Individual trees in turf	
Mulch type	ANL "Forest Fines" or equal	ANL "Forest Fines" or equal	
Depth (mm)	75mm	75mm	

4.5 PLANT MATERIAL: REFER TO PLANT SCHEDULES.

0256 LANDSCAPE – ESTABLISHMENT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide plant establishment, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Definitions

General: For the purpose of this worksection the following definitions apply:

- Plant establishment period: 13 WEEKS From the date of practical completion.

1.4 SUBMISSIONS

Execution details

Notice: Provide two days notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Watering.
- Each site maintenance visit.

Log book

Records: Log the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Availability: Upon request.

Monitoring program

General: incorporate the following:

- Photographic record including:
 - . Colour photographs.
 - . Documented monitoring locations and photograph angles.
- Reporting periods including photographic records at the following:
 - . Before commencement of the works.
 - . Date of practical completion.
 - . Monthly intervals during the plant establishment period.
 - . Date of final completion.

Replacement plants

Species: Provide written certification that all plant material is true to the required species and type.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection of the contract area may be made at the following:

- Date of practical completion.
- Date of final completion.

2 EXECUTION

2.1 GENERAL

Special instructions

Priority: If instructed by the contract administrator, attend to certain areas and procedures as a priority. Obtain approval for additional costs before commencement of works.

Reporting

Monthly report: Submit regular reports by the last Friday of each month:

- Of the general status of works.
- Include soil test results as required for the fertilising programs.
- Plant replacement requirements.

Incident reports: Report immediately verbally and confirm in writing any disturbance or incidence affecting or likely to affect the day to day scheduling of works.

Disruption of works by others

Other contractors: Make arrangements to work around the disturbance.

2.2 PLANTING WORKS

Planting

Planting: Ensure the general appearance and presentation of the landscape and the quality of plant material at date of practical completion is maintained for the full planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as specified for the corresponding classifications of new grass areas or planting.

Replacements: Replace failed, dead and/or damaged plants at maximum 3 week intervals as necessary throughout the full plant establishment period.

Pruning

Prune: To AS 4373 and as documented in the **Pruning schedule**.

Fertilising

Fertilising: Generally apply an all purpose fertiliser of N:P:K (Nitrogen:Phosphorus:Potassium) 10:4:6 at recommended rates. Alternatively apply 12 month slow release fertiliser at the manufacturer's recommended rate.

Insect and disease control

Responsibility for insect and disease control: Landscape Contractor

Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

Stakes and ties

Removal: If plants are robust with well developed systems and are strong enough to no longer require support, remove stakes and ties.

2.3 GRASS

Mowing and trimming

Litter: Remove litter and fallen branches before mowing.

Height: Consistent with the growth habit of the grass variety and maintained at 25 mm to 40 mm throughout the year.

Program: Weekly during the mowing season, November to March, and at bi-weekly intervals during April to October. Do not mow under wet conditions.

Raking: Once every month before mowing, during the mowing season, with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edges: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Ensure trees and shrubs are not damaged.

Clippings distribution: remove off site.

Topdressing

Topdressing material for remediation of depressions or irregularities: Apply coarse or medium soil to AS 4419 suitable for application to turf or grass seeded areas.

Fertilising

Fertilising: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

2.4 GARDEN BEDS

Weeding

Weeds: Unwanted plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly, and as determined by the relationship of the general lawn condition and weed growth.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at bi-weekly intervals.

Method: Clear and keep clear vigorous ground covers 200 mm from the base of any shrub or tree:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Avoid windy days or if rain is likely to follow within 12 hours. Apply:

- To the manufacturer's instructions and Safety Data Sheets.
- When the weather is humid with moderate temperatures and maximum sunlight.
- When the ground has recommended soil moisture.

Rubbish removal

Rubbish: Remove loose rubbish such as bottles, papers, and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at bi-weekly intervals.

Leaf litter: Remove from all path and lawn areas.

Leaf litter distribution: remove off site.

Mulched surfaces

Inspection: Bi-weekly to determine mulch requirements.

Depth: Maintain a minimum depth of:

- 75 mm for organic mulch.

Remulching: Maintain the original ground levels around the base of plants.

2.5 CONTROL MEASURES

Rabbit control

Generally: Implement rabbit control until the completion of the plant establishment period.

Rabbit guards: Maintain rabbit guards in a working upright and taut order with three stakes. Replace missing or damaged guards with the same materials as previously specified.

Removal: At the completion of the plant establishment period.

2.6 WATERING

Establishment

Extent: all new planted and grass areas.

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances that would be toxic to plant growth.

Watering program: Minimum three complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall. Confirm soaked depth and record in the log book.

Water restrictions: Coordinate the water supply and confirm the watering regime against state and territory government legislation and restrictions at the time.

Hand watering

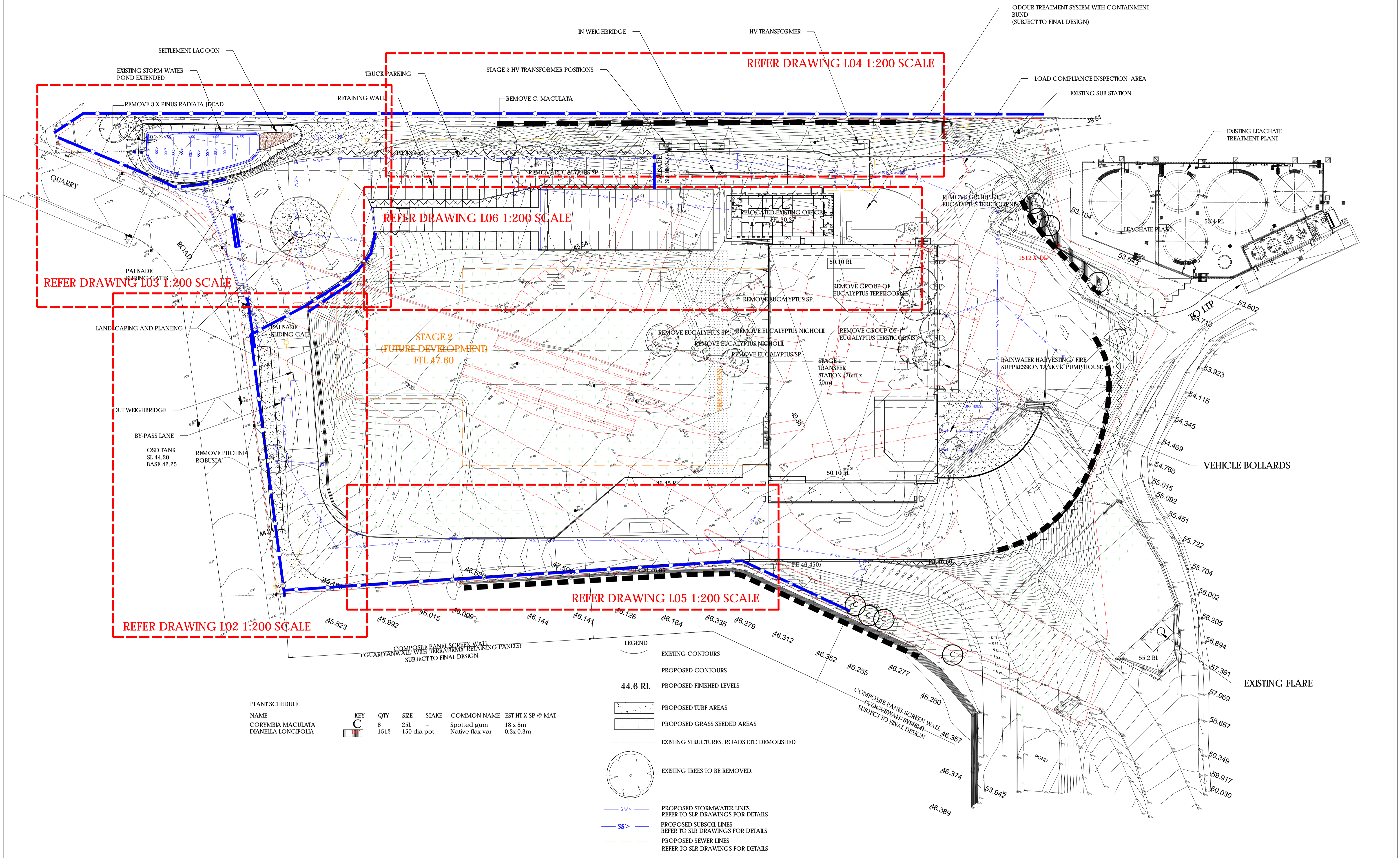
General: Manually water all lawn and planting areas, soaking to a depth of 150 mm for lawn and 300 mm for planting. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

2.7 COMPLIANCE

Criteria

Generally: Plant establishment shall be deemed complete, subject to the following:

- Repairs to planting media completed.
- Ground surfaces are covered with the specified treatment to the specified depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic mulched surfaces have been maintained in a weed free and tidy condition and to the specified depth.
- Vegetation is established and well formed.
- Vegetation cover to seeded and/or hydromulched areas.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and not able to be lifted out of its planting hole.
- Vegetation is not restricting essential sight lines and signage.
- Specified vegetation setbacks from services and road furniture are evident.
- Collection and removal of litter.
- Removal of mulch from drainage and access areas.
- All non-conformance reports and defects notifications have been closed out.

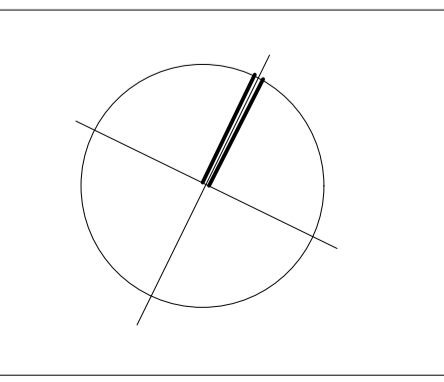


C	ENTRY DRIVEWAY & CARPARK REVISED GENERAL UPDATE-DWG L06 ADDED TO SET	07.11.18
B	CONSTRUCTION CERTIFICATE	22.06.17
A	PRELIMINARY - CLIENT REVIEW	21.06.17
ISSUE	AMENDMENTS	DATE

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CLEANAWAY
Making a sustainable future possible



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CLEANAWAY WASTE MANAGEMENT LTD

DATE:
JUNE 2017

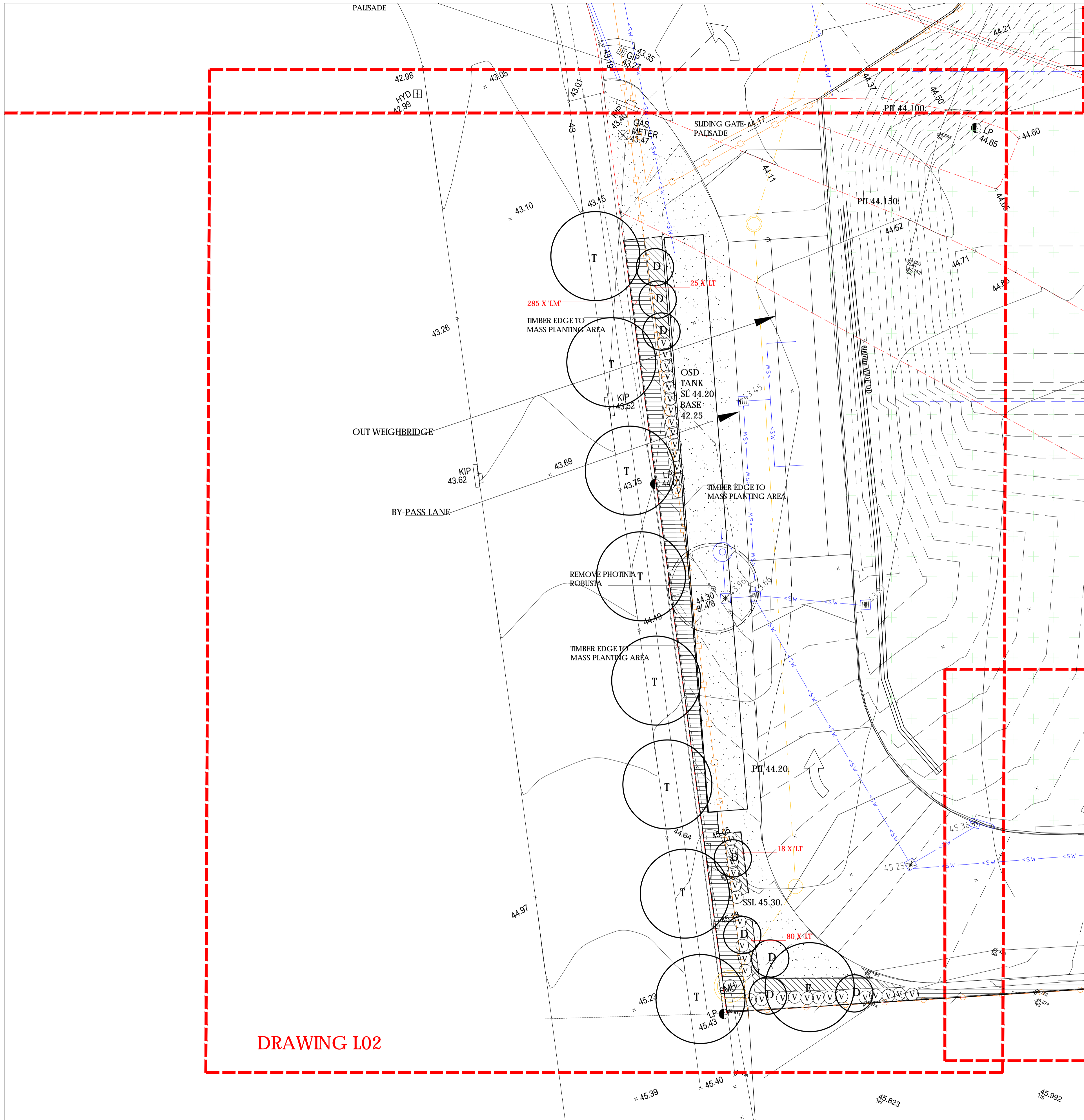
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17-016/L01

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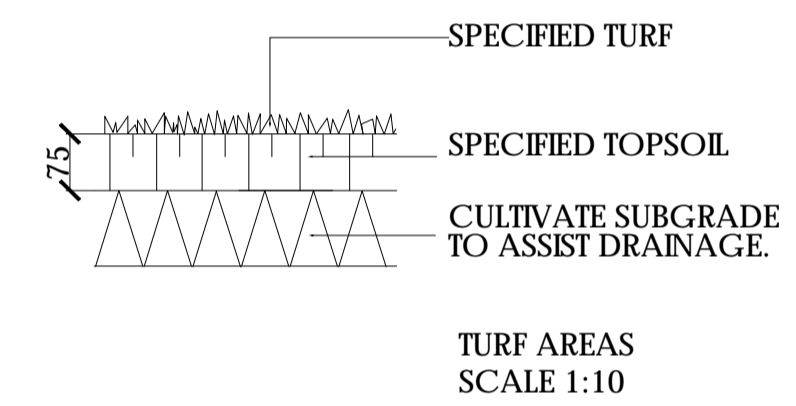
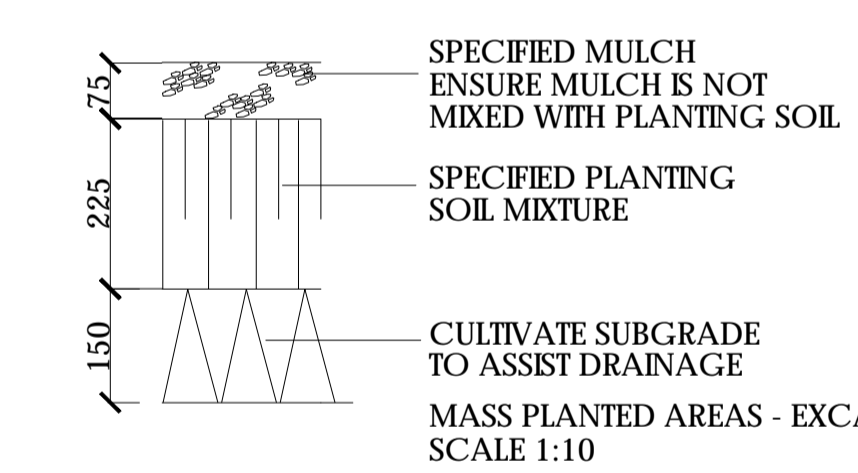
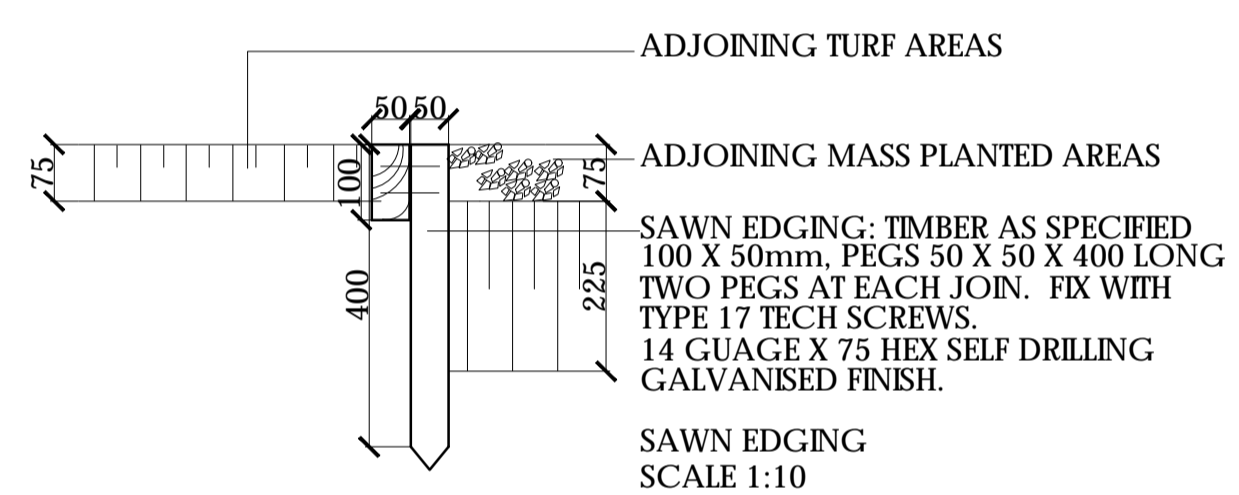
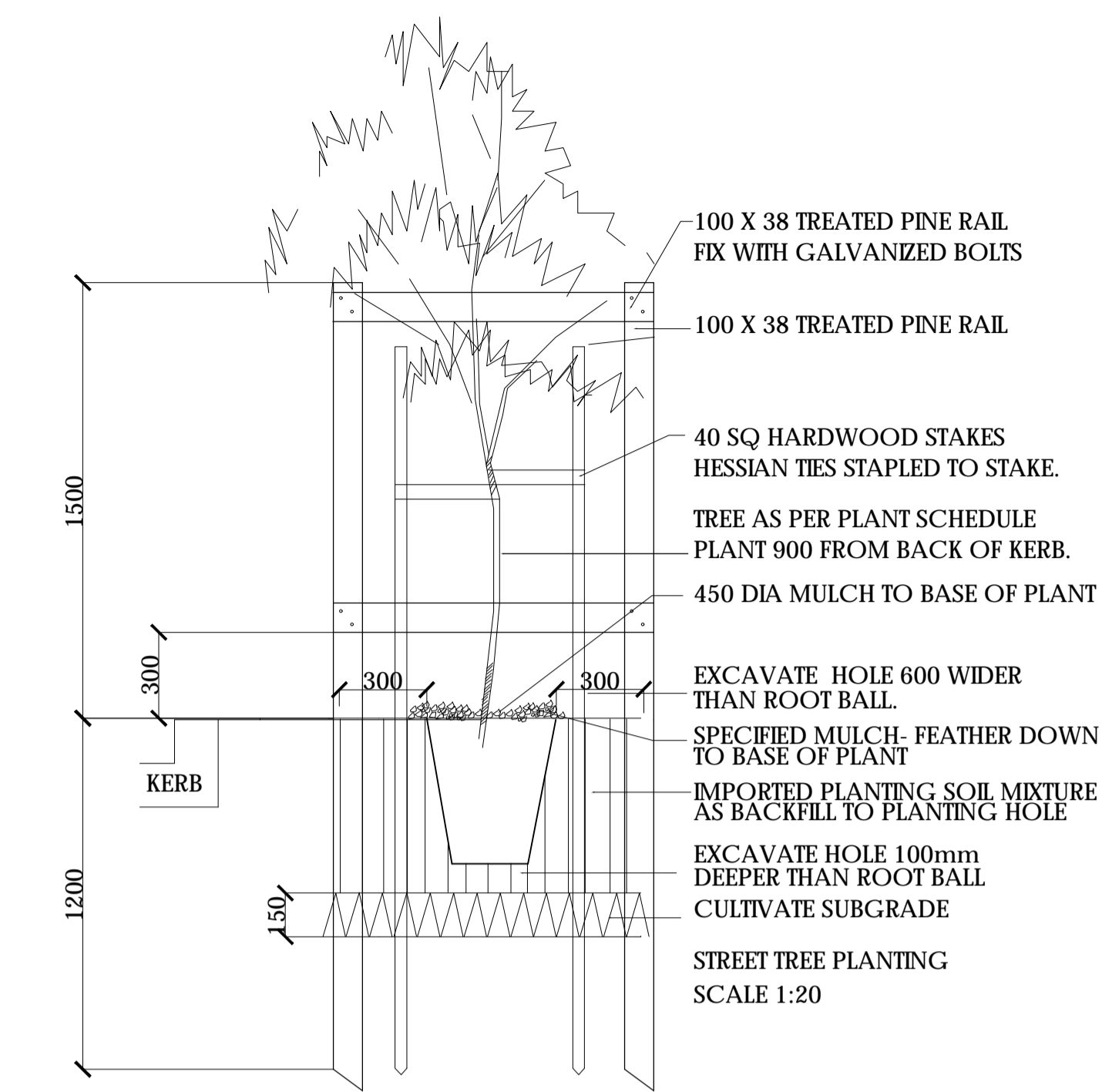
PROJECT:
ERSKINE PARK RMF STAGE 1-
WASTE TRANSFER STATION

DRAWING:
LANDSCAPE SITE PLAN

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DRAWING I02



LEGEND

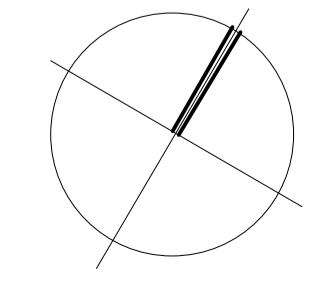
- EXISTING CONTOURS
- PROPOSED CONTOURS
- 44.6 RL PROPOSED FINISHED LEVELS
- PROPOSED TURF AREAS
- PROPOSED GRASS SEEDED AREAS
- EXISTING STRUCTURES, ROADS ETC DEMOLISHED
- EXISTING TREES TO BE REMOVED.
- PIT 46.50
- PROPOSED STORMWATER LINES REFER TO SLR DRAWINGS FOR DETAILS
- PROPOSED SUBSOIL LINES REFER TO SLR DRAWINGS FOR DETAILS
- PROPOSED SEWER LINES REFER TO SLR DRAWINGS FOR DETAILS

PLANT SCHEDULE

NAME	KEY	QTY	SIZE	STAKE	COMMON NAME	EST HT X SP @ MAT
EUCALYPTUS TERETICORNIS	T	8	100L	+	Forest Red gum	30 x 12m ——— °C
EUCALYPTUS TERETICORNIS	E	1	25L	+	Forest red gum	30 x 12m ——— °C
CORYMBIA MACULATA	C	5	25L	+	Spotted gum	18 x 8m
MELALEUCA DECORA	D	4	25L	+	White feather honey myrtle	8 x 4m ——— °C
CALLISTEMON VIMINALIS 'SLIM'	V	23	5L		Bottlebrush var	2.5 x 1m
LOMANDRA MULTIFLORA	LM	285	150 dia pot		Mat rush var	0.75 x 0.75m
LOMANDRA 'TANIKA'	LT	123	150 dia pot		Mat rush var	0.6 x 0.6m

ISSUE	AMENDMENTS	DATE
D	NEW DRAWING - ENTRY DRIVEWAY & CARPARK REVISED	07.11.18
C	AMENDS FOLL COUNCIL REVIEW	11.09.17
B	CONSTRUCTION CERTIFICATE	22.06.17
A	PRELIMINARY - CLIENT REVIEW	21.06.17

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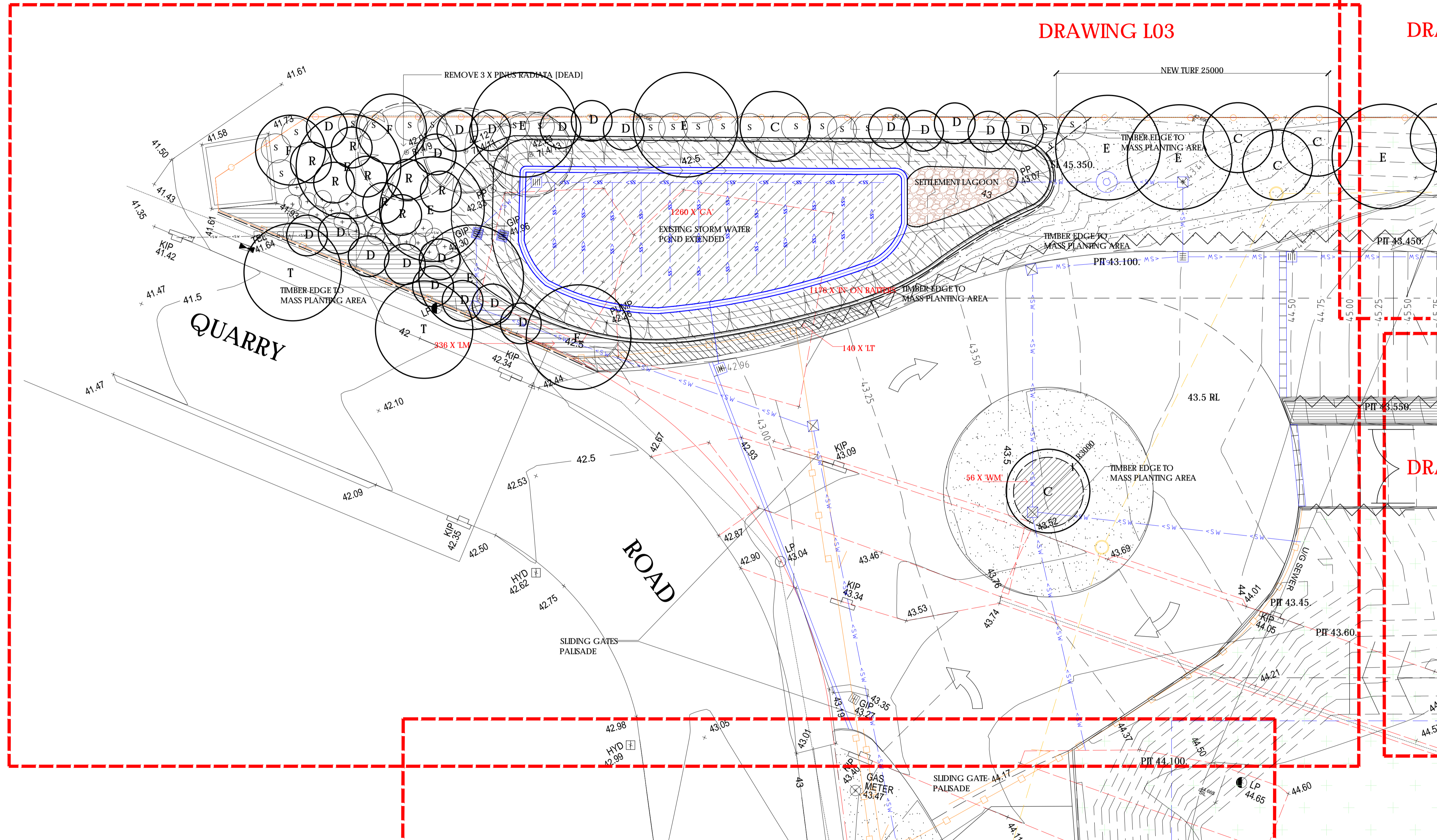
PROJECT:
ERSKINE PARK RMF STAGE 1-
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DRAWING L03

DRA



LEGEND

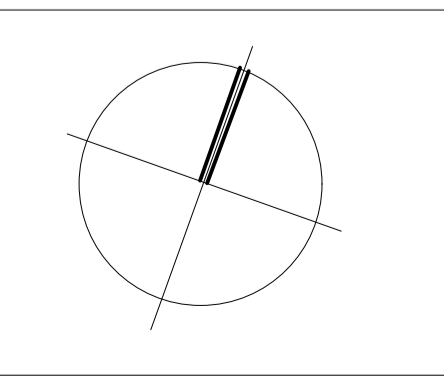
- EXISTING CONTOURS
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- PROPOSED GRASS SEEDED AREAS
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- PROPOSED SUBSOIL LINES
REFER TO SLR DRAWINGS FOR DETAILS
- PROPOSED SEWER LINES
REFER TO SLR DRAWINGS FOR DETAILS

PLANT SCHEDULE.

NAME	KEY	QTY	SIZE	STAKE	COMMON NAME	EST HT X SP @ MAT	
EUCALYPTUS TERETICORNIS	T C E R F E R	2	100L	+	Forest red gum	30 x 12m	
CORYMBIA MACULATA		5	25L	+	Spotted gum	18 x 8m	
EUCALYPTUS TERETICORNIS		8	25L	+	Forest red gum	30 x 12m	
EUCALYPTUS FIBROSA		2	100L	+	Broad leaf ironbark	15 x 6m	
ELAEOCARPUS RETICULATUS		16	25L	+	Blueberry Ash	6 x 3m	
MELALEUCA DECORA	13	25L	+	White feather honeymyrtle	8 x 4m		
CALLISTEMON SALIGNUS	S	21	5L		Bottlebrush var	6 x 3m	
DORYANTHES EXCELSA		20	5L		Bottlebrush var	2.5 x 1m	
CAREX APPRESSA	'CA'	1260	150 dia pot		Tussock sedge	1 x 1m	
SOLEPIS NODOSA		1176	150 dia pot		Knobby club rush	0.75 x 0.75m	
LOMANDRA MULTIFLORA		336	150 dia pot		Mat rush var	0.75 x 0.75m	
LOMANDRA 'TANIKA'		'LT'	140	150 dia pot		Mat rush var	0.6 x 0.6m
WESTRINGIA 'MUNDI'		'WM'	56	150 dia pot		Coast rosemary var	0.75 x 1.5m

D	NEW DRAWING - ENTRY DRIVEWAY & CARPARK REVISED	07.11.18
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NO. IN SET
6

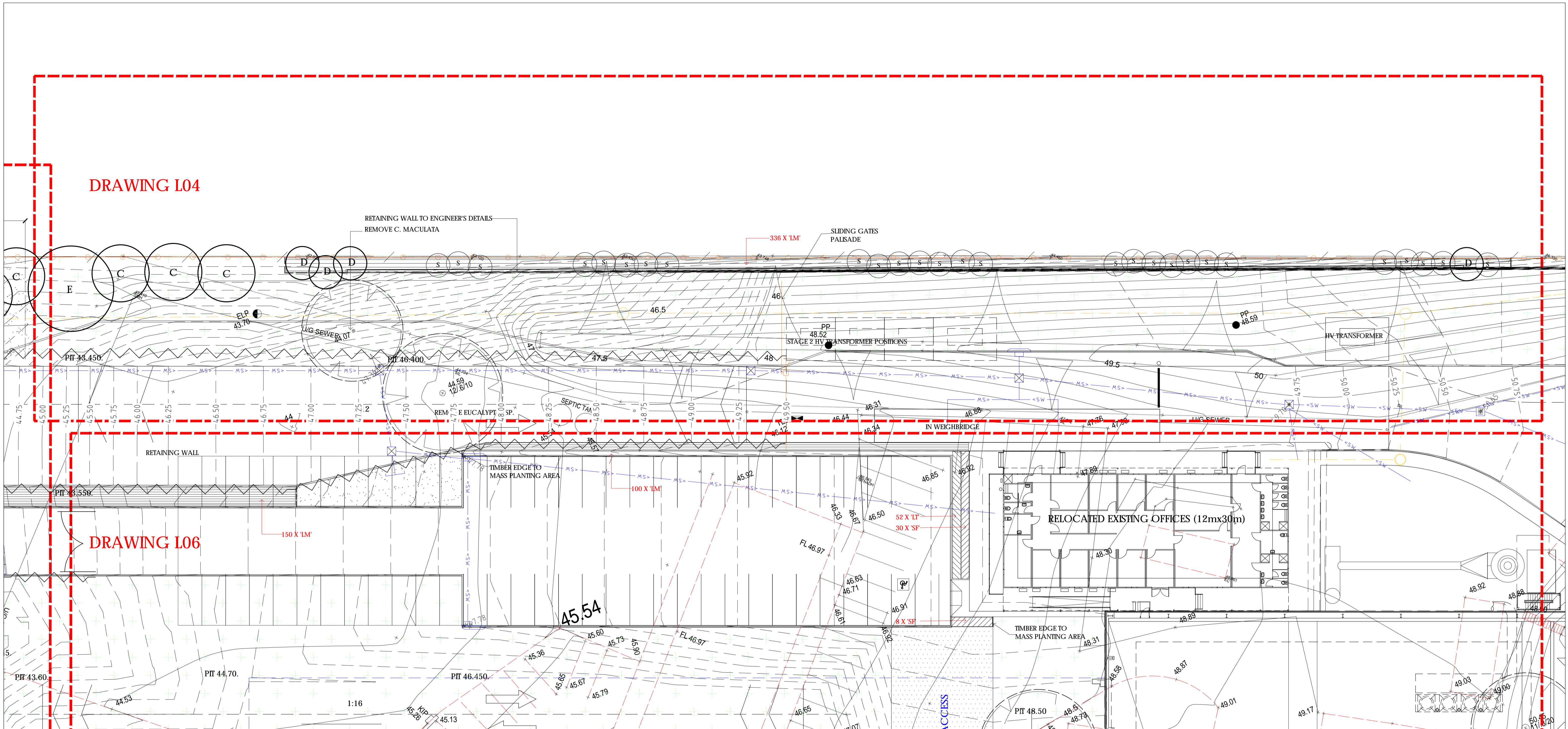
PROJECT:
ERSKINE PARK RMF STAGE 1-
WASTE TRANSFER STATION

DRAWING:
LANDSCAPE PLAN- PART SITE

JOCELYN RAMSAY & ASSOC. PTY. LTD
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ph. 0417 227843
email:jocelyn@jrla.com.au

DRAWING L04

DRAWING L06



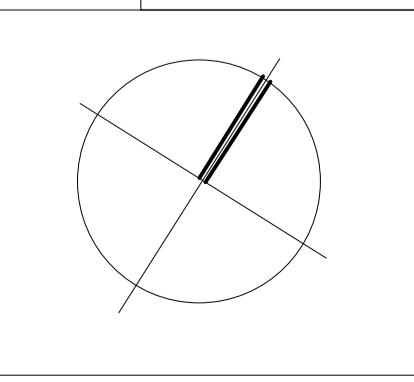
- LEGEND**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - 44.6 RL** PROPOSED FINISHED LEVELS
 - PROPOSED TURF AREAS
 - PROPOSED GRASS SEEDED AREAS
 - EXISTING STRUCTURES, ROADS ETC DEMOLISHED
 - EXISTING TREES TO BE REMOVED.
 - PIT 46.50.**
 - PROPOSED STORMWATER LINES REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SUBSOIL LINES REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SEWER LINES REFER TO SLR DRAWINGS FOR DETAILS

PLANT SCHEDULE

NAME	KEY	QTY	SIZE	STAKE	COMMON NAME	EST HT X SP @ MAT
CORYMBIA MACULATA	C	3	25L	+	Spotted gum	18 x 8m
EUCALYPTUS TERETICORNIS	E	1	25L	+	Forest red gum	30 x 12m
MELALEUCA DECORA	D	4	25L	+	White feather honeymyrtle	8 x 4m
CALLISTEMON SALIGNUS	S	27	5L		Bottlebrush var	2.5 x 1m
LOMANDRA MULTIFLORA	'LM'	568	150 dia pot		Mat nash var	0.75 x 0.75m

ISSUE	AMENDMENTS	DATE
D	NEW DRAWING - ENTRY DRIVEWAY & CARPARK REVISED	07.11.18
C	AMENDS FOLL COUNCIL REVIEW	11.09.17
B	CONSTRUCTION CERTIFICATE	22.06.17
A	PRELIMINARY - CLIENT REVIEW	21.06.17

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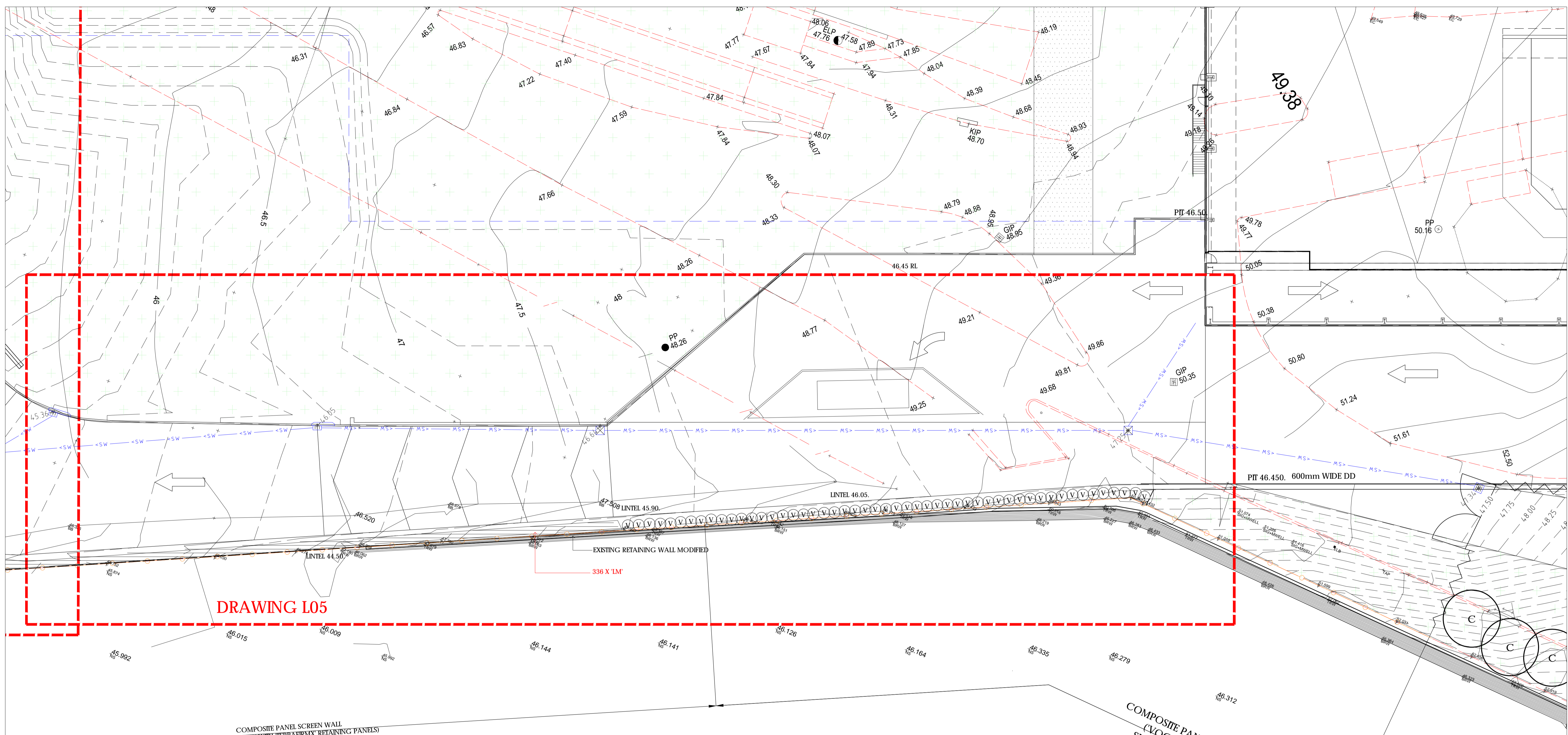
DATE:
JUNE 2017
DWG. NO.
17-016/L04

SCALE:
1:200 @ A1
NO. IN SET
6

PROJECT:
ERSKINE PARK RMF STAGE 1-
WASTE TRANSFER STATION

DRAWING:
LANDSCAPE PLAN- PART SITE

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DRAWING L05

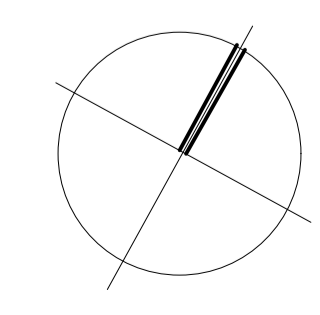
COMPOSITE PANEL SCREEN WALL
(GUARDIANWALL WITH TERRAFIRM RETAINING PANELS)
SUBJECT TO FINAL DESIGN

COMPOSITE PANEL SCREEN WALL
(VOGUEWALL SYSTEM)
SUBJECT TO FINAL DESIGN

- LEGEND**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - 44.6 RL** PROPOSED FINISHED LEVELS
 - PROPOSED TURF AREAS
 - PROPOSED GRASS SEEDED AREAS
 - EXISTING STRUCTURES, ROADS ETC DEMOLISHED
 - EXISTING TREES TO BE REMOVED.
 - PIT 46.50.**
 - PROPOSED STORMWATER LINES
REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SUBSOIL LINES
REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SEWER LINES
REFER TO SLR DRAWINGS FOR DETAILS

PLANT SCHEDULE.					
NAME	KEY	QTY	SIZE	COMMON NAME	EST HT X SP @ MAT
CALLISTEMON VIMINALIS 'SLIM'	V	51	5L	Bottlebrush var	2.5 x 1m
LOMANDRA MULTIFLORA	LM	260	150 dia pot	Mat rush var	0.75 x 0.75m

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DATE:
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DWG. NO.
17-016/105

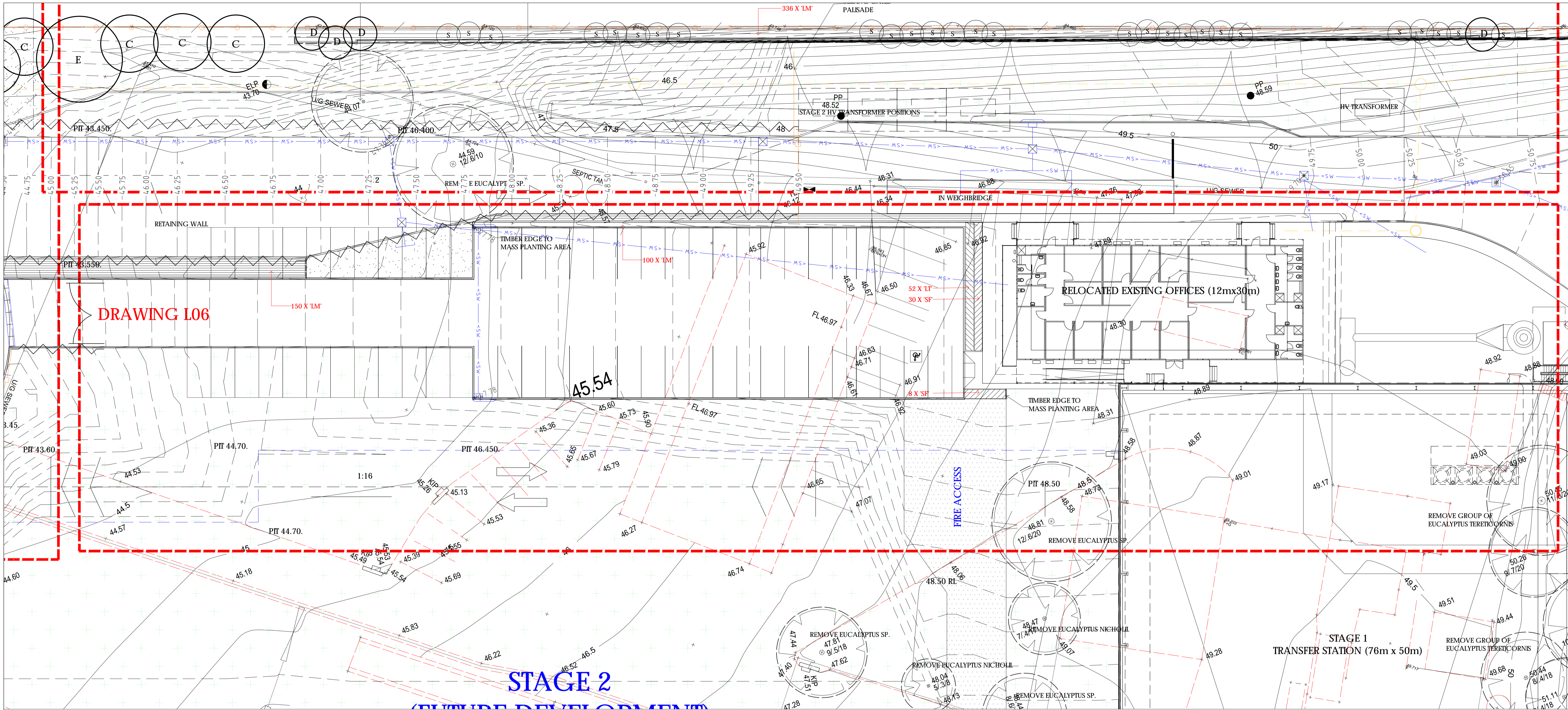
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NO. IN SET
6

PROJECT:
ERSKINE PARK RMF STAGE 1-
WASTE TRANSFER STATION

DRAWING:
LANDSCAPE PLAN- PART SITE

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ISSUE	AMENDMENTS	DATE
C	NEW DRAWING - ENTRY DRIVEWAY & CARPARK REVISED	07.11.18
B	CONSTRUCTION CERTIFICATE	22.06.17
A	PRELIMINARY- CLIENT REVIEW	21.08.17



DRAWING L06

STAGE 2

RELOCATED EXISTING OFFICES (12m x 30m)

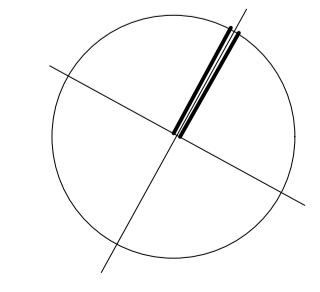
STAGE 1
TRANSFER STATION (76m x 50m)

PLANT SCHEDULE						
NAME	KEY	QTY	SIZE	STAKE	COMMON NAME	EST HT X SP @ MAT
CALLISTEMON 'SCARLET FLAME'	'SF'	38	150 dia pot		Bottlebrush var	0.75 x 0.75m
LOMANDRA MULTIFLORA	'LM'	250	150 dia pot		Mat rush var	0.6 x 0.6m
LOMANDRA TANKA	'LT'	52	150 dia pot		Mat rush var	0.6 x 0.6m

- LEGEND**
- EXISTING CONTOURS
 - PROPOSED CONTOURS
 - 44.6 RL** PROPOSED FINISHED LEVELS
 - PROPOSED TURF AREAS
 - PROPOSED GRASS SEEDED AREAS
 - EXISTING STRUCTURES, ROADS ETC DEMOLISHED
 - EXISTING TREES TO BE REMOVED.
 - PIT 46.50.** PROPOSED STORMWATER LINES
REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SUBSOIL LINES
REFER TO SLR DRAWINGS FOR DETAILS
 - PROPOSED SEWER LINES
REFER TO SLR DRAWINGS FOR DETAILS

ISSUE	DESCRIPTION	DATE
A	NEW DRAWING - ENTRY DRIVEWAY & CARPARK REVISED	07.11.18
	AMENDMENTS	

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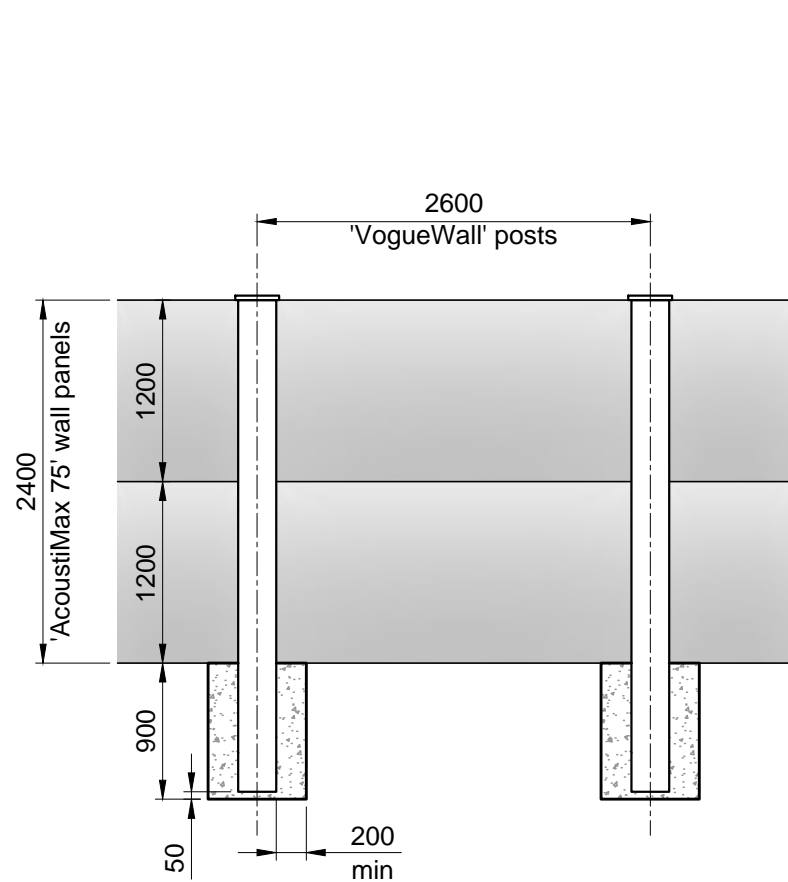
SCALE:
1:200 @ A1
NO. IN SET
6

PROJECT:
ERSKINE PARK RMF STAGE 1-
WASTE TRANSFER STATION

DRAWING:
LANDSCAPE PLAN- PART SITE

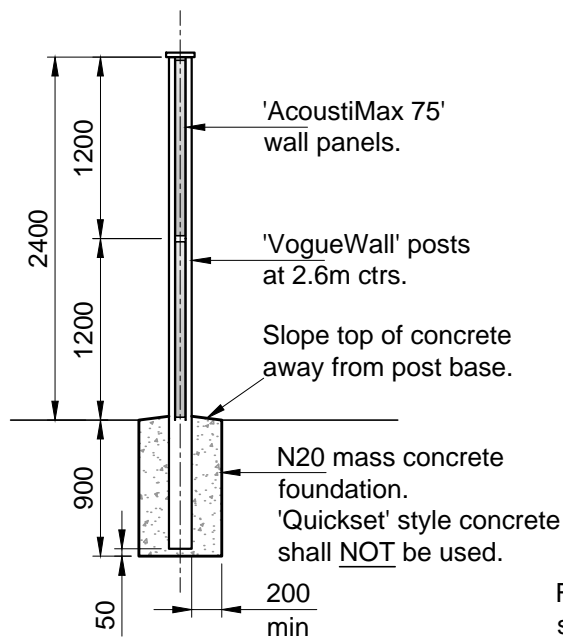
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ph. 0417 227843
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Appendix K - Boundary Fencing and Walls Images



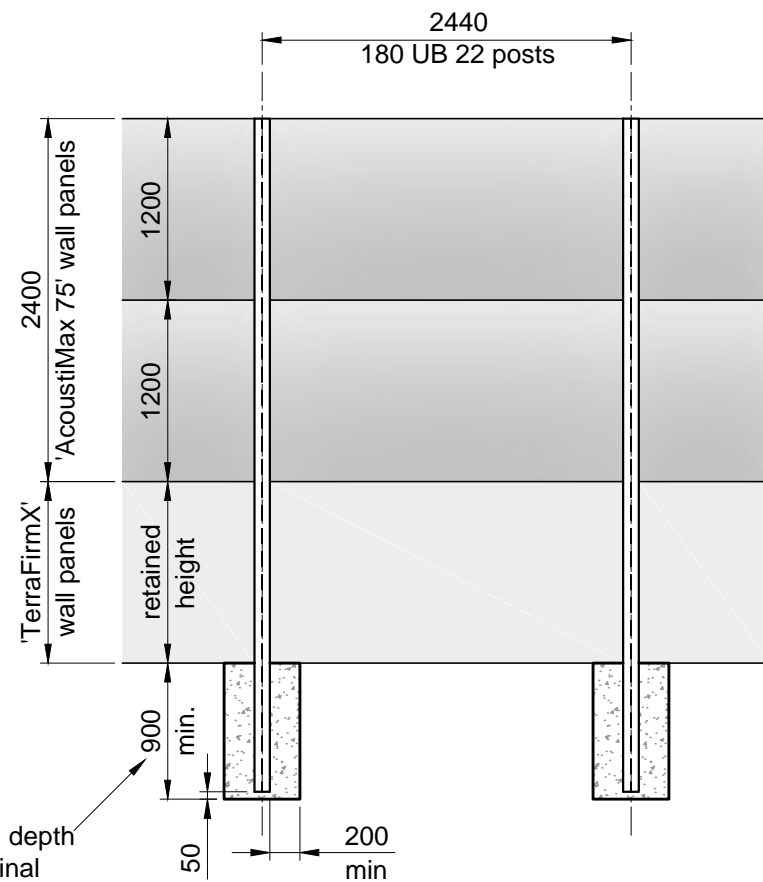
ELEVATION

VOGUEWALL



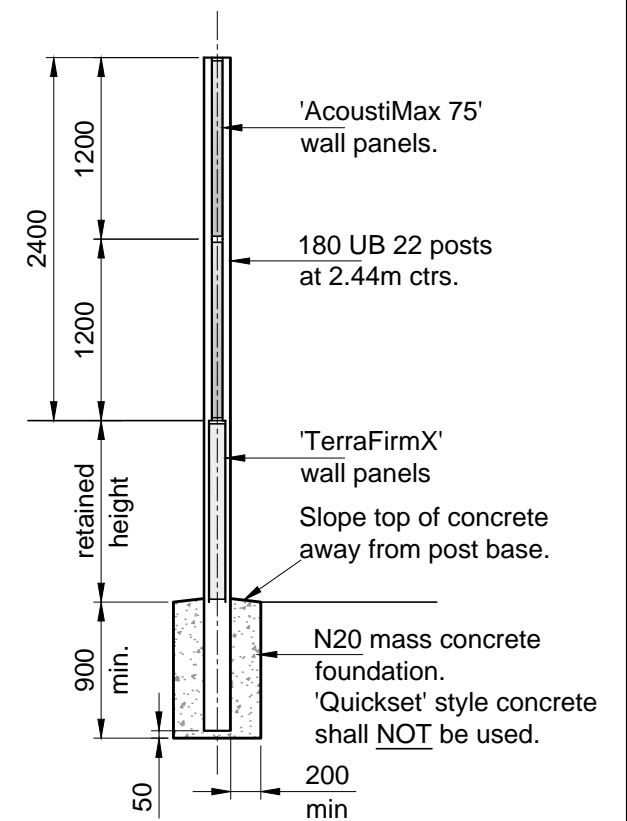
SECTION

NOTE:
Allow the concrete foundations to cure overnight. Longer curing may be required in very cold and or hot weather.



ELEVATION

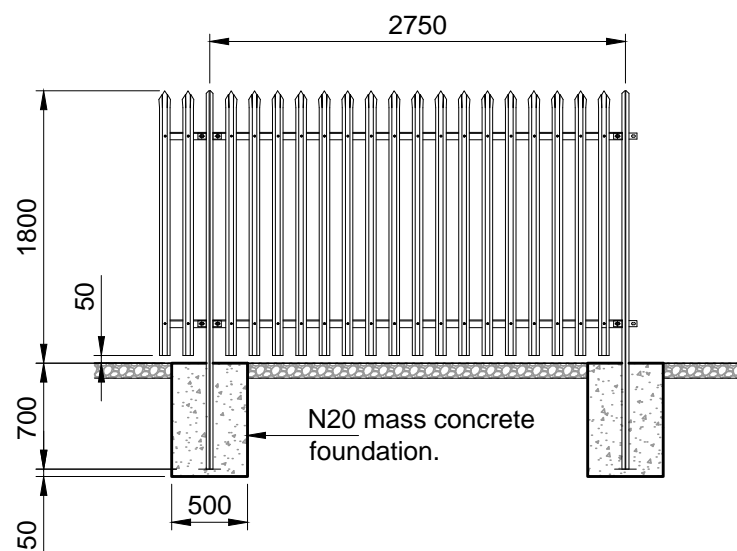
GUARDIANWALL



SECTION

TYPICAL 2.4m HIGH COMPOSITE PANEL SCREEN WALL DETAILS

1:50

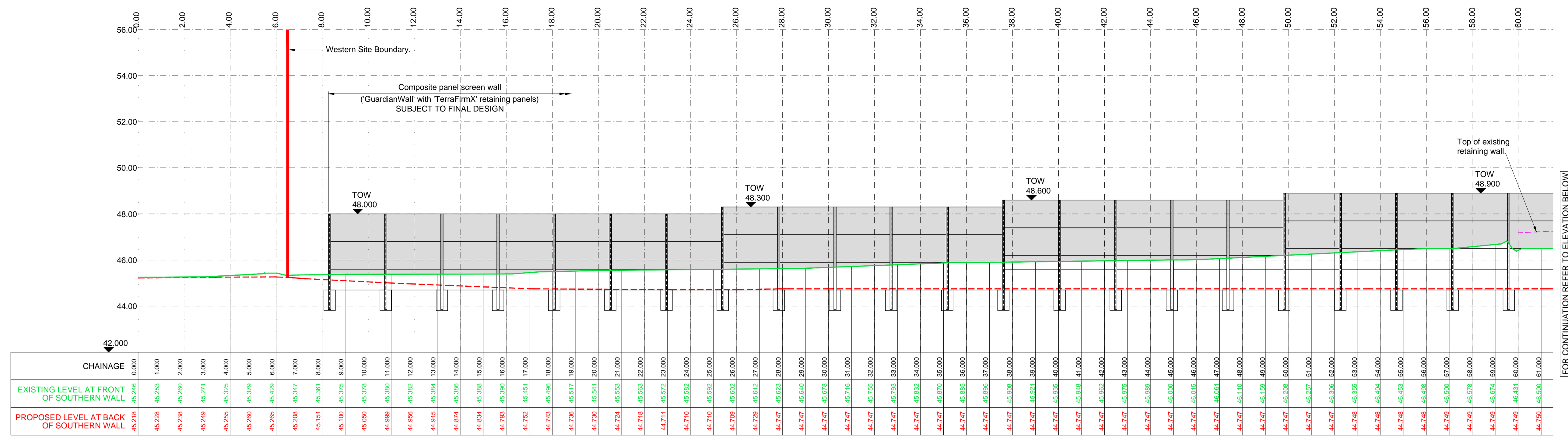


TYPICAL PALISADE FENCE DETAIL

1:50

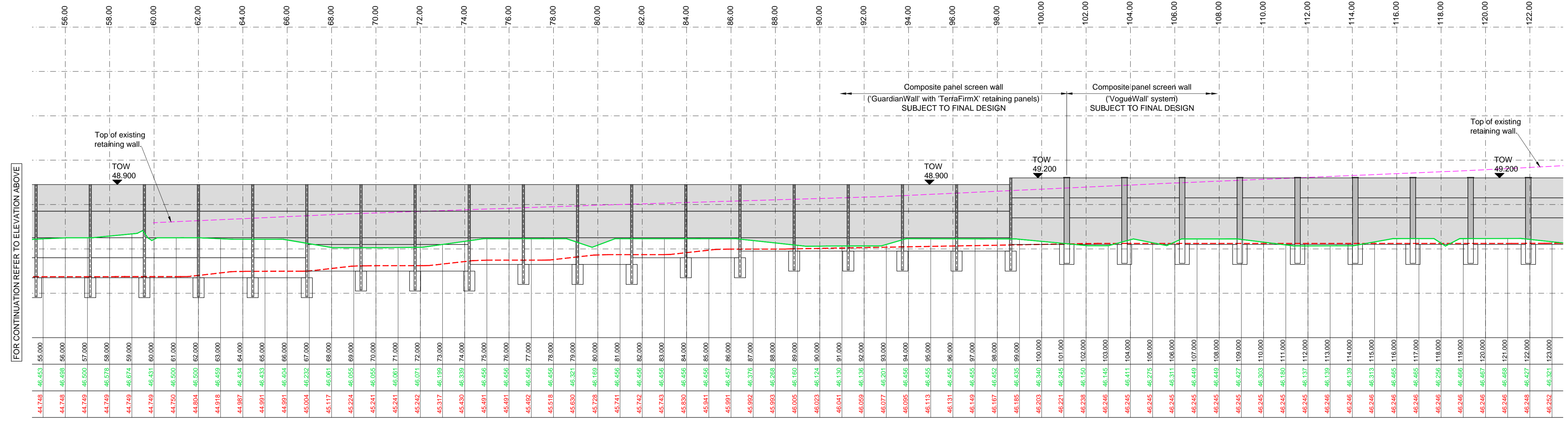
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Revision	Drawn By	Chkd By	Date	Comments	Project ERSKINE PARK RMF, STAGE 1 - WASTE TRANSFER STATION
<p>2 LINCOLN STREET LANE COVE NEW SOUTH WALES 2066 AUSTRALIA T: 61 2 9427 8100 F: 61 2 9427 8200 www.slrconsulting.com</p>					Drawing TYPICAL FENCING DETAILS SHEET 2 OF 2
					Date MAY 2016
Scale 1:50 @ A3					TENDER ISSUE

- NOTES
1. This drawing is to be read in conjunction with all Architects and Engineers drawings and Specifications.
 2. Do not scale this drawing.
 3. Existing ground levels outside of site boundary are approximate based on limited survey information. Contractor to confirm existing ground levels at base of existing retaining wall prior to construction.
 4. Composite panel screen wall layout shown is for information only subject to final design.



ELEVATION ON SOUTHERN BOUNDARY SCREEN WALL
1:100

FOR CONTINUATION REFER TO ELEVATION BELOW



ELEVATION ON SOUTHERN BOUNDARY SCREEN WALL Cont...
1:100

FOR CONTINUATION REFER TO ELEVATION ABOVE

FOR CONTINUATION REFER TO ELEVATION ON DRAWING 220

LEGEND

Revision	DH	LN	21.06.17	TENDER ISSUE
0	DH	LN	21.06.17	TENDER ISSUE

Client
 CLEANAWAY WASTE MANAGEMENT LTD

Project
 ERSKINE PARK RESOURCE MANAGEMENT FACILITY
 STAGE 1 - WASTE TRANSFER STATION

Drawing Title
SOUTHERN BOUNDARY SCREEN WALL ELEVATION SHEET 1 OF 2

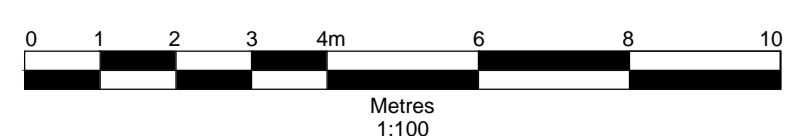
Scale
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 Date
 JUNE 2017

Drawing Number
219

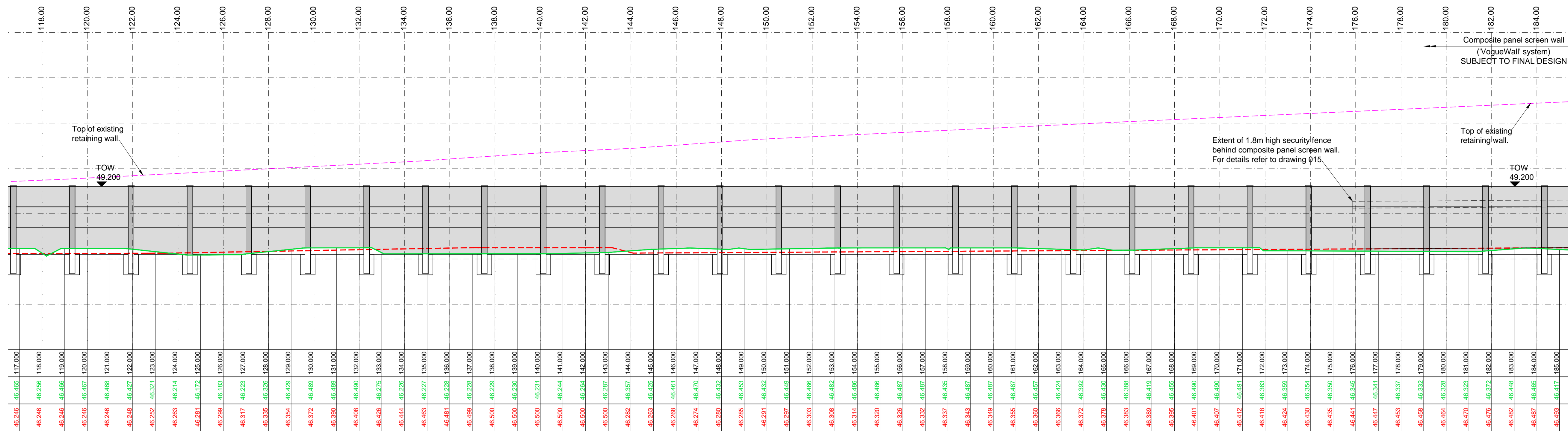
Revision
0

TENDER ISSUE

03561 0004 03 219 0 Southern Boundary Screen Wall Elevation - Sheet 1 of 2.dwg



FOR CONTINUATION REFER TO ELEVATION ON DRAWING 219

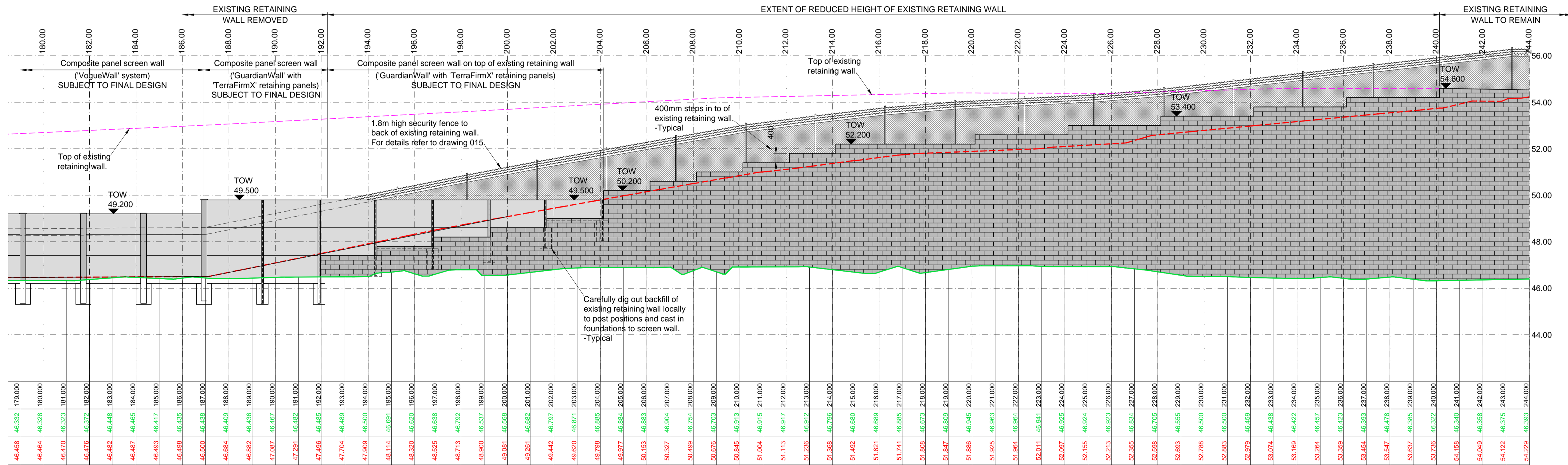


ELEVATION ON SOUTHERN BOUNDARY SCREEN WALL Cont...

1:100

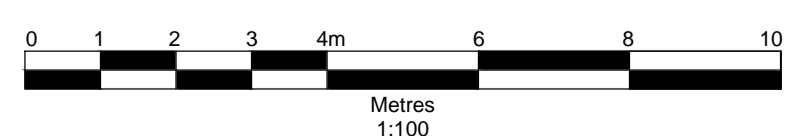
FOR CONTINUATION REFER TO ELEVATION BELOW

FOR CONTINUATION REFER TO ELEVATION ABOVE



ELEVATION ON SOUTHERN BOUNDARY SCREEN WALL Cont...

1:100



NOTES

1. This drawing is to be read in conjunction with all Architects and Engineers drawings and Specifications.
2. Do not scale this drawing.
3. Existing ground levels outside of site boundary are approximate based on limited survey information. Contractor to confirm existing ground levels at base of existing retaining wall prior to construction.
4. Composite panel screen wall layout shown is for information only subject to final design.

LEGEND

Revision	By	DN	LN	21.06.17	TENDER ISSUE
0					



Client: CLEANAWAY WASTE MANAGEMENT LTD

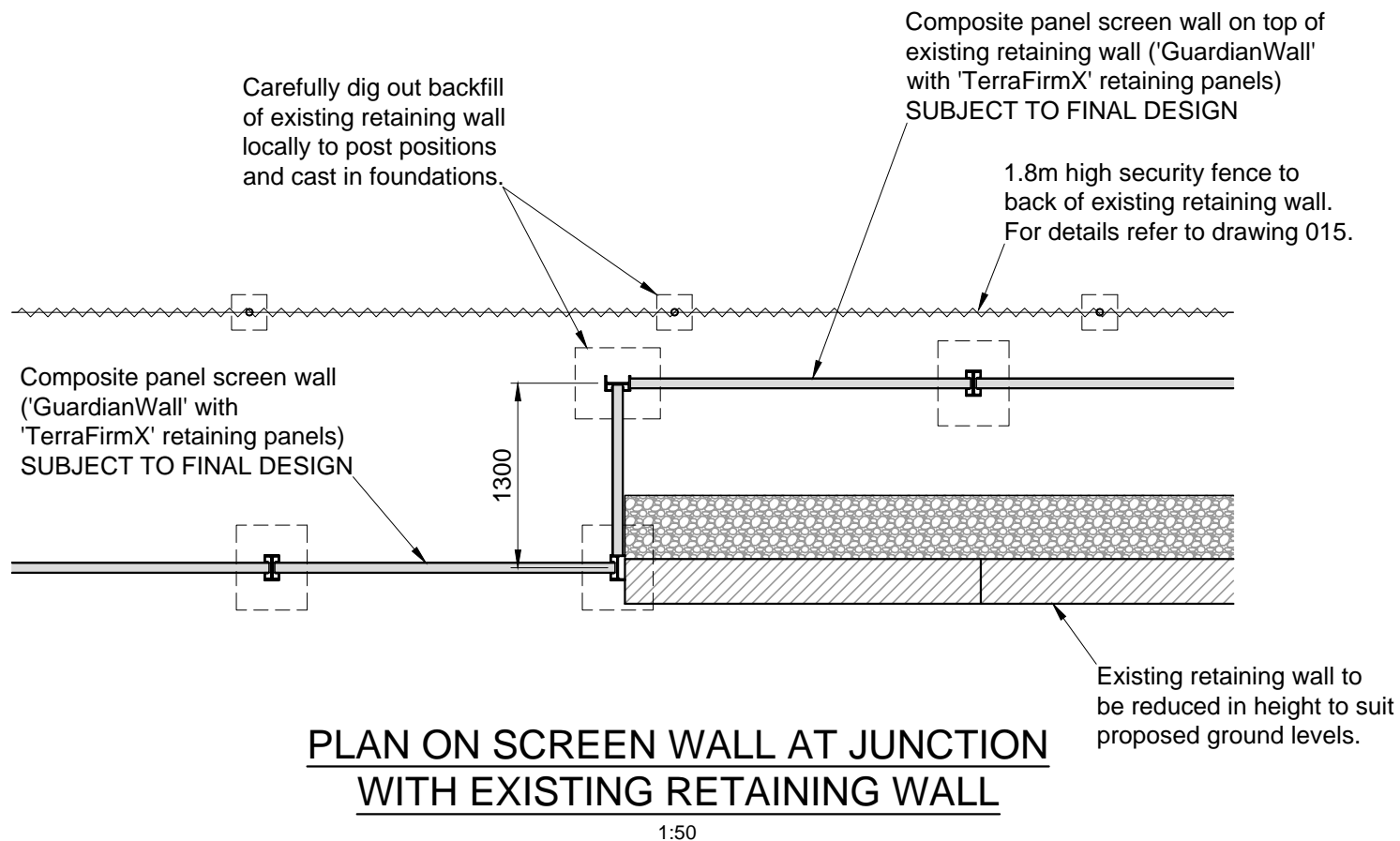
Project: ERSKINE PARK RESOURCE MANAGEMENT FACILITY STAGE 1 - WASTE TRANSFER STATION

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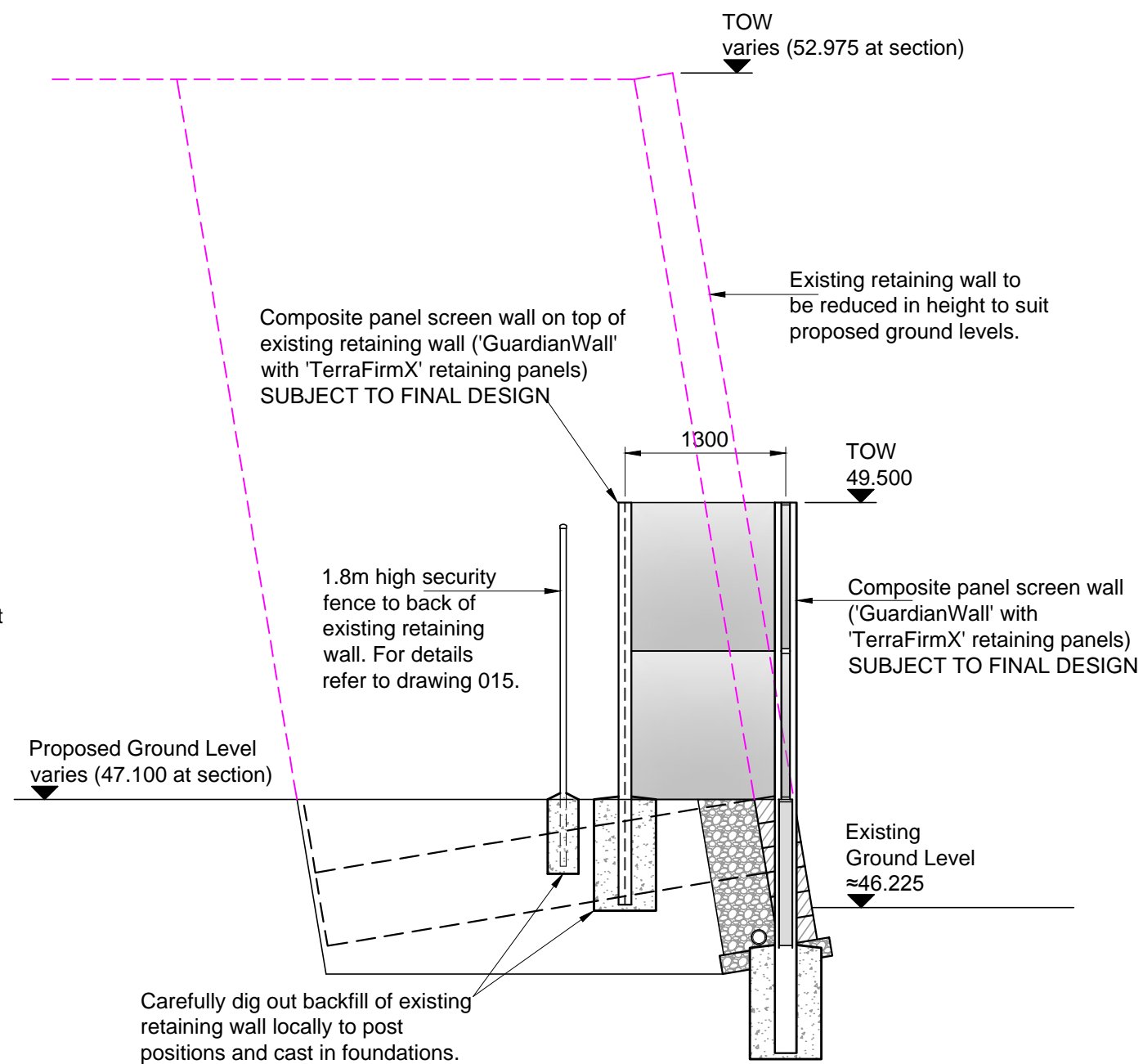
Drawing Number: 220 Revision: 0

TENDER ISSUE



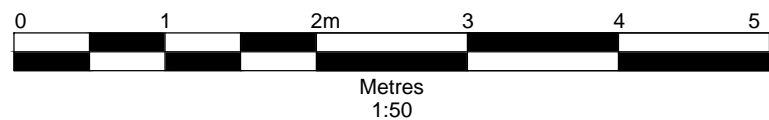
PLAN ON SCREEN WALL AT JUNCTION WITH EXISTING RETAINING WALL

1:50



TYPICAL SECTION THROUGH SCREEN WALL AT JUNCTION WITH EXISTING RETAINING WALL

1:50



NOTES

1. This drawing is to be read in conjunction with all Architects and Engineers drawings and Specifications.
2. Do not scale this drawing.
3. Existing ground levels outside of site boundary are approximate based on limited survey information. Contractor to confirm existing ground levels at base of existing retaining wall prior to construction.
4. Composite panel screen wall layout shown is for information only subject to final design.

0	DH	LN	21.06.17	TENDER ISSUE
Revision	Drawn By	Chkd By	Date	Comments

Client
CLEANAWAY WASTE MANAGEMENT LTD.

Project
ERSKINE PARK RMF, STAGE 1 - WASTE TRANSFER STATION

Drawing
SOUTHERN BOUNDARY SCREEN WALL DETAILS

Date JUNE 2017	Drawing Number 221	Revision 0
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Scale
1:50 @ A3
TENDER ISSUE

03561.00024.03.221.0 - Southern Boundary Screen Wall Details.dwg



03561.00024.03.501.0 - Southern Boundary Modular Wall Photomontage - Proposed.dwg

NOTES

0	PS	LN	21.06.17	FOR INFORMATION ONLY
Revision	Drawn By	Chkd By	Date	Comments



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Client
CLEANAWAY WASTE MANAGEMENT LTD.

Project
ERSKINE PARK RMF, STAGE 2

Drawing
**SOUTHERN BOUNDARY MODULAR WALL
PHOTOMONTAGE - PROPOSED**

Date AUGUST 2016	Drawing Number 501	Revision 0
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Scale
NTS @ A3

FOR INFORMATION ONLY

Appendix L - Section J Energy Efficiency Assessment



global environmental solutions

Modified Modular Office Building
Erskine Park Stage 1 - Waste Transfer Station
2016 NCC Section J Report - Deemed-to-Satisfy Method

Report Number 630.12093

15 June 2017

Cleanaway
PO Box 1824
Milton, QLD

Version: 3

Modified Modular Office Building

Erskine Park Stage 1 - Waste Transfer Station

2016 NCC Section J Report - Deemed-to-Satisfy Method

PREPARED BY:

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sydney@slrconsulting.com www.slrconsulting.com

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Cleanaway.
No warranties or guarantees are expressed or should be inferred by any third parties.
This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
630.12093	15 June 2017	15 June 2017	Horatio Cai		Neihad Al-Khalidy
630.12093	Version 3	15 June 2017	Horatio Cai	Neihad Al-Khalidy	Neihad Al-Khalidy
630.12093	Version 2	14 June 2017	Horatio Cai	Neihad Al-Khalidy	Neihad Al-Khalidy

Executive Summary

SLR Consulting Australia Pty Ltd has been engaged by Cleanaway to assess the relocated modular office building within the Erskine Park Stage 1 Waste Transfer Station for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

This requirement has been defined in Volume 1 of the 2016 NCC under Section J and is titled *Energy Efficiency*. There are seven (7) Deemed-to-Satisfy subsections, J1 to J8 (J4 withdrawn), that focus on separate aspects of energy efficiency.

- J1 - Building Fabric.
- J2 - External Glazing.
- J3 - Building Sealing.
- J5 - Air Conditioning and Ventilation Systems.
- J6 - Artificial Lighting and Power.
- J7 –Swimming Pool and Spa Pool Plant.
- J8 - Access for Maintenance and facilities for Monitoring.

The NCC currently defines the development area as climate zone 6. This report covers the NCC Section J requirements of the office building only.

SLR recommends the following to the building fabrics to the office building to comply with NCC 2016 Section J:

- Wall insulation requirements have been specified within **Table 1**
- Glazing requirements as per **Table 2**.
- Roof, ceiling and floor construction will remain unchanged so no requirements will apply to these building fabrics.

Requirements for building sealing, air-conditioning, artificial lighting, hot water supply and access for maintenance are found in the body of this report.

This report has provided advice about each subsection under Section J and identified how compliance with the NCC can be achieved in regards to the relocated and modified building. This office building will comply with the 2016 NCC Section J if all requirements listed in this report have been met.

Table of Contents

1	INTRODUCTION	6
1.1	Site Description	6
2	BUILDING CODE OF AUSTRALIA ENERGY EFFICIENCY REQUIREMENTS	7
2.1	Defining the Building Class	7
2.2	Defining the Energy Efficiency Requirements	7
2.3	Defining the BCA Climate	7
2.4	Design Documents	8
3	PART J1 - BUILDING FABRIC	9
3.1	J1.1 - Application	9
3.2	J1.2 - General Thermal Construction	9
3.3	J1.3 - Roof and Ceiling Insulation	9
3.4	J1.4 – Roof Lights	11
3.5	J1.5 – Walls	12
3.6	J1.6 - Floors	13
4	PART J2 – EXTERNAL GLAZING	14
4.1	J2.4 – Glazing	14
5	PART J3 – BUILDING SEALING	14
5.1	J3.1 - Application	15
5.2	J3.2 - Chimneys and Flues	15
5.3	J3.3 - Roof Lights	15
5.4	J3.4 - External Windows and Doors	15
5.5	J3.5 - Exhaust Fans	15
5.6	J3.6 - Construction of Roofs, Walls and Floors	16
5.7	J3.7 - Evaporative coolers	16
6	PART J6 - ARTIFICIAL LIGHTING AND POWER	17
6.1	J6.1 - Application	17
6.2	J6.2 - Interior Artificial Lighting	17
6.3	J6.3 - Interior Artificial Lighting and Power Control	17
6.4	J6.4 - Interior Decorative and Display Lighting	17
6.5	J6.5 - Artificial Lighting around the Perimeter of the Building	18
6.6	J6.6 - Boiling Water and Chilled Water Storage Units	18
7	PART J7 - HOT WATER SUPPLY	19
7.1	J7.2 - Heated water supply	19

Table of Contents

8	PART J8 - ACCESS FOR MAINTENANCE	19
8.1	J8.1 - Application	19
8.2	J8.2 - Access for maintenance	19
8.3	J8.3 Facilities for energy monitoring	19
9	CONCLUSIONS	21

TABLES

Table 1	Internal Wall R-value	12
Table 2	Glazing Thermal Ratings Recommendations	14
Table 3	Maximum Lamp Power Density	17

FIGURES

Figure 1	Site Location	6
Figure 2	Building Code of Australia Climate Zone Map	8
Figure 3	Internal partition with wall insulation	12

APPENDICES

Appendix A	NCC Glazing Calculator	
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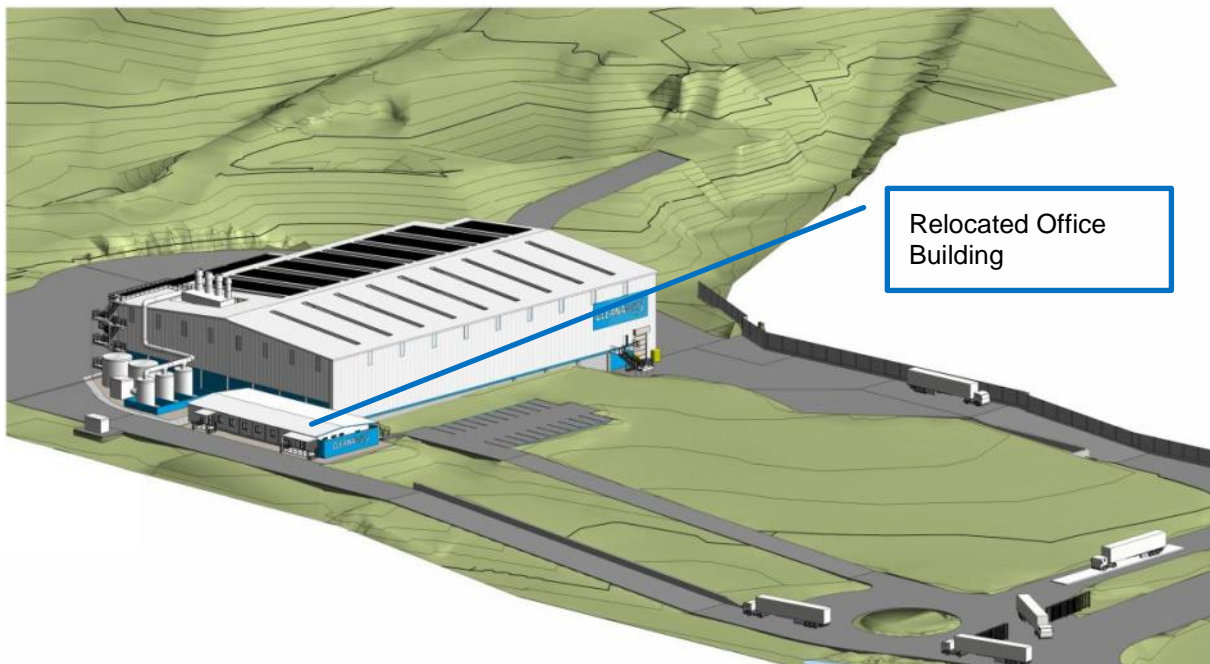
1 INTRODUCTION

SLR Consulting Australia Pty Ltd has been engaged by Cleanaway to assess the relocated modular office building within the Erskine Park Stage 1 Waste Transfer Station for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

1.1 Site Description

The site is within the industrial warehouse precinct. It is surrounded by industrial warehouses and vacant land. The site 3D view from north is shown in Figure 1 below.

Figure 1 Site Location



2 BUILDING CODE OF AUSTRALIA ENERGY EFFICIENCY REQUIREMENTS

Since the 2006 release of the Building Code of Australia (BCA) it is a mandatory requirement for all BCA class buildings, except Class 4 and Class 10 buildings, to achieve efficient use of energy.

This requirement has been defined in Volume 1 of the 2016 NCC under Section J and is titled *Energy Efficiency*. There are seven (7) Deemed-to-Satisfy subsections, J1 to J8 (J4 withdrawn), that focus on separate aspects of energy efficiency.

- J1 - Building Fabric.
- J2 - External Glazing.
- J3 - Building Sealing.
- J5 - Air Conditioning and Ventilation Systems.
- J6 - Artificial Lighting and Power.
- J7 –Swimming Pool and Spa Pool Plant.
- J8 - Access for Maintenance and facilities for Monitoring.

This report will provide advice about each subsection and identify how compliance with the NCC can be achieved for these new requirements in regards to the development.

It shall remain the responsibility of the building owner to ensure that the installation meets the requirements of this report, and in turn the NCC.

2.1 Defining the Building Class

The sub classification for the building is:

- Office building – Class 5 building

2.2 Defining the Energy Efficiency Requirements

The objective of Section J from Volume 1 of the NCC defines this section as being applicable to Class 2 to 9 buildings, other than Class 7, 8 or 9b buildings that do not have conditioned space. In this instance of the development, there are requirements for compliance with Section J.

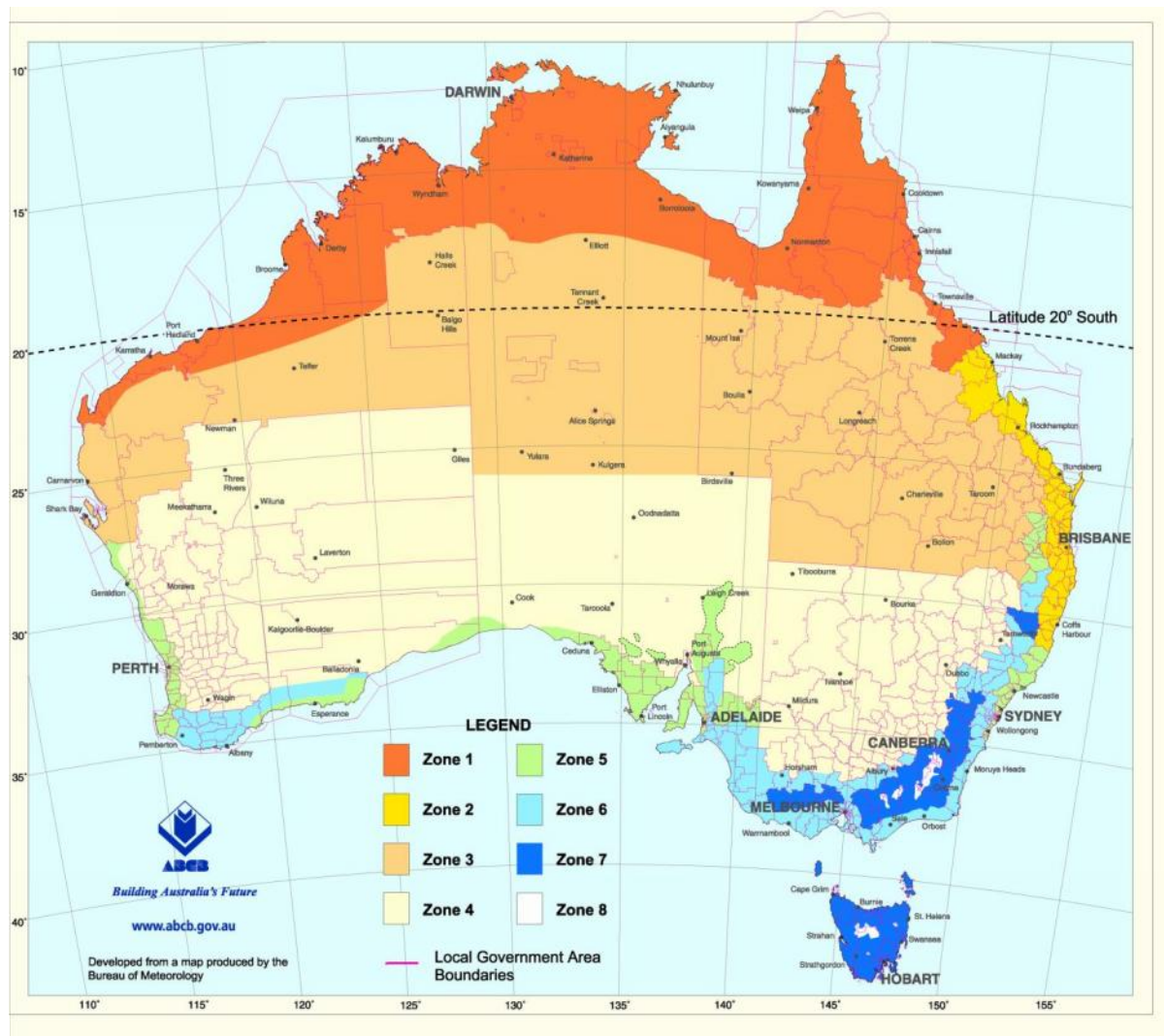
This report assumes the 2016 NCC Section J compliance for this development will be achieved through the Deemed-to-Satisfy method.

In order to achieve compliance with Section J of the 2016 NCC, the development has to satisfy and achieve all requirements of every Deemed-to-Satisfy subsections.

2.3 Defining the BCA Climate

As the development is situated within Sydney urban, parts of the NCC requirements will be based on these climate characteristics. The NCC currently defines the development area as climate zone 6 (shown in **Figure 2**).

Figure 2 Building Code of Australia Climate Zone Map



2.4 Design Documents

The report is prepared based on the tender architectural set with revision 0, dated 02.06.17. The drawings that were used in this report are attached in Appendix B.

3 PART J1 - BUILDING FABRIC

Part J1 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of the building fabric. The purpose of this subsection is to ensure that the building fabric will provide sufficient thermal insulation to minimise heating and cooling loads placed on the building and the commensurate energy consumption HVAC systems servicing internal building spaces.

3.1 J1.1 - Application

As stated by the 2016 NCC, Part J1 applies to the office building.

3.2 J1.2 - General Thermal Construction

Where thermal insulation is installed in exterior envelope walls or roof of the development, the insulation must comply with AS/NZS 4859.1 and be installed so that it:

- a. abuts or overlaps adjoining insulation;
- b. forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- c. does not affect the safe or effective operation of a *service* or fitting.

Where reflective insulation is installed in exterior envelope walls or roof of the facility, it must be installed with:

- a. the necessary airspace to achieve the *required R-Value* between a reflective side of the *reflective insulation* and a building lining or cladding;
- b. the *reflective insulation* closely fitted against any penetration, door or *window* opening;
- c. the *reflective insulation* adequately supported by framing members; and
- d. each adjoining sheet of roll membrane being:
 - overlapped not less than 50 mm; or
 - taped together.

Where bulk insulation is installed in exterior envelope walls or roof of the facility, it must be installed so that:

- it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in ceilings where there is no bulk insulation or *reflective insulation* in the wall, it overlaps the wall member by not less than 50 mm.

3.3 J1.3 - Roof and Ceiling Insulation

The development is located in climate zone 6, the roof and ceiling system that is part of the envelope must achieve the minimum Total R-value of:

Table J1.3a ROOFS AND CEILINGS - MINIMUM TOTAL R-VALUE FOR EACH CLIMATE ZONE

<i>Climate zone</i>	1, 2, 3, 4 and 5	6	7	8
Direction of heat flow	Downwards		Upwards	
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of not more than 0.4	3.2	3.2	3.7	4.8
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.4 but not more than 0.6	3.7	3.2	3.7	4.8
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.6	4.2	3.2	3.7	4.8

For compliance with Table J1.3a, roof and ceiling construction is deemed to have the thermal properties listed in specification J1.3.

Where, for operational or safety reasons associated with exhaust fans, flues or recessed downlights, the area of the required ceiling is reduced, the loss of the insulation must be compensated for by increasing the R-value of the insulation in the remainder of the ceiling in accordance with Table J1.3b.

Table J1.3b ADJUSTMENT OF MINIMUM R-VALUE FOR LOSS OF CEILING INSULATION

Percentage of ceiling area uninsulated	Minimum <i>R-Value</i> of ceiling insulation <i>required</i> to satisfy J1.3(a)										
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	Adjusted minimum <i>R-Value</i> of ceiling insulation <i>required</i> to compensate for loss of ceiling insulation area										
0.5% to less than 1.0%	1.0	1.6	2.2	2.8	3.4	4.0	4.7	5.4	6.2	6.9	
1.0% to less than 1.5%	1.1	1.7	2.3	2.9	3.6	4.4	5.2	6.1	7.0		
1.5% to less than 2.0%	1.1	1.7	2.4	3.1	3.9	4.8	5.8	6.8			
2.0% to less than 2.5%	1.1	1.8	2.5	3.3	4.2	5.3	6.5				
2.5% to less than 3.0%	1.2	1.9	2.6	3.6	4.6	5.9					
3.0% to less than 4.0%	1.2	2.0	3.0	4.2	5.7						
4.0% to less than 5.0%	1.3	2.2	3.4	5.0							
5.0% or more											

Note: Where the minimum *R-Value* of ceiling insulation *required* to satisfy J1.3(a) is between the values stated, interpolation may be used to determine the adjusted minimum *R-Value*.

A roof that has metal roof sheeting fixed to metal purlins, metal rafters or metal battens and does not have a ceiling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal

battens must have a thermal break, consisting of a material with an R-value of not less than R0.2, installed between the metal sheet roofing and its supports.

The roof/ceiling system for the exposed roof of the development is:

- Metal deck roof

Existing offices roof will be repainted. As advised, all roof and ceiling construction will remain unchanged. Therefore, this section is not applicable.

3.4 J1.4 – Roof Lights

The total area of roof lights serving the room or spaces as a percentage of the floor area of the room or space must not exceed 5%. The roof lights must comply with Table J1.4 below.

Table J1.4 ROOF LIGHTS - THERMAL PERFORMANCE OF TRANSPARENT AND TRANSLUCENT ELEMENTS

Roof light shaft index (see Note 1)	Constant	Total area of <i>roof lights</i> serving the room or space as a percentage of the <i>floor area</i> of the room or space			
		Up to 2%	More than 2% to and up to 3%	More than 3% and up to 4%	More than 4% and up to 5%
Less than 0.5	<i>Total System SHGC</i>	Not more than 0.83	Not more than 0.57	Not more than 0.43	Not more than 0.34
	<i>Total System U-Value</i>	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
0.5 to less than 1.0	<i>Total System SHGC</i>	Not more than 0.83	Not more than 0.72	Not more than 0.54	Not more than 0.43
	<i>Total System U-Value</i>	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
1.0 to less than 2.5	<i>Total System SHGC</i>	Not more than 0.83	Not more than 0.83	Not more than 0.69	Not more than 0.55
	<i>Total System U-Value</i>	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
2.5 and more	<i>Total System SHGC</i>	Not more than 0.83	Not more than 0.83	Not more than 0.83	Not more than 0.83
	<i>Total System U-Value</i>	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4

Notes:

1. The total area of roof lights is the combine area for all roof lights serving the room or space.
2. The area of a roof light is the area of the roof opening that allows light to enter the building.
3. The thermal performance of an imperforate ceiling diffuser may be included on the total system U-value and total system SHGC of the roof light.

No roof lights will be installed in the office building, therefore this section is not applicable.

3.5 J1.5 – Walls

Table J1.5a of Part J1.5 of the 2016 NCC requires each part of an external wall of building located in climate zone 5 to:

- (i) achieve a minimum *Total R-Value* of 2.8 for external wall; and
- The minimum Total R-Value in (i) is reduced for a wall with a surface density of not less than 220 kg/m², by 0.5; and
- The minimum Total R-Value in (i) is reduced for a wall that is— facing the south orientation as described in Figure J2.3 of par J2.4 , by 0.5
- (ii) achieve a minimum *Total R-Value* of 1.8 for envelope wall other than external wall.

For internal wall between conditioned and unconditioned area such as service riser, lift shaft, toilets and FHR wall, they need to achieve a minimum of Total R-value of 1.8.

The external and internal wall systems are:

- Light weight Colourbond cladding wall

Existing offices external walls will be repainted. As advised, all external wall construction will remain unchanged. Therefore, the J1.5 requirements will not apply to existing external walls.

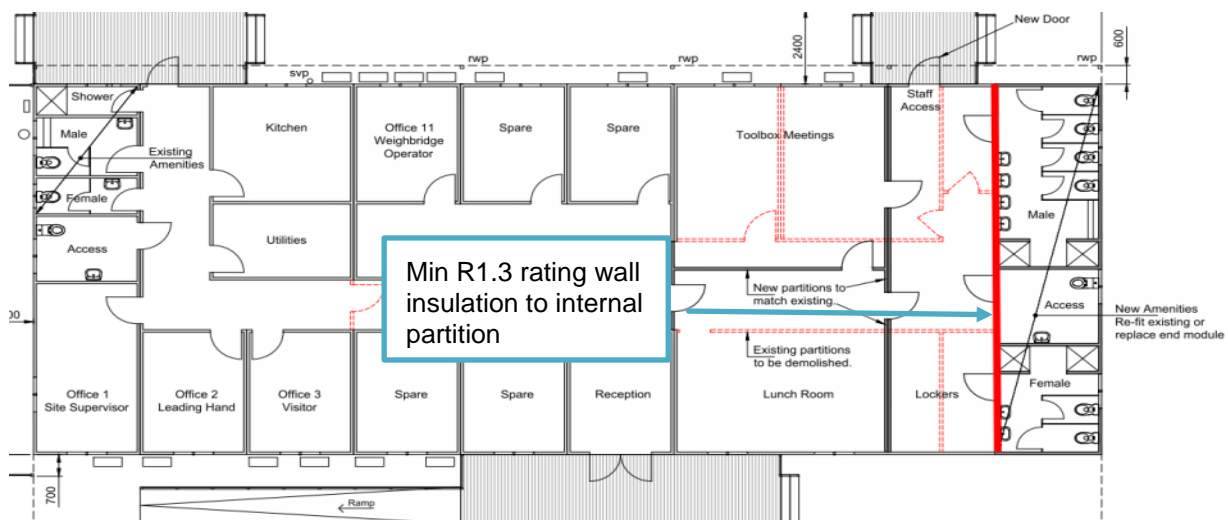
Part of the existing partitions will be demolished on the east side of the office building. The R-value requirement of the new internal wall/partition is shown in Table 1 below. This requirement only applies to partitions separate the conditioned and unconditioned spaces. The partitions required to install wall insulation or be constructed with material that achieve a minimum R1.8 rating are highlighted in Figure 3.

R-value of the wall systems and recommendations

Table 1 Internal Wall R-value

Suggested Wall System	R-Value	R-Value Requirement	Compliance	Additional R-Value Required	Recommendations
Plywood on Stud	0.53	1.8	No	1.3	SLR recommends R1.3 wall insulation into the wall system.

Figure 3 Internal partition with wall insulation



3.6 J1.6 - Floors

External floor must achieve the total R-value specified in Table J1.6.

Table J1.6 FLOORS — MINIMUM TOTAL R-VALUE

Location	Climate zone							
	1	2	3	4	5	6	7	8
Direction of heat flow	Upwards	Downwards and upwards		Downwards				
(a) A slab on ground:								
(i) Without an in-slab or in-screed heating or cooling system	Nil	Nil	Nil	Nil	Nil	Nil	1.0	2.0
(ii) With an in-slab or in-screed heating or cooling system	1.25	1.25	1.25	1.25	1.25	1.25	1.25	2.25
(b) A suspended floor without an in-slab or in-screed heating or cooling system where the non- <i>conditioned space</i> is—								
(i) enclosed; and								
(ii) where mechanically ventilated by not more than 1.5 air changes per hour.	1.0	1.0	Nil	Nil	1.0	1.0	1.5	2.5
(c) A suspended floor with an in-slab or in-screed heating or cooling system where the non- <i>conditioned space</i> is—								
(i) enclosed; and								
(ii) where mechanically ventilated by not more than 1.5 air changes per hour	1.25	1.25	1.25	1.25	1.25	1.25	1.75	2.75
(d) For other than (a), (b) or (c)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.5
Note: A subfloor space with not more than 150% of the <i>required</i> subfloor ventilation is considered enclosed.								

The floor system is as described below:

- Suspended timber floor

As advised, all existing floor construction will remain unchanged. Therefore, this section is not applicable.

4 PART J2 – EXTERNAL GLAZING

Part J2 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of external glazing. The purpose of this subsection is to ensure that building glazing will provide sufficient thermal insulation, and be appropriately shaded, to minimize heating and cooling loads placed on the building and the commensurate energy consumption of HVAC systems servicing internal building spaces.

4.1 J2.4 – Glazing

The glazing elements of a building must be assessed separately in accordance with orientation.

The glazing for the conditioned areas has been calculated using the glazing calculators attached in Appendix A. The calculator shows the minimum glazing performance to meet the requirements for the building of Part J2. The values shown in the glazing calculator are whole of window values.

Existing windows on west and south façades will be retained. Therefore, J2.4 does not apply to those windows.

The new windows on east façade will serve the amenities (unconditioned spaces) so J2.4 does not apply to those windows.

The new windows and doors on the north façade will serve conditioned spaces. To achieve NCC Section J compliance, the glazing of the office building is to be as recommended in **Table 2** below.

Table 2 Glazing Thermal Ratings Recommendations

Space Description	Glazing IDs	U-Value (NFRC)*	SHGC (NFRC)*	Window Type
North facing windows and doors	As per Glazing calculator	≤ 6.3	≤ 0.73	Single Glazing Clear

Notes:

- a) A shading device is a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which:
 - (i) is capable of restricting at least 80% of summer solar radiation; and
 - (ii) if adjustable, is operated automatically in response to the level of solar radiation.
- b) The U-value and SHGC are NFRC values for the window assembly values, not the glass only values. This is taken from <http://www.wers.net/Certified-Products-Commercial>
- c) Alternative glazing may be used subject to recalculation in glazing calculator.

5 PART J3 – BUILDING SEALING

Part J3 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance for building sealing. The purpose of this subsection is to ensure that additional heating and cooling loads will not be introduced through building leakage.

5.1 J3.1 - Application

Building sealing is applicable to the conditioned spaces within the building.

5.2 J3.2 - Chimneys and Flues

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

5.3 J3.3 - Roof Lights

(a) A roof light must be sealed, or capable of being sealed, when serving—

- (i) a conditioned space; or
- (ii) a habitable room in climate zones 4, 5, 6, 7 or 8.

(b) A roof light required by (a) to be sealed, or capable of being sealed, must be constructed with—

- (i) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or
- (ii) a weatherproof seal; or
- (iii) a shutter system readily operated either manually, mechanically or electronically by the occupant.

5.4 J3.4 - External Windows and Doors

The Part J3.4 of the NCC Section J requirements will apply to the development.

Part J3.4 of the 2016 NCC requires that a seal to restrict air infiltration must be fitted to each edge of an external door, openable external window or the like when serving a conditioned space. This requirement does not apply to:

- a window complying with AS 2047; or
- a fire door; or
- a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.

The seal may be a foam or rubber compressible strip, fibrous seal or the like.

Main entrances to a building if leading to a conditioned space, must have an airlock, self-closing door or revolving door excluding:

- where the conditioned space is less than 50m²; or
- where a cafe, restaurant, open front shop or the like has a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and all other entrances to the cafe, restaurant, open front shop or the like, have self-closing doors.

5.5 J3.5 - Exhaust Fans

A miscellaneous exhaust fan, such as a bathroom or domestic kitchen exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space or habitable room.

5.6 J3.6 - Construction of Roofs, Walls and Floors

For all conditioned spaces, the roofs, *external walls*, external floors and any opening including all *windows* and doors must be constructed to minimise air leakage. The conditioned spaces include all spaces within the building where the environment is likely, by the intended use of the space, to be controlled by *air-conditioning*.

The construction *required* will be:

- a. enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions;
or
- b. sealed by caulking, skirting, architraves, cornices or the like.

5.7 J3.7 - Evaporative coolers

Due to the absence of evaporative coolers within the development there are no requirements to be met on this part.

6 PART J6 - ARTIFICIAL LIGHTING AND POWER

Part J6 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's artificial lighting and power. The purpose of this subsection is to ensure that efficient lighting systems are installed to maintain required lighting levels while keeping energy consumption to a minimum. This subsection also ensures that effective lighting control is utilised to reduce wasted energy consumption.

6.1 J6.1 - Application

As stated by the 2016 NCC, Part J6 applies to all classes of buildings with the exception of sole-occupancy units of a Class 2 or Class 4 part of a building. Part J6 therefore applies to the development.

6.2 J6.2 - Interior Artificial Lighting

There is a requirement for the building that the artificial lighting must not exceed the maximum lamp power density in **Table 3**, except that in a bathroom, dressing rooms or the like, an average artificial *light source efficacy* of not less than 40 Lumens/W may be used.

Table 3 Maximum Lamp Power Density

Location	Maximum Lamp Power Density (W/m ²)
Office	9
Kitchen and food preparation area	8
Within public corridors	8
Service areas such as plant rooms or store rooms	5
Employees' work areas such as reception areas	9
General purpose learning areas and tutorial rooms	8
Toilet, locker room, staff room ,rest room	6

The maximum illuminance power density may be increased by multiplying by any adjustment factor provided in NCC Table J6.2b which provides adjustment factors based on methods of controlling the lighting systems, such as motion detectors, dimming systems and room properties.

6.3 J6.3 - Interior Artificial Lighting and Power Control

A light switch must be located in a visible position in the room or space being switched, or in an adjacent room or space from where the lighting being switched is visible. The light switch must not operate lighting within an area of more than 250 m².

These lighting and power control requirements do not apply to Emergency Lighting in accordance with Part E4, NCC Volume One.

6.4 J6.4 - Interior Decorative and Display Lighting

Any interior/ lighting for display or decorative purposes, such as the illumination of foyer murals, must be separately controlled from other artificial lighting.

Each group of decorative/display lighting must be controlled by a manual light switch.

6.5 J6.5 - Artificial Lighting around the Perimeter of the Building

Artificial lighting around the perimeter of a building will be controlled by a time switch or daylight sensor complying with Section J6 lighting controls requirements.

A time switch needs to abide by the specification set out in the 2016 NCC. Switching on and off electric power to systems at variable pre-programmed times and on variable pre-programmed days.

When the total perimeter lighting load exceeds 100W, it must have an average light source efficacy of not less than 60 Lumens/W or be controlled by a motion detector in accordance with Specification J6 and when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification J6.

6.6 J6.6 - Boiling Water and Chilled Water Storage Units

Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification J6.

7 PART J7 - HOT WATER SUPPLY

Part J7 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's hot water supply system. The purpose of this subsection is to ensure that efficient hot water units and systems are installed.

7.1 J7.2 - Heated water supply

A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.

8 PART J8 - ACCESS FOR MAINTENANCE

Part J8 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's access to services for maintenance. The purpose of this subsection is to ensure that access can be gained to all services that will require regular maintenance. Maintenance to these services will ensure that reduction in efficiency over time is kept to a minimum.

8.1 J8.1 - Application

As stated by the 2016 NCC, Part J8 applies to a Class 5 building. Part J8 therefore applies to the development.

8.2 J8.2 - Access for maintenance

Access must be provided to all plant, equipment and components of services that rely on maintenance to continue to perform including:

- (a) adjustable or motorised shading devices;
- (b) time switches and motion detectors;
- (c) room temperature thermostats;
- (d) plant thermostats such as on boilers or refrigeration units;
- (e) motorised air dampers and control valves;
- (f) reflectors, lenses and diffusers of light fittings;
- (g) heat transfer equipment; and
- (h) plant that receives a concession under JV3(b) for the use of energy obtained from:
 - i. an on-site renewable energy source; or
 - ii. another process as reclaimed energy.

8.3 J8.3 Facilities for energy monitoring

(a) A building or sole-occupancy unit with a floor area of more than 500 m² must have the facility to record the consumption of gas and electricity.

(b) A building with a floor area of more than 2,500 m² must have the facility to record individually the energy consumption of:

- i. air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans;
- ii. artificial lighting;
- iii. appliance power;
- iv. central hot water supply;
- v. internal transport devices including lifts, escalators and travelators where there is more than one serving the building; and
- vi. other ancillary plant.

9 CONCLUSIONS

SLR Consulting Australia Pty Ltd has been engaged by Cleanaway to assess the relocated modular office building within the Erskine Park Stage 1 Waste Transfer Station for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

This report has provided advice about each subsection under Section J and identified how compliance with the NCC can be achieved in regards to the relocated and modified building. This office building will comply with the 2016 NCC Section J if all requirements listed in this report have been met.

NCC GLAZING CALCULATOR

Office Building

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014) HELP

Building name/description: **Modified Modular Office Building** Application: **other** Climate zone: **6**

Storey: **G**

Facade areas		N	NE	E	SE	S	SW	W	NW	internal
Option A									81m ²	
Option B										n/a
Glazing area (A)										8.86m ²

Number of rows preferred in table below: **10** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
ID	Glazing element	Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
		Option A facades	Option B facades	Height (m)	Width (m)	Area (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	Windows	NW		1.20	6.60		6.3	0.73				0.00	1.00	1.00	7.92	89% of 69%
2	Doors	NW		0.85	1.10		6.3	0.73				0.00	1.00	1.00	0.94	11% of 69%
3																
4																
5																
6																
7																
8																
9																
10																

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

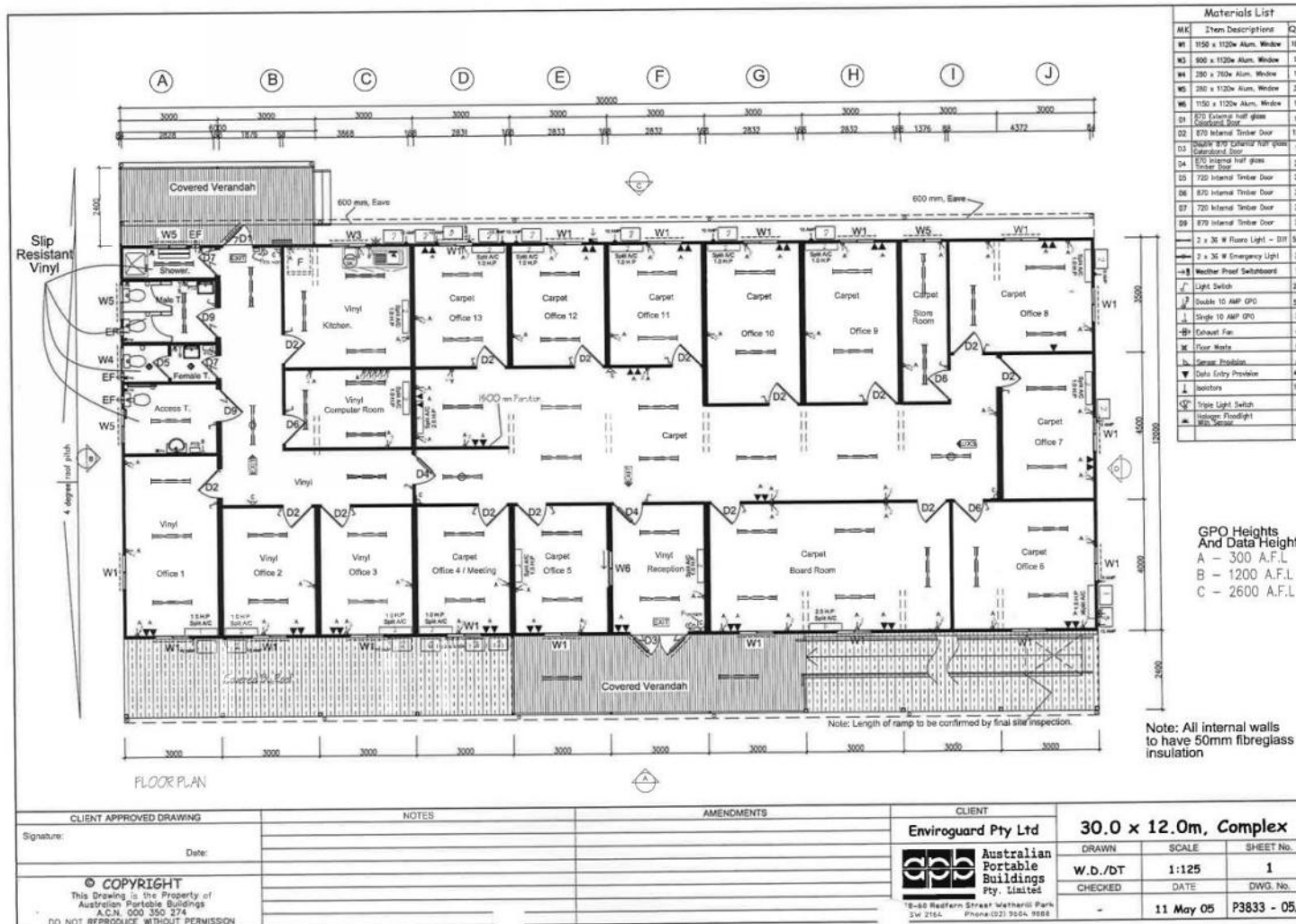
if inputs are valid

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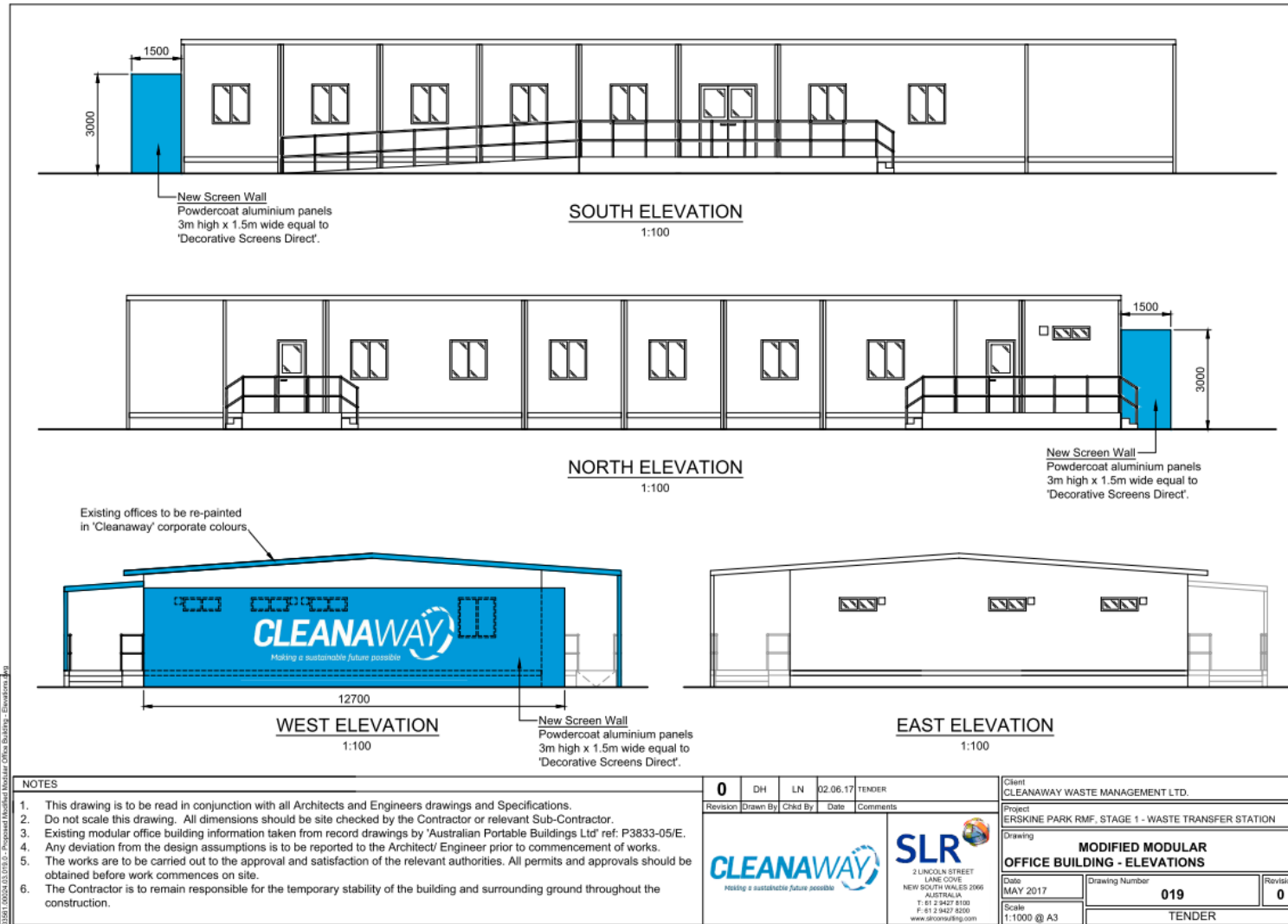
PROJECT EXISTING OFFICE BUILDING DRAWINGS



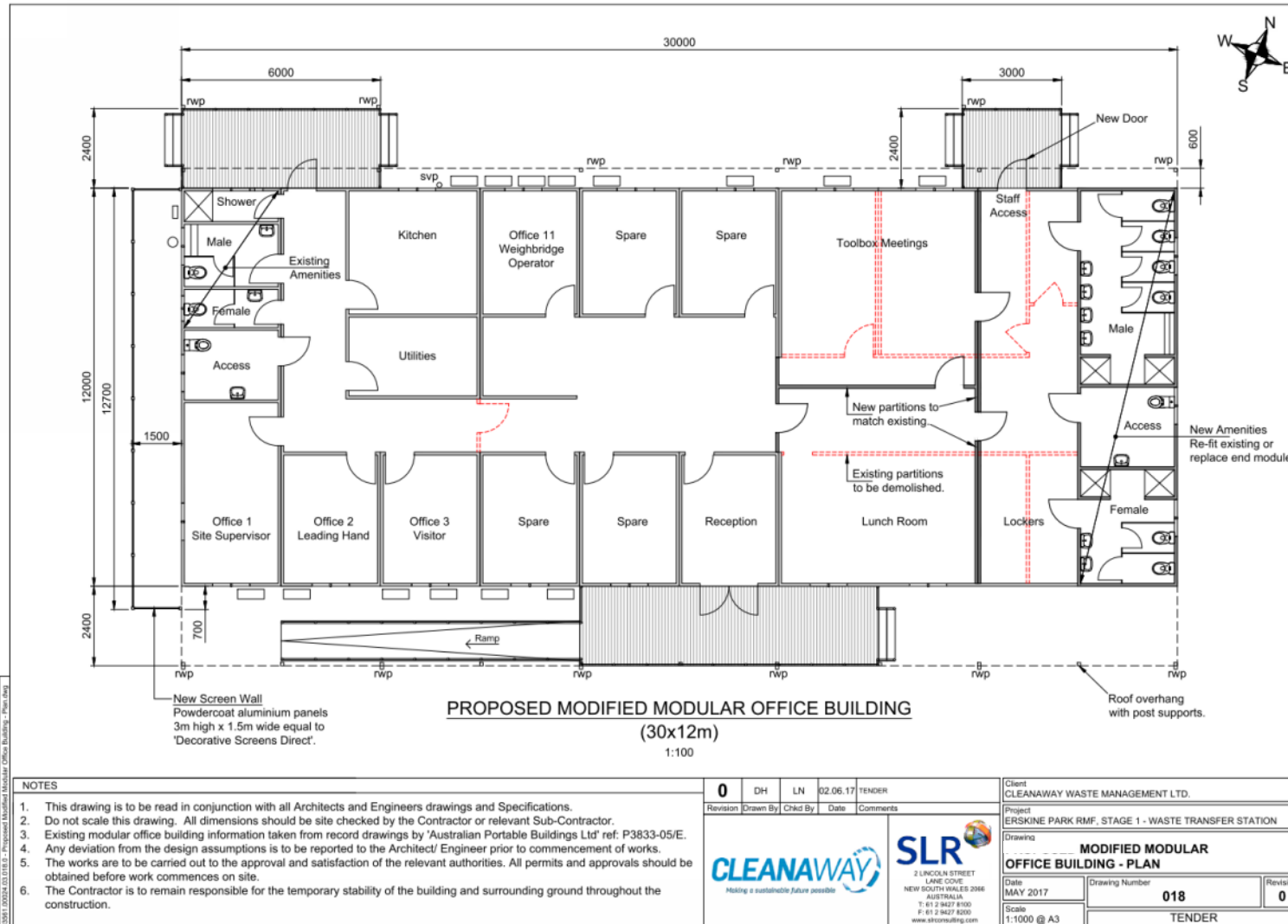
PROJECT EXISTING OFFICE BUILDING DRAWINGS



PROJECT NEW OFFICE BUILDING DRAWINGS



PROJECT NEW OFFICE BUILDING DRAWINGS



NOTES

1. This drawing is to be read in conjunction with all Architects and Engineers drawings and Specifications.
2. Do not scale this drawing. All dimensions should be site checked by the Contractor or relevant Sub-Contractor.
3. Existing modular office building information taken from record drawings by 'Australian Portable Buildings Ltd' ref: P3833-05/E.
4. Any deviation from the design assumptions is to be reported to the Architect/ Engineer prior to commencement of works.
5. The works are to be carried out to the approval and satisfaction of the relevant authorities. All permits and approvals should be obtained before work commences on site.
6. The Contractor is to remain responsible for the temporary stability of the building and surrounding ground throughout the construction.

0	DH	LN	02.06.17	TENDER	Client CLEANAWAY WASTE MANAGEMENT LTD.
Revision	Drawn By	Chkd By	Date	Comments	Project ERSKINE PARK RMF, STAGE 1 - WASTE TRANSFER STATION
					Drawing MODIFIED MODULAR OFFICE BUILDING - PLAN
					Date MAY 2017
Scale 1:1000 @ A3					TENDER

Appendix M - Incident Non Conformance Report Form

Note: All complaints incident events are to be completed in Vault using the details from this form.

COMPLAINANT CONTACT DETAILS						
Full Name						
Contact Numbers	Mobile:	Business: ()	Other: ()			
Email Address	@					
Mailing Address	Street:					
	City:	State:	Post Code:			
COMPLAINT DETAILS						
Type of Incident	<input type="checkbox"/> Injury	<input type="checkbox"/> Illness	<input type="checkbox"/> Incident	<input type="checkbox"/> Near Miss	<input type="checkbox"/> Environment	
Severity Level	<input type="checkbox"/> Near Miss	<input type="checkbox"/> Minor	<input type="checkbox"/> Moderate	<input type="checkbox"/> Major	<input type="checkbox"/> High	
Person involved	<input type="checkbox"/> Employee	<input type="checkbox"/> Contractor	<input type="checkbox"/> Third Party	Date of Incident: / /		
Name			Position			
Location & Time of Incident			Incident Description			
<input type="checkbox"/> Incident happened off site			What happened?			
Reported by						
Supervisor						
Date Reported						
Site						
Incident Time	Property / Vehicle Damage					
Location	What was damage?					
Environmental Description						
Nature of Incident	Water <input type="checkbox"/>	Land <input type="checkbox"/>	Air <input type="checkbox"/>	Other:		
Type of Incident	Contamination <input type="checkbox"/>	Release <input type="checkbox"/>	Odour <input type="checkbox"/>	Dust <input type="checkbox"/>	Other:	
Impact Source			Quantity Discharged / Unit	kg / L / m ³		
Health and Safety Description						
Indicate Injury Type			Indicate Body Location			
<input type="checkbox"/> Amputation	<input type="checkbox"/> Electrical Shock	<input type="checkbox"/> Nervous System	<input type="checkbox"/> Upper	<input type="checkbox"/> Ankle	<input type="checkbox"/> Finger	<input type="checkbox"/> Lip
<input type="checkbox"/> Asphyxiation	<input type="checkbox"/> Exposure	<input type="checkbox"/> Poisoning	<input type="checkbox"/> Lower	<input type="checkbox"/> Arm	<input type="checkbox"/> Foot	<input type="checkbox"/> Neck
<input type="checkbox"/> Bruise or Crushing	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Puncture	<input type="checkbox"/> Front	<input type="checkbox"/> Back	<input type="checkbox"/> Groin	<input type="checkbox"/> Organ
<input type="checkbox"/> Burn or Scald	<input type="checkbox"/> Fracture	<input type="checkbox"/> Respiratory	<input type="checkbox"/> Back	<input type="checkbox"/> Chest	<input type="checkbox"/> Hand	<input type="checkbox"/> Shoulder
<input type="checkbox"/> Concussion	<input type="checkbox"/> Heart/Circulation	<input type="checkbox"/> Skin Disorder	<input type="checkbox"/> Left	<input type="checkbox"/> Ear	<input type="checkbox"/> Head	<input type="checkbox"/> Teeth
<input type="checkbox"/> Cut / Open Wound	<input type="checkbox"/> Infectious Disease	<input type="checkbox"/> Sprain/Strain	<input type="checkbox"/> Right	<input type="checkbox"/> Eye	<input type="checkbox"/> Knee	<input type="checkbox"/> Wrist
<input type="checkbox"/> Dislocation	<input type="checkbox"/> Inhalation	<input type="checkbox"/> Other	<input type="checkbox"/> Body	<input type="checkbox"/> Face	<input type="checkbox"/> Leg	<input type="checkbox"/> Other

INCIDENT NON CONFORMANCE REPORT

HSE MANAGEMENT SYSTEM

Indicate Agent of Injury

- | | | | | |
|--|--|--|---|------------------------------------|
| <input type="checkbox"/> Animal / Insect | <input type="checkbox"/> Equipment / Tool | <input type="checkbox"/> Noise | <input type="checkbox"/> Slip/Trip/Fall | <input type="checkbox"/> Thermal |
| <input type="checkbox"/> Biological | <input type="checkbox"/> Explosion / Implosion | <input type="checkbox"/> Psychological | <input type="checkbox"/> Step on / Strike Against | <input type="checkbox"/> Vehicle |
| <input type="checkbox"/> Chemical | <input type="checkbox"/> Muscular Effort | <input type="checkbox"/> Radiation | <input type="checkbox"/> Struck by Falling Object | <input type="checkbox"/> Vibration |
| <input type="checkbox"/> Electricity | <input type="checkbox"/> Needle / Sharps | <input type="checkbox"/> Other | | |

Treatment

- No Treatment
 First Aid
 Medical Treatment
 Hospitalisation

Medical Condition

- Fully Fit
 Restricted Duties
 Other:

Days Off

- This is a Lost Time Incident
 Total Days Off:

Is this reportable to a Government Authority/Workers Compensation Insurer? No Yes. If yes – Contact OHS&E Manager **immediately.**

Indicate treatment given, if any

Initial Corrective Action

TPI Use only

All incidents are to be entered into the **VAULT** Entered into Vault Yes No Vault No:

Relevant Branch complaint referred to:

Date referred: / /

Resolution Type:

Complaint resolution date:

/ /

Complainant Advised By:

- Mail
 Telephone
 E-mail

Date Advised: / /

Is Complaint Closed?

- Yes
 No

What Further action required:

Completed By:

Signature:

Date: / /