



# Technical Specification

Salt Valley Road Landfill – Cells 5 and 6 Bulk Earthworks

Prepared for Opalvale Pty Ltd

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## 1 Introduction

The work under this Technical Specification consists of all work associated with the bulk earthworks, drainage and road works (the Works) for the development of Cells 5 and 6 at the Salt Valley Road Class II Landfill (the Site) for Opalvale Pty Ltd (the Principal).

Talis Consultants Pty. Ltd. (Talis) has been engaged by the Principal to design Cells 5 and 6 and produce the associated tender documentation which includes this Specification and Drawings, and assist with seeking the relevant approvals for development from the Department of Water and Environmental Regulation (DWER). Construction works will be split into two phases, the Bulk Earthworks (the Works) and the Lining and Leachate Management Works (the Lining Works), the latter commencing following DWER approval.

This document forms part of the Contract Documents with the full list described in Section 2.

### 1.1 Site Description

The Site is located approximately 80 kilometres (km) east of Perth and comprises part of Lot 11 Chitty Road on Deposited Plan 34937. The Site occupies an area of approximately 48 hectares (ha) and is located at the Williamsons Clay Pit and is situated on the southeastern portion of Lot 11. The Site can accept up to 150,000 tonnes per annum (tpa), with the Site having the following features:

- A weighbridge for secure site access;
- A site office;
- Putrescible Landfill Cells 1, 2, 3 and 4 surrounded by a 2m high chain-link fence;
- Asbestos Disposal; and
- Three leachate evaporation ponds.

Cells 1, 2, 3 and 4 are approaching the end of their lifespan and the Principal seeks services for the construction of Cells 5 and 6 to extend the lifespan of the Site.

### 1.2 Location

The Site Boundary is shown in Licence L9089/2017/1 and depicted on Drawing W-101.

Access to the site is via Salt Valley Road, with an internal road providing access to the landfill cell.

### 1.3 Geology

The Department of Mines, Industry Regulation and Safety (DMIRS) Geological Survey of Western Australia (GSWA) 1:500,000 map series describes the underlying bedrock geology as “quartz – mica schist; includes sillimanite, andalusite, kyanite, graphite, and staurolite bearing varieties”. The surface geology has been described as “yellow gravelly loamy sand to depth of approximately 0.5m, underlain by sandy clay” by Stass Environmental.

Based on maximum inferred groundwater levels from the nearest monitoring bores, groundwater within the footprint of the location of proposed cells is at a depth of approximately 276m AHD.

## 1.4 Scope of Works

This Specification has been developed for the construction of the Cell 5 and 6 Earthworks and does not cover other construction works at the Site.

The works to be carried out under this Specification include, but are not limited, to the following:

- General earthworks to construct Cells 5 and 6;
- Realignment and extension of the unsealed road around the perimeter of Cells 5 & 6;
- Dismantling the existing fencing along the western edge of Cells 1 and 3 and installation of temporary fencing; and
- Decommissioning bores C1, C4, and C12.

## 1.5 Tender Documentation

The following form the Tender Documentation for this Project:

- This Specification;
- Price Schedule;
- Drawings;
- Request for Tender;
- Construction Quality Assurance Plan; and
- Conditions of Contract.

## 1.6 Drawings

The drawings in **Table 1-1** form part of the Tender Documentation.

**Table 1-1: List of Drawings**

Drawing Number	Drawing Title
TW21026_C-101	Site Layout and Topography
TW21026_C-102	Formation Levels
TW21026_C-103	Engineered Fill Levels
TW21026_C-108	Road Layout and Section

## 1.7 Interpretation

Whether or not the words ‘provide,’ ‘install’ and/or ‘supply’ appear in the Tender Document, all equipment for the complete installation shall be provided and installed by the Contractor. Where equipment is to be provided and installed by others, it will be stated.

Terms in use within this Specification are clarified as follows:

- ‘Approved’, ‘directed’, ‘required’, ‘rejected’, and similar expressions, shall mean approved, directed, required, rejected, and the like, by the Superintendent;



- 'Provide' shall mean the supply and complete installation of the item to the satisfaction of this Specification;
- 'Supply' shall mean supply and delivery without installation;
- 'Install' shall mean complete installation of the item to the satisfaction of this Specification excluding supply;
- Manufacturer's Specifications – applied as directed by the manufacturer by an experienced person with the nominated product;
- 'Give notice', 'submit', 'furnish', and similar expressions, shall mean given notice, submit, furnish, and the like, to the Superintendent;
- 'The Contractor' shall mean the future company contracted by the Principal to execute the works and complete the project;
- 'The Principal' shall be as defined in the Conditions of Contract and for this Project will be Opalvale Pty Ltd (Opalvale); and
- 'The Superintendent' shall be as defined in the Conditions of Contract and for this Project will be Opalvale or their appointed representative.

## 2 General

### 2.1 Compliance with the DWER Licence and Licence Amendment

Operations at the Site are governed by Licence L9089/2017/1 under Part V of the *Environmental Protection Act 1986 (WA)*. A copy of the Licence may be viewed on the Department of Water and Environmental Regulation (DWER) website ([www.der.wa.gov.au](http://www.der.wa.gov.au)).

The Contractor shall comply with the relevant conditions of the Licence and any subsequent conditions issued by the DWER during the Contract.

The rates submitted by the Contractor should allow for compliance with the conditions of the Licence.

### 2.2 Quality Management

#### 2.2.1 Quality Plan

For all works the Contractor shall plan, develop, document and implement a Quality System based on the principles and practices specified in the AS/NZS ISO 9000 series.

The Quality Plan shall include, but not be limited to the following:

- Inspection and test plans for all materials and construction work;
- Items that require approval of the Superintendent before proceeding (Hold Points);
- Non-conformance identification and action procedures;
- Details of quality personnel and relationship to the company; and
- Safety procedures and checklists.

Works shall not commence until the Superintendent has approved in writing the Contractor's Quality Plan, comprising a **Hold Point**.

### 2.3 Programme of Works

The Contractor shall provide a Programme of Works in accordance with the following requirements:

- The Contractor must submit a detailed Construction Programme to the Superintendent for acceptance within seven (7) days of the Date of Acceptance of Tender.
- The Construction Programme must:
  - Be submitted in accordance with (a-e) below; and
  - Comply with the Date of Practical Completion set out in Annexure A to the General Conditions of Contract.

If the Superintendent considers that the Construction Programme submitted does not show sufficient details or does not conform to the requirements of the Contract, then they may direct by written notice, the Contractor to amend the programme. Such amendments shall be provided within seven (7) days of issuing the written notice.

The Construction Programme submitted, and any subsequent amendments thereto submitted by the Contractor shall, when accepted by the Superintendent, be termed the Construction Programme.

Details to be shown on the Construction Programme shall include, but not be limited to:

- a. Details of the proposed order of work and the planned dates of completion of the various parts of the works;
- b. Placing of orders by both the Contractor and Subcontractors;
- c. Hold points at listed in Section 2.6;
- d. Tests and inspections; and
- e. Dates of site testing and commissioning.

The Contractor must provide an updated Programme whenever directed by the Superintendent. At intervals determined by the Superintendent, but not exceeding 28 days, the Contractor and the Superintendent together, shall review the actual progress of the works in comparison with the Construction Programme. If in the opinion of the Superintendent, this review shows that the Contractor will not complete the works by the Date of Practical Completion, the Contractor shall within seven (7) days, amend the Construction Programme so that it complies with the date of Practical Completion stated in Annexure A to General Conditions of Contract and resubmit it to the Superintendent for acceptance.

The Contractor shall not commence works on-site until the Construction Programme has been agreed by the Superintendent. Failure to provide the programme or sufficient detail contained thereon shall not relieve the Contractor of the responsibility for completing the project by the date stated in the Conditions of Contract.

The rates submitted by the Contractor should allow for completing the project in the timeframe set out above.

As much of the work is weather dependent, the Contractor shall make due allowance when resourcing the works to accommodate bad weather by accelerating output if necessary to achieve the deadline.

## **2.4 Hours of Operations of the Site**

The Site is operational by the Principal between the hours of 07:00 and 18:00 Monday to Saturday, excluding public holidays, when the Site is closed.

The normal working hours for this Contract shall be the Site's operational hours as mentioned above, unless specified elsewhere in the contract documents. Exceptionally, the Principal's consent for work outside these hours may be given after any necessary application and consultation with the appropriate authorities. Five working days' notice is required from the Contractor when seeking such consent.

Should the Contractor wish to undertake work outside these hours to perform works, all health and safety controls and costs that are incurred by the Contractor, performing work outside of normal hours shall be deemed to be included in tendered rates.

The Contractor shall employ the best practical means to minimise noise produced by their operations including plant maintenance and shall comply with the recommendations in AS 2436.

## **2.5 Time for Completion**

With the Tender, a realistic time for completion shall be submitted, in accordance with the practical completion date documented in Item 7 Annexure Part A of the Conditions of Contract. This time shall

include for all annual holidays, public holidays and weather constraints. This realistic time will be presented in the programme of works as described in Section 2.3.

## 2.6 Hold Points

The critical hold points for completed works that require the Superintendent and/or the CQA Auditor to check and sign off before the preceding works commence are listed in Table 2-1.

**Table 2-1: Project Hold Points**

Hold Point Number	Item	Description
1	Approval of Management Plans	Section 2.11, 2.15 and 2.16.2
2	Approval of Formation Surface	Section 4.6
3	Approval of Engineered Fill compaction field trial	Section 4.8.2.1
4	Approval of Engineered Fill testing	Section 4.8.3
5	Approval of Engineered Fill surface	Section 4.8.6
6	Decommissioning of bores	Section 6

## 2.7 Site Meetings

The Contractor and any Subcontractors that the Contractor deems necessary shall attend a Preliminary Site meeting with the Superintendent and/or the Principal. The meeting will include, but not be limited to, a walk-over of the Site and an opportunity for the meeting attendees to discuss any outstanding issues relating to the works.

The Contractor shall attend Site Meetings when requested by the Superintendent or Client for the proper management and supervision of the contract works. The tendered price shall allow for attendance on-site by the Contractor and/or Subcontractors (Domestic or Nominated). Regular meetings shall be called to discuss, but not be limited to:

- Information flow;
- Occupational Health & Safety;
- Co-ordination;
- Resources;
- Progress;
- Quality;
- Procurement; and
- Costs.

The Superintendent shall minute the meetings and distribute the minutes within two working days of the meeting ending. The minutes will include all items discussed and in particular actionable items discussed and the person responsible for closing out that item with the due date.

## 2.8 Safe Work Method Statements/Procedures

Safe Work Method Statements/Procedures (SWMS or SWP) are required for all major works to include, but not be limited to, the Scope of Works outlined in Section 1.4. The Contractor shall submit relevant SWMS to the Superintendent prior to the works commencing that at a minimum shall address the following:

- Describes how the work are carried out;
- Identifies the work activities assessed as having safety or environmental risks;
- States what the safety and environmental risks are;
- States what the health and safety, and environmental risks are; Describes the control measures that will be applied to the work activities to control risks to the environment and ensure the health and safety of the Contractor personnel and other personnel;
- Describes how control measures will be implemented, monitored and reviewed to do the work in a safe and environmentally sound manner;
- Outlines the legislation, standards, and codes to be complied with; and
- Includes a description of the equipment used in the work, the qualifications of the personnel doing the work and the training required to do the work in a safe and environmentally sound manner.

The cost of providing the method statements is to be included in the rates associated with the aspects of the work the method statement relates. If the Superintendent considers that the SWMS submitted does not show sufficient details, is impracticable or does not conform to the requirements set out above, the Superintendent may direct the Contractor to amend and resubmit the SWMS.

The Superintendent's acceptance or non-acceptance of the submitted SWMS does not remove the liability for the works from the Contractor.

## 2.9 Drawings and Schedules

The Contractor shall be responsible for checking all Drawings prior to the commencement of the works. If the Contractor discovers any discrepancies between the various Contract Documents or if the Contractor considers that additional Drawings or information are required, then in either case the Contractor shall report such inconsistency to the Superintendent for instruction or apply in writing for such detail drawings or information at least 28 days before the work concerned is to be initiated. This four-week period shall allow the Superintendent to provide any additional information that may be required.

The Contractor shall not be entitled to claim for any additional cost during this four-week period as a result of delays or other increased expenditure which it may incur by not advising the Superintendent in a timely fashion of any discrepancy or query in the information provided.

The Contractor shall be responsible for the preparation of manhole, chamber, ducting, pipeline and finishing schedules, from the contract Drawings, as it deems necessary for the satisfactory completion of the works. These may be requested by the Superintendent for approval.

### 2.9.1 Setting out the Works

The Contractor shall be responsible for setting out the works. The Contractor shall be supplied with electronic information, in the form of digital terrain model (DTM), with which to establish the lines and levels of the works.

The Map Grid of Australia Zone 50, using GDA94 shall be used for the setting out of the works.

The Contractor shall provide all necessary hardware and software on-site, a drawing package compatible with AutoCAD, electronic surveying equipment and suitably qualified staff, which will enable it to determine setting out co-ordinates at locations deemed necessary.

All control points and reference points shall be clearly marked and where appropriate bedded in concrete. They shall be adequately protected during the construction of the works. Where it is necessary to remove a control point, additional reference points shall be provided to the satisfaction of the Superintendent.

Prior to commencing construction, the Contractor shall check all centre lines, prominent footprints and grid lines in sufficient detail to ensure that the work is fully compatible with existing features.

The setting out of the works shall be perfectly co-ordinated with and shall be continuous with that of any adjacent works. The Contractor shall, when instructed by the Superintendent, make any adjustments necessary to satisfy these requirements. Where appropriate, reference points shall be adjusted to take account of the new locations of the master control points.

Subsequently, the Contractor shall be fully responsible for the setting out of the works and the Superintendent accepts no responsibility for replacing any of the master control points or master levels where given. The Superintendent's acceptance or non-acceptance of the setting-out does not remove the liability for the works from the Contractor.

### 2.9.2 As-Built Drawings

The Contractor shall supply as-built records, Drawings, details, and surveys etc. of all completed work. These records are to be submitted in full to the Superintendent within one month of practical completion of the works in AutoCAD and PDF electronic formats.

Notwithstanding the above timescale, the Contractor shall note that certain as-built drawings are required to accompany the CQA report as specified elsewhere in this document. The Contractor shall note that the main contract works may only be offered for handover to the Principal upon approval of validation report.

The following is a list of minimum criteria to be adhered to when creating the as-built drawings:

- Line types and colours shall be set 'By Layer';
- Layer names should not be abbreviated, and must be self-explanatory;
- All break lines to identify toes and crests of earthwork slopes;
- Units shall be in metres;
- Levels to Australian Height Datum (AHD); and
- Common Site layouts such as surveys, as-built buildings and road layouts shall be externally referenced to all relevant drawings (insert 0, 0, 0 (X, Y, Z) and to Map Grid of Australia Zone 50, using GDA94).

The as-built drawings must detail the following:

- Formation level survey;
- Engineered Fill survey; and
- Perimeter and cell access roads survey.

## 2.10 Surface Water and Groundwater Management

Where not included in the permanent works, the Contractor shall make allowances in his system of working and pricing for dewatering both surface and subsurface water if required and permitted.

The Contractor shall sequence the works to minimise the build-up of surface water within and outside the Site as a result of its actions and allow for all arrangements for evaporation on-site. Where it is necessary and permitted to discharge water or groundwater, the Contractor shall not cause overtopping and erosion of any part of the downstream surface water network. In any case, measures shall be implemented to prevent silt entering the offsite surface water network.

Where the sequence or method of work is such that there is a build-up of water within or outside the Site Boundary, the Contractor shall be liable for the expense of dewatering, control and, if necessary, remediation to the infrastructure.

Unless permitted, the build-up of any surface water may not be discharged to the groundwater regime.

## 2.11 Traffic Requirements

### 2.11.1 General

The Contractor shall submit a Traffic Management Plan (TMP) for the works to the Superintendent for approval at least 5 days prior to commencement of works. This constitutes a **Hold Point**. The Contractor shall implement and maintain the endorsed TMP during the works.

The Contractor shall provide traffic signs and undertake any temporary works to comply with the requirements of the Contract. All signs and method of traffic control shall be generally in accordance with AS 1742.

Should circumstances arise which are not adequately covered in this section, the Contractor shall submit alternative proposals to the Superintendent for review and approval prior to works proceeding.

The Contractor shall be liable for any accident, damage or injury to any person and/or any claim or litigation or other matters arising out of the works of this Contract.

### 2.11.2 Traffic and Safety Management – Internal Road Network

The Contractor shall acknowledge that the Site as a whole is not open to the public but is open to third party companies and the Principal's own staff and vehicles. This flow of traffic has priority over usage of the internal road network. In carrying the works, the Contractor shall not adversely impact the smooth traffic flows for other users. Where the Contractor, its Subcontractors and/or suppliers causes congestion or blockages, the Superintendent may require immediate removal of the offending



vehicles, plant, equipment and/or supplies regardless of the consequences to the Contractor's operations.

The Superintendent will not entertain any claim for financial compensation or extension of time to the Contract as a result of the removal of the congestion or blockages.

Where the Contractor, Subcontractors and/or Suppliers has vehicles which crosses from non-metalled surfaces to asphalt roads, the Contractor shall ensure that no detritus, mud, litter, or other contamination is transferred to the road network. Where the road network surrounding the Site becomes dirty or contaminated, the Superintendent shall require the Contractor to clean the surfacing.

The Contractor shall include cleaning the road surfacing in its pricing structure.

### **2.11.3 Traffic and Safety Management – External Road Network**

All necessary traffic safety precautions shall be taken by the Contractor to ensure the safety of all traffic and pedestrians using the existing roads adjacent to the Site and connecting minor roads during the execution and completion of the works, and all precautions shall be taken to minimise disruption to the local residents.

The Contractor shall ensure that no item of plant, goods, vehicles and/or equipment (including stores or offices) shall be temporarily placed or parked on the public roadway or its verges in a manner which may result in danger to the personnel on the Site or members of the public, or which may restrict sight distances on all accesses to the Site or on public roads.

The Contractor shall ensure that no plant, equipment, goods and/or vehicles shall be parked overnight on the public roads adjacent to the Site.

### **2.11.4 Cleaning and Damage to Roadways**

All roads, accesses, drains, ditches and grips shall be kept clear of all dirt, mud and material arising from the execution and completion of the works and suitable clearing equipment and labour shall be provided by the Contractor for this purpose.

Particular attention shall be paid to the loading of trucks carrying bulk materials into the Site and spoil from the Site to ensure that these shall not be overloaded or loaded in such a way that spillage shall be unavoidable. Any dirt or mud adhering to the tyres or chassis of any vehicles shall be thoroughly cleaned off before the vehicle shall be permitted to leave the Site. In the case of delivery to the Site, vehicles shall be thoroughly cleaned before they leave the point of collection. The Contractor shall be equally responsible for the vehicles of their Subcontractors and Suppliers and the like.

Despite any measures and actions undertaken by the Contractor, should it not prove successful in clearing the roads in a timely manner, then the Superintendent will arrange for professional street cleaners to undertake the work. The cost of doing this shall be subtracted from the monthly or final valuations.

The Contractor shall take particular care to avoid damage to roads, footpaths, grass margins and other surfaces outside of the authorised Site and shall be liable for the cost of repairing all such damage caused by the Contractor's operations to the satisfaction of the Superintendent and the Principal. The Contractor shall also take precautions to prevent spillage of diesel fuel or solvents. Should a spillage



arise from either the Contractor, its Subcontractors or Suppliers then it will promptly clear up the spillage and remediate any damage.

The Contractor shall have regard to the maximum legal permissible loads for public roads and where requested by the Superintendent, shall provide evidence of compliance with regard to delivery of material to Site. The Contractor shall also prohibit the use of tracked plant on road surfaces outside of the Site unless suitably approved protective measures are taken to safeguard the integrity of the road surfaces. Pumping of water onto a public road or private property shall not be permitted. Heavy discharges to gullies and storm drains shall have silt traps incorporated in the temporary discharge arrangement. Any damage so caused shall be made good by the Contractor at its own expense.

The Contractor must satisfy the requirements of the Chain of Responsibility Legislation with respect to transportation of materials.

<https://www.mainroads.wa.gov.au/UsingRoads/HVS/Pages/chainofresponsibility.aspx>

## 2.12 Engineering Control

All verbal instructions given by the Superintendent/CQA Consultant shall be accompanied by a Confirmation of Verbal Instruction (CVI) prior to undertaking in writing or by email. Verbal instructions or verbal requests for information alone shall not be considered binding.

Technical Queries (TQs) from the Contractor to the Superintendent/CQA Consultant are to be issued electronically in a format to be agreed with the Superintendent.

## 2.13 Variations of Work

Where extra works are ordered, they shall be valued in accordance with the Rates in the Bill of Quantities, where they exist or otherwise in accordance with the Conditions of Contract. Where any additional works are not fully covered by the rates in the Bill of Quantities, the Superintendent will request a separate quotation for the work. Where approved, the Superintendent may commission these works using the Day Rates.

Such works shall not be carried out until a written order has been issued by the Superintendent, and if it is authorised to be carried out on a Time and Materials basis, the Contractor shall submit to the Superintendent weekly time and material sheets for checking and approval. Payment will not be made for work carried out in this manner unless previously authorised by the Superintendent.

The Superintendent reserves the right on the Principal's behalf to omit any part or parts of the Contract and claims for any loss of profit due to any omissions will not be entertained by the Superintendent unless further specified in the Conditions Contract.

## 2.14 Dayworks

- The Contractor shall provide the following:
- Contractor to submit maximum working hours in a day;
- Dayworks shall be pre-approved by the Superintendent;
- Dayworks shall be signed off by Superintendent at the end of each day; and
- The tendered dayworks rates for all personnel and plant that shall be used during the contract.

The Contractor shall give notice to the Superintendent of the commencement and completion of any work for which the Contractor intends to submit daywork records in accordance with the Conditions of Contract. The Contractor shall submit to the Superintendent at the end of each month an application for payment for all dayworks done in the preceding month.

The dayworks records to support applications for payment will include at a minimum the following:

- Description of work done;
- Operative's name and trade;
- Plant type, make and model;
- Rates and hours worked segregated into normal time; and
- Types and quantities of materials used.

## **2.15 Control of Environmental Issues**

The Contractor shall, within 14 days of the Date of Acceptance of Tender, provide the Superintendent with an Environmental Management Plan (EMP), detailing how the Contractor will implement and maintain environmental management measures to comply with all requirements set out in Sections 2.15.1 to 2.15.9. This plan shall include the name of the relevant manager/supervisor with the primary responsibility for environmental matters and environment related communications.

### **2.15.1 Noise**

The normal working hours within the Site shall be as detailed in Section 2.4 of this Specification. Exceptionally, the Superintendent's consent for work outside these hours may be given after any necessary consultation. Five working days' notice is required from the Contractor when seeking such consent. If complaints are received and justified, during work outside the normal hours the Principal reserves the right to require all construction works to be undertaken during the approved hours.

The Contractor shall employ the best practical means to minimise noise produced by their operations, including plant maintenance, and shall comply with the recommendations in AS 2436.

### **2.15.2 Mud**

The Contractor shall prevent any nuisance occurring through the discharge of dirt, water, fumes, and the like on to persons or property.

The Contractor shall ensure that waste products of whatever description associated with the execution and completion of the works shall not enter watercourses, whether dry or not, which are adjacent to the Site.

### **2.15.3 Dust**

Fine material encountered on the Site is susceptible to erosion by wind under normal wind conditions when the surface material is dry. The Contractor shall provide, use, maintain and keep available plant and equipment necessary to minimise the formation and accumulation of dust arising from the works, normally in dry weather conditions. The Contractor shall implement all measures necessary to minimise wind erosion and prevent material from the Site being blown over or onto property outside the Site or onto others on the Site. The measures shall include, but not be limited to:

- Frequent watering of areas disturbed by the Contractor;
- Not carrying out operations with dust-creating potential at a time of high winds; and
- Control of dust caused by the works.

The Contractor shall allow for any delay and effect on the Contract Programme caused by diverting manpower and equipment to control dust and windborne material.

The Contractor shall be responsible for the cost of controlling dust and windborne material generated by the immediate activities of plant, equipment and/or personnel.

If, during the actual construction of work, the suggested dust suppression measures are found to be insufficient, the responsibility for carrying out additional measures necessary to achieve the desired level of dust suppression rests totally with the Contractor. If this is not carried out in a timely manner, the Superintendent shall arrange for additional dust suppression, the cost of which shall be taken from the monthly or final account.

#### **2.15.4 Contaminated Water and Sewage**

The Contractor must, at its own cost, provide toilet and adequate wash facilities for its personnel and that of its Subcontractors. These facilities shall be connected to a storage tank, or other facility approved by the Superintendent, which shall have a minimum of 14 days storage capacity and shall be located in a place approved by the Superintendent.

The Contractor shall arrange for the removal of all sewage from the holding tank to be collected at regular intervals and disposed of at approved and lawful locations outside the work site.

#### **2.15.5 Smoking**

Smoking is not permitted at the Site unless in authorised areas as agreed by the Superintendent. Smoking is prohibited in Site offices, lunchrooms, or enclosed toilet facilities.

#### **2.15.6 Fire Prevention**

No fires shall be set alight by the Contractor under any circumstance. The Contractor shall provide and maintain adequate fire-fighting equipment on-site and must comply with the Bush Fires Act 1954.

#### **2.15.7 Spill Prevention and Response**

The Contractor shall plan and execute all works so as to minimise the possibility of pollution of the Site and adjoining areas from chemicals, dangerous goods and other potential contaminants.

The usage, storage and handling of chemicals and dangerous goods shall be in accordance with all relevant legislation, manufacturer's instructions and the relevant Safety Data Sheets (SDS). The Contractor shall employ methods that will prevent chemical, fuel and lubricant spillage on the site and adjoining areas and not permit the pollution of land or waterways by a chemical, fuel or lubricant, or any waste material or imported fill.

Storage areas shall be greater than 50m from natural or built drainage lines, flood prone areas, or on slopes steeper than 1:10.

Spill clean-up equipment and materials, appropriate for the type and quantities of chemicals used on site, must be kept on site in a readily accessible location, at all times during the works. All site

personnel must be trained in the use of spill clean-up equipment, and containment of materials and clean up all chemical spills immediately.

All spills shall be reported to the Superintendent and remediated to their satisfaction. If a spill constitutes an environmental incident, the incident must be reported in accordance with reporting procedures and legislative requirements.

### **2.15.8 Refuse Disposal**

All Site refuse (including foodstuffs) shall be handled and disposed of in accordance with the requirements of relevant statutes and to the approval of the Superintendent.

Litter and general rubbish generated by the Contractor in executing the works shall be temporarily stored in appropriate receptacles prior to being conveyed to a licensed disposal facility. Prior approval for the disposal of litter and general rubbish at suitable facilities on-site, should they exist, shall be obtained from the Superintendent. All debris, spoil, rubbish or materials shall be suitably contained and covered in vehicles during transportation to or from the Site to prevent spillage or contamination of adjoining and other areas or property.

### **2.15.9 Vehicles**

The Contractor shall maintain vehicles, wheels, and tracks in a suitable clean condition to prevent transfer of mud onto adjacent roads or other areas. The location of all servicing/maintenance of plant and equipment on-site shall be agreed with the Superintendent. The Contractor shall identify all the key environmental aspects for the storage, use, and safe disposal of hazardous materials/fluids and mitigation of any fuel/oil/diesel etc. spills during the works.

## **2.16 Occupational Health and Safety**

The Contractor shall comply with the Occupational Safety & Health Act 1984 (the OSH Act) and the Occupational Safety & Health Regulations 1996 (the OSH Regulations) and with any amendments that may be made to the OSH Act and OSH Regulations from time to time.

The Contractor shall comply with all relevant safety and security procedures and rules of the Principal. Where there is conflict between the OSH Acts/Regulations and the Principal's safety and security procedures and rules, the more rigorous requirements shall apply.

### **2.16.1 Contractor's Safety Risk Assessment**

Within 14 days of the Date of Acceptance of Tender, the Contractor shall carry out its Safety Risk Assessment and shall supply the Superintendent with a copy of the potential hazards identified and the proposed control measures to be implemented for consideration.

Throughout the Contract period, the Contractor shall report to the Superintendent any potential hazards identified or notified.

### **2.16.2 Safety Management Plan**

The Contractor shall, throughout the Contract, implement and maintain a "Safety Management Plan". The Contractor shall prepare the Safety Management Plan in conjunction with a person suitably experienced and qualified in safety matters.

Two weeks prior to the commencement of Works, the Contractor shall supply to the Superintendent, in writing, its Safety Management Plan.

### **2.16.3 Induction Training**

Employees of the Contractor, its Subcontractors and employees of Subcontractors shall not commence work on the Site until the Contractor has carried out Site induction training. Prior to this, the Contractor's Representative shall receive the scope of the induction from the Principal in order that it may cascade it to the staff, Subcontractors and suppliers. The Contractor is reminded that the Site induction training is separate to any safety training that it is legally required to impart to its staff. The Contractor's staff, Subcontractors and Suppliers will not be allowed to access the Site independently without the Site induction training. To this effect all people engaged in the works will be required to sign an Induction Form confirming that they have received the training.

Upon commencement of work on the Site, the Contractor shall further induct each employee with regard to all significant hazards associated with their particular activity and area of employment on the Site and where relevant, shall include the use of powered plant, tools and equipment. If requested by the Superintendent, the Contractor shall provide appropriate documentation detailing the satisfaction training of its employees on the safe use of all plant, vehicles and equipment to be used on the project. Failure to provide appropriate certification may lead to the relevant employees being removed from the working roster.

### **2.16.4 Safe Working Procedures**

Where legislation or codes of practice identify particularly hazardous activities, including but not limited to, work in confined spaces, asbestos removal, demolition work, excavation work, working near power lines and live conductors and working at heights, the Contractor shall supply to the Superintendent a Safe Work Procedure (SWP) document prior to commencing such activity or type of work on the Site, which complies with the Site Licence.

The Contractor shall induct its employees and its Subcontractors with regard to SWP and shall prepare "Training Session Attendance" sheets signed by each attendee verifying that such induction has occurred.

### **2.16.5 Site and Public Security & Safety**

Notwithstanding the Contractor's obligations to the Site and public security as stated elsewhere in this Contract, the Contractor shall monitor and control wherever practical, the access of all persons to the Site.

Where the general safety of the Public is concerned, and time of notification of the Contractor further jeopardises this safety, the Superintendent may order immediate remedial works to be conducted at the Contractor's expense.

### **2.16.6 Contractor's Safety Agreement**

The Contractor shall liaise with the Principal's Occupational Safety & Health (OS&H) Co-ordinator to complete and sign a Contractor's Safety Agreement.

### **2.16.7 Safety Notifications, Compliance & Standards**

The Contractor shall notify the Department of Mines, Industry Regulation, and Safety (formerly the Department of Labour and Industry) of all Notifiable Works and make payment of all inspection and other fees in connection with such works.

The Contractor shall conduct the construction of the works in accordance with all current statutory requirements, Local Government By-laws and the provisions of AS 1470, together with any other Code relating specifically to type of machine, process, handling procedures or materials. The Contractor shall provide employees with all necessary equipment and protective clothing to allow the safe construction of the works and shall ensure maintenance to all plant and machinery to ensure fitness for purpose.

### **2.16.8 Unsafe Machinery or Structures**

On notification from the Superintendent, in respect to any operation, machine or structure being, in the opinion of the Superintendent, unsafe, the Contractor shall cease use immediately of such operation, machine or structure and shall conduct remedial work to the satisfaction of the Superintendent before continuing to use the operation, machine or structure in the works. Where no remedial action can ensure continued safe use of an operation, machine or structure, the Contractor shall, in the case of an operation, cease such operation, and, in the case of a machine or structure, shall dismantle and remove such machine or structure from the Site.

### **2.16.9 Fire Prevention**

The Contractor shall provide and maintain adequate, approved fire-fighting equipment on-site. The Contractor shall observe the provisions of the WA Bushfires Act, Local Authority regulations, WA Fire Brigades Board regulations and any other regulation in respect to fire prevention.

BURNING ON SITE IS PROHIBITED.

The Contractor shall ensure that all flammable materials are used and stored in accordance with the Explosives and Dangerous Goods Act and any other statute or regulation governing storage and use of such materials and shall obtain such permits and licenses and pay all relevant fees and charges..

## **2.17 Containment of Leachate and/or Surface Water Run-off**

Should the Contractor in the course of the works cause a leachate or surface water break out, the Contractor shall immediately inform the Superintendent and remedy the situation at the Contractor's own expense.

Should the Contractor notice a leachate or surface water breakout, the Contractor shall immediately inform the Superintendent and await instruction as to what course of action is required.

## **2.18 Site Climatic Conditions**

The Contractor shall inform itself fully in regard to the climatic conditions likely to be experienced at the Site and shall make its own assessment of the effect that such conditions may have on the execution of the works and make due allowances for it in the Construction Programme. The rainfall and other weather conditions details can be accessed Bureau of Meteorology website ([www.bom.gov.au](http://www.bom.gov.au)).

## 2.19 Control of Quantities On-Site

The method adopted to verify volume/mass relationship shall be determined prior to works commencing.

The Contractor is responsible for programming such surveying to limit any delays to the programme and to allow completion of the surveying to the satisfaction of the Superintendent.

The Contractor is required to coordinate with the surveyor to ensure that the surveying is completed in accordance with the Superintendent's requirements without adversely affecting the programme of the works. The independent ground surveyor shall be required at a minimum to survey at the following stages:

- Location of specified Site investigations (trial pits and boreholes) carried out by the Contractor at the direction of the Superintendent;
- The reinstated formation levels at the landfill and all other construction areas;
- The surfaces of the individually completed layers, such as but not limited to, engineered clay, geomembrane, sub-bases, etc.;
- Topographical survey of completed construction including finished earthworks, drainage, all other aspects of the infrastructure and affected areas of the borrow source should it be relevant; and
- Any requirements as stipulated in the CQA Plan as mentioned in the Appendices of this Specification.

## 2.20 Temporary Accommodation

The Contractor will not be permitted to set-up any residential (donga/demountable) accommodation on-site, for Staff or Subcontractors when undertaking the contract works.

## 2.21 Security

The Contractor shall be responsible for establishing and maintaining a secure Site for the duration of the Contract during and outside of normal working hours. All new structures shall be made secure.

The Contractor shall allow in its tender for security and provision of all necessary accommodation and utilities, including lighting, for the carrying out of these duties.

Security fencing shall be erected where required to delineate working areas/compounds and access to any open excavations at the end of the working day should be cordoned off, with restricted access.

The security measures to be employed by the Contractor must be to the satisfaction of the Superintendent. The Principal is not responsible for any losses due to lapses in security by the Contractor's personnel and/or its Subcontractors' personnel.



## **3 Site Works**

### **3.1 Entry on to the Site**

The Contractor shall notify the Superintendent in writing, 14 days in advance, of its intention to start work within each work area.

The Contractor shall allow the Principal unfettered access to all areas of the Site to inspect works and conduct ALL work as required by the Site Licence.

### **3.2 Site Fencing**

Where the type and location of temporary Site fencing are shown in the Contract, the Contractor shall erect such fencing as soon as it is given possession of the relevant portion of the Site. The Contractor shall regularly inspect and maintain all such fencing with any defects being made good without delay. Temporary fencing shall remain in position until either it is replaced by permanent fencing, or the works are sufficiently completed to enable that portion of the Site to be brought into use.

### **3.3 Contractor's Site Facilities**

The Contractor must supply and maintain all facilities on-site as deemed necessary by the Contractor for Contractor's staff, Subcontractors and Superintendent. The facilities shall include all necessary offices, stores, toilets, washing facilities and other facilities as required by industrial agreements for facilities, including the cleaning and maintenance of the facilities.

The Contractor must provide facilities satisfactory for the storage of such materials as may be described in the various sections of the Specifications.

Prior to erecting any Site facilities, the Contractor will ensure that the proposed location and positioning of the units have been agreed with the Superintendent.

The compound shall be maintained by the Contractor to the satisfaction of the Superintendent, for the duration of the contract works.

All buildings and facilities established and used by the Contractor must be removed from the Site at no cost to the Principal on completion of the works and the Site must be left in a clean and tidy condition.

### **3.4 Office Accommodation for the CQA Consultant**

The office accommodation for the CQA Consultant personnel shall be provided by the Principal for the duration of the works.

### **3.5 Interference with Land Interests**

The Contractor shall confine its constructional operations within the Site, or such other area of land as may be negotiated and shall instruct its employees not to trespass.



Subject to any unavoidable disturbance which may be necessitated by the execution of the Contract, the Contractor shall not interfere with any sporting, fishing or other rights which may be enjoyed on or near the Site.

### **3.6 Interference with Existing Access**

Before interfering with access to any property, the Contractor shall provide alternative arrangements. The Contractor shall notify the Superintendent and the relevant occupiers, in writing, 14 days in advance of any such interference and shall confirm to the Superintendent that alternative arrangements have been agreed.

### **3.7 Protection against Damage**

The Contractor shall take all necessary precautions to avoid causing any unwarranted damage to roads, lands, properties, trees, monitoring boreholes and other features during the currency of the Contract and shall deal promptly with any complaints by owners or occupiers.

Where any portion of the works is close to, across or under any existing apparatus of public utilities or other parties, the Contractor shall temporarily support and work around, under or adjacent to all apparatuses in a manner designed to avoid damage, leakage or danger, and to ensure uninterrupted operation.

If any damage occurs, the Contractor shall, at once, notify the Superintendent and the Statutory Authority or owner concerned. Any damaged or affected apparatus shall be repaired or replaced at the expense of the Contractor.

The Contractor shall take all reasonable necessary precautions to avoid damage to its own works, by its own employees, domestic and nominated Subcontractors, until such time as the works have been handed over and accepted by the Principal.

Where deemed necessary by the Superintendent, stockpiled materials shall be covered with tarpaulin to avoid contamination of adjacent streams.

### **3.8 Location of Existing Services**

The Contractor shall be responsible for the maintenance and protection of existing services which may be affected by the contract works. It is not warranted that the services shown on the Drawings are in the exact position or are to the full extent shown. Prior to commencing any works, the Contractor should make such investigations with all service authorities and Dial Before You Dig (<http://www.1100.com.au/>) that are necessary to locate all services on-site or within the work areas adjacent to the Site.

Existing private and public statutory services such as water mains, gas mains, cables, house drains, culverts, etc., shall be located insofar as possible before commencement of the works. The Contractor shall proceed with the works in such a manner that the works shall be constructed without interference.

## 4 Earthworks

All works carried out under this section of the Specification shall comply with the following standards, and those specified therein, which shall be held to be incorporated in the Specification:

- AS 3798: Guidelines on earthworks for commercial and residential developments; and
- AS 1289: Methods for testing of soils.

### 4.1 Definitions

The following definitions of earthworks material shall apply to this and other clauses of the Specification in which reference is made to the defined materials.

“Suitable materials” imported or on-site won material complying with the requirements for use in the permanent works.

“Un-suitable material” shall mean material other than suitable material and shall include:

- Peat materials from swamps, marshes or bogs;
- Logs, stumps and perishable material;
- Material susceptible to spontaneous combustion;
- Material in a frozen condition;
- Clay of liquid limit exceeding 80% and/or plasticity index <10% or exceeding 55%;
- Material having a moisture content greater than the maximum permitted for such materials in the Contract, unless otherwise permitted by the Superintendent; and/or
- Non-hazardous material other than those permitted in the Contract.

“Unacceptable Hazardous Material” shall be material having hazardous chemical or physical properties requiring special measures for its excavation, handling, storing, transportation, deposition and disposal.

“Rock” shall mean hard rock in mass formation which can only be removed by the use of a rock breaker or explosives. Boulders in excess of 0.25 m<sup>3</sup> volume in pipe trenches or in excess of 1.0 m<sup>3</sup> in mass excavation shall be deemed to be rock excavation.

“Cohesive Soil” shall include clays and marls with up to 20% of gravel or rock and have a moisture content not less than the value of the plastic limit minus 4.

“Well-graded granular and dry cohesive soils” shall include clays and marls containing more than 20% of gravel or rock and/or having a moisture content less than the value of the plastic limit minus 4 and well-graded sands and gravels with the uniformity coefficient exceeding 10.

“Uniformly-graded material” shall include sands and gravels with uniformity coefficient of 10 or less, and all silts. Any soil containing 80% or more of material in the practical size range 0.06-0.002 m will be regarded as silt for this purpose.

### 4.2 Site Clearance

The clearing of native vegetation is not required, or permitted, during the works.

Burning of cleared vegetative materials shall not be permitted under any circumstances.

### 4.3 Trial Holes

Before commencing general excavation work, it may be necessary to carry out trial holing to ascertain the exact location of underground services, which may affect the works. Before such trial holing commences, the Contractor shall notify the Dial Before You Dig (<http://www.1100.com.au>) involved so that an inspector may be present if required, while the trial holing proceeds. The cost of any trial holes shall be deemed to be included in the tendered rates.

The Contractor shall note the requirements of Section 3.8 whilst undertaking any trial holes. Any disruption to existing services while carrying out trial holes shall be repaired at the full expense to the Contractor.

It is anticipated that no trial holes will be required. The Contractor shall notify the Superintendent before considering such work.

### 4.4 Products and Materials

#### 4.4.1 Use of Materials

The Contractor shall be responsible for any assumptions made by the Contractor in relation to the nature and types of materials encountered in excavations and the bulking and compaction characteristics of materials incorporated in any earthworks. The summary of the estimated quantity for general earthworks provided includes all types of materials that may be encountered in the cuttings.

Where material from excavations is suitable for use in the earthworks, but the Contractor elects to:

- Spoil it; or
- Use it for the Contractor's own purposes; or
- Use it as a source of pavement materials; or
- Construct embankments with dimensions other than those shown on the Drawings, or to dimensions as otherwise authorised by the Superintendent, and a deficiency of material for earthwork construction is thereby created;

the Contractor shall make good that deficiency from sources of suitable material. The making good of such deficiency of material shall be affected at no cost to the Principal.

#### 4.4.2 Unsuitable Material

Some materials are unsuitable for forming structural fill and should be either removed to spoil or used in non-critical areas. In addition to the definition in Section 4.1, unsuitable materials, as detailed in AS 3798 may include:

- Organic soils, such as many topsoils, severely root-affected subsoils and peat;
- Materials contaminated through past Site usage which may contain toxic substances or soluble compounds harmful to water supply or agriculture;

- Materials containing substances that can be dissolved or leached out in the presence of moisture (e.g. gypsum), or which undergo volume change or loss of strength when disturbed and exposed to moisture (e.g. some shales and sandstones), unless these matters are specifically addressed in the design;
- Silts, or materials that have the deleterious engineering properties of silt;
- Other materials with properties that are unsuitable for the forming of structural fill; and
- Fill that contains wood, metal, plastic, boulders or other deleterious material, in sufficient proportions to affect the required performance of the fill.

In some circumstances a design may allow for the use of some of these materials in structural fill. Before allowing for such use, the Contractor must supply specialised advice from a geotechnical professional. The use of any material in structural fill not specified in the Drawings or otherwise must be approved by the Superintendent before using such materials.

#### **4.4.3 Imported Material**

It is not anticipated that imported material will be required during the works. Where it is deemed necessary to import material, it shall be certified as “Dieback-free” (free from the plant disease *Phytophthora cinnamomi*).

#### **4.4.4 Engineered Fill**

Engineered Fill will comprise of suitable site-won soil material from the development footprint and on-site stockpile, which will be used to form the Bulk Earthworks.

### **4.5 Excavation**

The Contractor shall carry out all earthworks excavation to the extent shown on the Drawings or as directed by the Superintendent. The contractor is responsible for assessing the soils and selecting suitable plant and equipment to undertake the works. All completed works are to be inspected by the Superintendent.

All excavations shall have adequate warning lights, handrail and guarding to allow safe work within and on top of the excavations.

#### **4.5.1 Protection of Foundation Surfaces**

The exposed surface at the bottom of the excavation shall be adequately protected from disturbance by the Contractor’s operations or by the action of storm water or ground water. Where required, dewatering shall be undertaken in accordance with the requirements of Section 4.5.4 of this Specification. Any disturbance shall be reinstated to original conditions by the Contractor at no cost to the Principal.

#### **4.5.2 Protection of Excavations**

The Contractor shall provide all the necessary supports to secure the sides of any excavations whether mass excavation or trench excavation. Except where required by or permitted under the Contract, sides of the excavations shall not be battered. The Contractor shall be responsible for all trench boxes, planking and strutting necessary to ensure the stability of the side slopes of excavation. The Contractor

will be responsible for the costs associated with such temporary works. Any battering or collapsed excavations shall be backfilled with material approved by the Superintendent.

All excavations shall have adequate warning lights, handrail and guarding to allow safe work within and on top of the excavations.

#### **4.5.3 Excavated Materials**

Excavated material shall be disposed of in accordance with the Contract. No excavated materials, suitable for use in the works shall be removed from the Site except on the direction, or with the permission, of the Superintendent.

#### **4.5.4 Water in Excavations**

The Contractor shall not allow water to lie in any part of the works unless required to do so under the Contract. Water arising from or draining into the works shall be drained or pumped to an approved disposal point.

No excavation shall occur in water without the area first being dewatered in accordance with this Section.

#### **4.5.5 Excavation Below Formation Level**

If the Contractor encounters ground below formation level which is considered unsuitable, or if the formation level is damaged and allowed to deteriorate, the Superintendent shall be promptly informed. Any unauthorised excavation to a depth greater than is necessary for the proper execution of the works shall be filled with suitably approved fill material to bring it to the correct formation level. Any underground services or structures within 500 mm below the formation shall be removed and the excavation backfilled with crushed rock material or equivalent approved.

#### **4.5.6 Hand Excavation**

Hand excavation shall be used in confined spaces where the use of excavating machinery is unsuitable and for other operations such as trimming the formation to final level whether in open cut or in trench. Hand excavation shall be used around and adjacent to existing services to expose and locate them.

#### **4.5.7 Excavation to Formation Levels**

After removal of topsoil (where present), the Contractor shall cut to the design formation levels shown on the Drawings and transport the material to the areas to be filled, exported off-site to designated locations or disposed of at an appropriately licensed facility. The Contractor shall take precautions that prior to any subsequent works placed on top of the formation the surface shall be protected from trafficking, storage, rainfall and any other climatic condition.

Where necessary, the Contractor shall temporarily stockpile all cut material in areas to be agreed with the Superintendent.

Any areas that are over excavated shall be refilled in accordance with suitable material to the correct design levels and compacted as specified in Section 4.6.

Indigenous materials to be used as fill shall be assessed in-situ for its suitability for re-use by the Contractor and agreed by the Superintendent. Where appropriate, in-situ or laboratory testing shall

be conducted to confirm the material's suitability for use in the permanent works. The material shall be designated as being Unsuitable or Suitable for incorporation into the permanent works.

## 4.6 Formation Preparation

Formation preparation shall be completed in all areas where Engineered Fill is to be placed, and where cut has occurred to achieve final levels. The formation surface shall be constructed to the shape and levels as shown in the Drawings and to the specified requirements and tolerances in Section 4.8.6. The completed formation shall be in a homogeneous uniformly bonded condition with no evidence of layering or disintegration.

Soft spots shall be excavated and disposed of as directed by the Superintendent and filled with approved Engineered Fill. The acceptance of the formation levels constitutes a **Hold Point**.

The completed formation surface shall be maintained in its conforming condition and shall be watered as necessary to prevent shrinkage cracking, dusting or loosening of its surface until Engineered Fill is placed.

## 4.7 General Fill

This Specification defines general fill as material to be used in fill locations upon which embankments and other areas of structural fill are not required. All general fill shall still meet the requirements for suitable materials as per AS 3798 and be deemed acceptable by the Superintendent.

Filling shall, wherever practicable, be undertaken immediately after the specified operations preceding it have been completed. Filling shall not, however, be commenced until the works to be covered have achieved a strength sufficient to withstand all loading imposed thereon.

Filling around tanks and other structures shall be undertaken in such a manner as to avoid uneven loading.

No filling shall take place in water.

## 4.8 Engineered Fill

Engineered Fill will be placed and compacted during the cell construction to a thickness of 500mm or greater, as necessary, within the entire footprint of Cell 5 and 6 in accordance with the Drawings. In the low areas, Engineered Fill will be placed and compacted to achieve the formation levels shown in the Drawings.

Engineered Fill will also be placed and compacted to achieve the formation levels and embankments of the road.

### 4.8.1 Conditioning

It is recommended that the site-won cohesive soils are moisture conditioned prior to placement. Due to the nature of the material to be used as Engineered Fill, conditioning of the material, by thorough mixing and breaking down of clods, and water addition, is required prior to placement and compaction. Under no circumstances should clods of greater than 300mm across be placed; if present large clods must be thoroughly broken down prior to placement.

## 4.8.2 Compaction

A vibratory sheepsfoot/padfoot roller or other suitable compaction plant approved by the Superintendent/CQA Consultant should be used for construction of the Engineered Fill. The surface of compacted layer shall be sealed with a smooth roller after each shift. The smooth surface is then to be scarified/lightly tyned and watered before the next lift of clay is placed. The Contractor shall submit with his completed Tender, a method statement detailing the plant, conditioning and compaction techniques they propose to use. Uncompacted lift thickness must not exceed 300mm.

Engineered Fill material shall have a moisture content, during and after compaction, within the range of optimum moisture content (OMC)  $\pm 3\%$  as determined by the methods of test AS1289, to  $>95\%$  MMDD.

### 4.8.2.1 Field Trial

To assess the Contractor's proposed placement and compaction procedures a Field Trial of Engineered Fill construction will be carried out. The trial should be carried out in an area not less than 15m x 10m, and consist of two lifts.

The purpose of the Field Trials shall be to provide field verification of the moisture/density relationships as determined from the characterisation testing. The following aspects of the Engineered Fill installation shall be evaluated for each layer of the field trial.

- Material handling and placement requirements
- Compaction equipment and procedures
- Number of passes of equipment necessary to achieve the required results
- Testing of the Engineered Fill shall be undertaken after each lift has been placed and compacted.

If a Nuclear Density Meter (NDM) is utilised for field testing the trial shall be used to calibrate the instrument against adjacent sand replacement or core cutter in-situ density test methods, with a minimum of five (5 No.) corresponding samples. One (1 No.) bulk sample shall be submitted to the laboratory for grading and Atterberg testing.

The calibration will only be applicable to the actual NDM as verified by serial number, used as part of the field trial. The results of the Field Trial shall be submitted to the Superintendent/CQA Consultant for approval. This constitutes a **Hold Point**.

If the results of Field Trials are unsatisfactory, the Field Trial area shall be excavated and removed. The Contractor shall then submit their proposals for a revised procedure to the Superintendent/CQA Consultant for approval before continuing with further field trials.

The Contractor may also propose to remediate the unsatisfactory trial area through further compactive effort/conditioning, followed by re-testing, until the material meets the performance specification for all criteria. Once the trial liner has been proven to meet the specification, the trial area may be incorporated into the permanent works.

## 4.8.3 Testing

The Contractor shall undertake the following compliance tests:



**Table 4-1: Engineered Fill Testing Requirements**

Test	Frequency
In-situ dry density/moisture	1 per 500m <sup>3</sup> or 1 per 2500m <sup>2</sup> per clay lift
Laboratory permeability tests	1 per 2,500m <sup>3</sup>
Grading analysis (to clay size/inc. hydrometer)	1 per 2,500m <sup>3</sup>
Plasticity Index/Atterberg	1 per 2,500m <sup>3</sup>

*Note: Permeability to be assessed when compacted to a Dry Density Ratio of 95% for MMDD in accordance with AS1289*

All laboratory testing shall be undertaken by a NATA accredited laboratory, approved by the Supervisor.

The in-situ field dry density shall be measured using either the sand replacement method, core cutter method, or by a nuclear density gauge. If a nuclear gauge is used the readings will be verified by core cutter or sand replacement at a minimum of 1 per 10 nuclear gauge readings. All drill rod penetrations from the nuclear density gauge testing must be backfilled with bentonite granules up to 75mm of the clay surface then plugged with clay.

The undisturbed samples for laboratory permeability testing shall be taken by the Contractor from the finished mineral liner under the instruction of the Superintendent/CQA Consultant. The samples shall be taken by placing a thin walled sample tube, 150 to 300 mm in length, upright on the completed material and jacking the tube down vertically and steadily. Upon excavation, the samples shall be immediately sealed, labelled and sent to a NATA accredited laboratory (approved by the Superintendent/CQA Consultant) for determination of permeability.

All perforations made in the clay liner for testing shall be backfilled in a manner approved by the Superintendent/CQA Consultant.

All test results shall be submitted to the Superintendent/CQA Consultant, detailing sample location, level, depth and date taken, for approval. This constitutes a **Hold Point**.

#### 4.8.4 Rectification of Works

If the field testing demonstrates that the compaction requirements are not being attained the Contractor must carry out the following at his own expense:

- Undertake additional works on the layer as necessary such that subsequent testing of the layer meets the required compaction requirement. This may include such measures as wetting up or drying of placed materials, additional passes of the compacting plant or other measures as deemed suitable by the Superintendent/CQA Consultant.
- Remove the part of the layer demonstrated to have not met the required compaction requirement and replace it to the satisfaction of the Superintendent/CQA Consultant.

#### 4.8.5 Protection of Finished Surface

The site won soils to be used for Engineered Fill are highly susceptible to rapid moisture loss. The Contractor shall protect the Engineered Fill surface from desiccation prior to geosynthetic placement. The Contractor shall order its works so the duration of exposure of the prepared is minimised to prevent deterioration. Additional protection may be in the form of a thin plastic sheet, delaying final trimming prior to liner installation, but shall in all cases require the prior approval of the



Superintendent. Surfaces containing desiccation cracks exceeding 12mm deep or exhibiting swelling, heaving or other similar conditions shall be replaced or reworked by the Contractor to remove these defects to the approval of the Superintendent/CQA Consultant.

#### 4.8.6 Tolerances

As part of the Construction Quality Assurance programme the Superintendent/CQA Consultant must verify the as-constructed Engineered Fill survey. The Contractor should ensure all survey data is passed to the Superintendent/CQA Consultant within 3 days of undertaking the survey, for approval to demonstrate the required geometry and falls have been met. This constitutes a **Hold Point**.

Only where cut is required to reach the formation level, the tolerance for the formation surface is: -100mm / +0mm.

The tolerance for the final Engineered Fill surface is: -0mm / +50mm.

## **5 Pavement**

### **5.1 Products and Materials**

#### **5.1.1 Recycled Aggregate Wearing Course**

New roads shall be surfaced with a 220mm thick recycled aggregate provided by the Principal. The aggregate shall consist of a durable pebble in soil mortar. The material shall be free from particles having any dimension greater than 50mm and free from clods, stumps, roots, sticks, vegetable matter or other deleterious materials.

The pavement material does not contain more than 20% by mass of material retained on a 37.5mm sieve.

#### **5.1.2 Water**

The water shall be clean and substantially free from detrimental impurities such as oils, salts, acids, alkalis and vegetable substances.

### **5.2 Construction**

#### **5.2.1 General**

Pavement construction includes the placing, compacting and finishing of pavement materials supplied by the Principal in accordance with the Specifications and Drawings to the prepared Subgrade surface.

Prior to the construction of any pavement layer, the Contractor shall certify to the Superintendent that the underlying layer has been constructed as specified.

#### **5.2.2 Spreading**

The wearing course worked shall be generally parallel to the finished pavement surface and shall extend the full width of the layer.

It shall be worked in compacted layers not greater than 250mm nor less than 100mm. Where less than 100mm is required to be worked the underlying subgrade shall be scarified to such a depth that the resulting compacted thickness of the layer to be worked is not less than 100mm.

#### **5.2.3 Compaction**

Pavement material shall be spread, mixed and compacted to achieve uniformity free from any evidence of segregation.

Compaction shall be carried out at a Construction Moisture Content, at any point in the Lot within the range of 90% - 110% of the Optimum Moisture Content and with a uniform compactive effort applied longitudinally and transversely to the road alignment to achieve the width, shape, level and surface finish.

## **5.3 Acceptance**

### **5.3.1 Surface Shape**

The shape of the pavement shall be judged to be acceptable when the maximum deviation from a 3 metre straight edge placed in any position on the surface does not exceed 50mm.

### **5.3.2 Surface Finish**

Completed Pavement layers shall be in a homogeneous, uniformly bonded condition with no evidence of layering, cracking, disintegration or surface tearing. The finished surface should appear as a stone mosaic interlocked with fine material and shall be dense, even textured and tightly bonded.

## **5.4 Maintenance**

### **5.4.1 Maintenance of Compacted Layers**

The surface of any compacted pavement layer or prepared subgrade shall be maintained in such a way as to minimise dust, prevent ravelling, erosion, deformation or any other damage to the layer resulting from environmental conditions, traffic or construction activities. The layer shall be kept free from contamination until subsequent pavement work under is commenced.

Watering shall be continued as necessary to prevent, dusting or loosening of the surface.

## 6 Decommissioning of Bores

There are three monitoring bores within the footprint of Cells 5 and 6. These bores are to be decommissioned and backfilled in accordance with the Department of Water - Water Quality Protection Guidelines No. 4 Mining and Mineral Processing - Installation of Mine Site Groundwater Monitoring Bores 2000 Section 4.15. This document refers to “Bores should be decommissioned in accordance with the Agriculture and Resource Management Council of Australia and New Zealand’s Minimum Construction Requirements for Water Bores in Australia”, which requires the following:

Decommissioning shall be as follows:

- Pump bore dry (if not dry already);
- Attempt to pull bore casing if possible;
- Where casing removal is possible, insert bentonite pellets into well cavity progressively as casing is removed;
- Where casing removal is impossible, insert pellets into well cavity and cut bore to 1m below ground level;
- Saturate the bentonite pellets by filling the bore with fresh water until the bore cannot accept water; and
- Place and compact 300 mm soils over the bore while the bentonite hydrates.

The following details shall be recorded for each bore:

- Date/time;
- Bore ID;
- Bore depth;
- Bore volume;
- Volume of bentonite pellets used; and
- Volume of fresh water used to hydrate the bentonite pellets.

The backfilling of the bores is to be undertaken under the supervision of the CQA Engineer or Superintendent. This constitutes a **Hold Point**.

## **7 Fencing**

Fencing surrounds Cells 1, 2, 3, and 4. The Contractor must dismantle the necessary sections of the fence to carry out earthwork activities and stockpile for use in future works. Following completion of the earthworks, the Contractor must install temporary fencing along the interface of Cells 5 and 6 with Cells 1, 3 and 4.

# APPENDIX A

## Figures

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Figure 1: Site Locality

# APPENDIX B

## Drawings

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# APPENDIX C

## Bill of Quantities

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# **APPENDIX D**

## Construction Quality Assurance Plan

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Assets | Engineering | Environment | Noise | Spatial | Waste

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