

June 2011

**ENVIRONMENTAL MANAGEMENT STRATEGY (EMS)**

**LEACHATE COLLECTION CONVEYANCE AND MANAGEMENT SYSTEM**

**Former QUARRY SITE AT OLD WALLGROVE ROAD EASTERN CREEK**

**MATERIALS PROCESSING CENTRE (MPC)**

**WASTE TRANSFER FACILITY associated with an adjacent**

**PROPOSED SOLID WASTE LANDFILL**

**Document Control**

Reference Documents

For controlled copies of this EMS the copy number is shown below and initialled in Red by the Light Horse Business Centre and the The Quarry Unit Trust Project Manager.

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## LEACHATE MANAGEMENT SYSTEM

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### PROJECT APPROVAL CONDITIONS

*Condition 10 and 11 of Schedule 3 is as follows.*

### ACHIEVEMENT OF REQUIREMENTS

- 10 *Prior to the commencement of construction of the leachate management system (LMS), the Proponent must submit a report to the Director General for approval that is prepared in consultation with DECCW and Sydney Water, providing design details of the proposed leachate collection, conveyance, extraction, storage, treatment and disposal systems for all aspects of the proposal's operations (landfill and materials processing centre 1 resource recovery facility), including but not limited to:*
- (a) a construction quality assurance (CQA) plan for the collection, conveyance and storage measures of leachate including details of the leachate barrier system proposed for any surface areas used for the direct impoundment of leachate;*
  - (b) details of the proposed leachate pre-treatment system, including its capacity;*
  - (c) a programme for the installation and commissioning of the systems; and*
  - (d) details of the Proponent's proposed trade waste agreement with Sydney Water Corporation.*
- 11 *No waste may be received until the Proponent has constructed the proposed leachate collection system (LCS) and the leachate treatment plant and has secured a trade waste agreement with Sydney Water Corporation for the disposal of treated leachate."*

**Table A** provides a summary of the current compliance status and provides recommendations to achieve compliance and to improve the presentation of the Plan.



**Table A**

<b>CONSENT REQUIREMENTS</b>	<b>COMPLIANCE STATUS</b>
Submit a report to the Director-General for approval that is prepared in consultation with DECCW and Sydney Water.	Part Complies. Douglas Partners- report LMS Specification reviewed by DECCW and Sydney Water. This EMS is submitted to DECCW and Sydney Water concurrently with submission to DoP.
Details of the proposed leachate collection, conveyance, extraction, storage, treatment and disposal systems for all aspects of the proposal's operations (landfill and materials processing centre 1 resource recovery facility).	Complies.  Details in this EMS
A construction quality assurance (CQA) plan for the collection, conveyance and storage measures of leachate including details of the leachate barrier system proposed for any surface areas used for the direct impoundment of leachate.	Complies.  Douglas Partners- report LMS Specification reviewed by DECCW and Sydney Water and attached to this EMS in Appendix B.
Details of the proposed leachate pre-treatment system, including its capacity; a programme for the installation and commissioning of the systems; and details of the Proponent's proposed trade waste agreement with Sydney Water Corporation.	Complies.  Details in this EMS.
No waste may be received until the Proponent has constructed the proposed leachate collection system (LCS) and the leachate treatment plant and has secured a trade waste agreement with Sydney Water Corporation for the disposal of treated leachate."	Noted.

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## **SPECIFICATION FOR CONSTRUCTION AND INSTALLATION OF LEACHATE MANAGEMENT**

### **SYSTEM LIGHT HORSE BUSINESS CENTRE, EASTERN CREEK, NSW**

The Light Horse Business Centre (LHBC) proposes to operate a Resource Recovery / Materials Processing Centre and a solid waste landfill site at the former Pioneer Quarry located off Old Wallgrove Road at Eastern Creek ("the site"). The proposed site is located within a former breccia quarry immediately east of Archbold Road and South of the M4 Motorway, Eastern Creek within the Parish of Melville, County of Cumberland in the local government area of Blacktown.

This report presents specifications for the construction of the proposed leachate management system which has been indicated in a previous report (IGGC, 2009 and DP, 2010).

The specifications include the proposed leachate collection, conveyance, extraction, storage, treatment and disposal systems for the proposed landfill.

The report was commissioned by Alexandria Landfill Pty Ltd.

The report has been prepared with reference to the above planning conditions issued by the Department of Planning associated with their Major Project Assessment dated 22 November 2009:

The site layout is shown on Drawing 1, Appendix A.

### **THE SITE**

The operational areas are described as follows:

#### **Section A – Processing Area approximately 194,000m<sup>2</sup>:**

Area 1 – clean area, including the MPC shed, stockpiles, internal roads, workshop, office, weighbridge, and car parks.

Area 2 – leachate area, including greenwaste storage, greenwaste processing, and MPC work floor.

#### **Section B – Landfill Area approximately 280,000m<sup>2</sup>:**

Area 3 – clean operational area, capped with intermediate cover.

Area 4 – leachate area, including approximately 4,000m<sup>2</sup> of active landfill face.

### **LEACHATE WATER BALANCE**

The site water balance was calculated to include details of all water extracted, transferred, used and/or discharged by the development; identify the source of all water collected or

stored on the site; and describe the measures that would be implemented to minimise water use on site.

The leachate generated in Area 4 is anticipated to range between 45 and 872m<sup>3</sup> per day, with an average of 241m<sup>3</sup> per day.

The leachate generated in Area 2 is anticipated to range between 0 and 22m<sup>3</sup> per day.

In order to maintain groundwater elevations at acceptable levels within the landfill, pumping rates will be required to range between 250m<sup>3</sup> per day and 500m<sup>3</sup> per day.

### **GREENWASTE STORAGE AND GREENWASTE PROCESSING**

Leachate generation in areas of greenwaste stockpiles is expected to be minimal. Leachate which is generated in these areas will be captured within a concreted and bunded area. The concrete platform will slope to a sump, from which the leachate will be either recirculated or pumped to poly tanks. It is proposed that the leachate shall be reused within the bunded area in a re-circulating system to encourage organic degradation and to minimise dust.

All water in the greenwaste area will flow towards a sump, in which will be positioned an electronically operated submersible pump, operated automatically by float switch. At a predetermined sump level the pump will operate to recirculate the water to the stockpile at the farthest end of the system, or to one of two 50kL poly tank reservoirs.

Increases in leachate volume which cannot be usefully utilised or stored in the poly tank in will be treated for removal to the sewer. Excess leachate will be piped from the poly tank to the leachate sump at the base of the quarry, which is in turn pumped to the leachate treatment system. It is expected that this volume will be maximum of 10m<sup>3</sup> per day.

A drawing is attached in Appendix A1.

### **MPC WORK FLOOR**

Leachate will be generated in this area from the use of water for dust suppression. Leachate is contained by grated concrete pits at the entries and exits of the building. There is a sump in the floor of the MPC building, from where the leachate is piped to the leachate sump at the base of the quarry, and is in turn pumped to the leachate treatment system. It is expected that this volume will be a maximum of 0.5m<sup>3</sup> per day.

### **SCOPE OF WORK**

The scope of work to be completed under the Contract for construction of the basal drainage layer and Leachate Management System (LMS) infrastructure generally includes :

- earthworks to form the landfill sub-grade,
- installation of the basal HDPE liner,
- drainage layer pipe work,
- drainage aggregate, geosynthetic materials, and leachate sump, together with the leachate riser,

Specifically, the Contractor must:

- Supply and erect project signboards and secure and protect the site during works to the satisfaction of the Superintendent and relevant authorities;
- Do the setting out necessary to perform the work including all associated survey work.
- Drawings of the existing and required sub-grade surface grades are provided herein and shall be used by the Contractor to accurately set-out and construct the sub-grade surface;
- Installation and maintenance during construction of erosion and sedimentation control measures;
- Excavate soil / rock necessary to develop the finished surfaces;
- Undertake filling, compaction and grading of the basal level to establish the finished surfaces at the required minimum grades
- Supply and install geosynthetic (geofabric) materials
- Supply and install geomembrane (HDPE liner) materials
- Supply "as-constructed drawings" in both digital and hardcopy format for respective components of the leachate management system.

#### **CONSTRUCTION PROGRAMME**

This Specification contains the requirements for materials and procedures to be implemented during the construction of the LHBC leachate management system.

A preliminary Construction Programme is shown at Appendix C.

All work under the Contract shall comply with the most current applicable Australian Standard in effect at the time of construction in addition to this Specification.

In order to provide an accurate programme the Contractor will review Construction Programme.

The Construction Programme shall satisfy the instructions provided in, the tender instructions and requirements provided in this Specification.

The Superintendent may amend the Construction Programme at any time.

The Construction Programme shall include the Contractor's proposed sequence of work. The Construction Programme must be continually evaluated against the progress of the works.

The Contractor shall assist with all relevant information in keeping the Construction Programme up to date and the Programme must be approved by the Superintendent prior to undertaking the Works.

## **LIST OF DRAWINGS**

The Drawings listed below identify the work detailed in this Specification, and shall be used for construction of the leachate management system.

The drawings are presented in Appendix A.

- 1 Proposed Site Layout
- 2 Basal Leachate Drainage Layer
- 3 Typical Details for Basal Leachate Drainage Layer
- 4 Cross Section (Current)
- 5 Cross Section Base forming Work (Stage 1)

## **NUISANCE**

The Contractor shall take all necessary precautions to minimise noise, dust, mud, vibration and any other nuisance. Agreement shall be reached with appropriate authorities with respect to roads that may be used for importing materials and removing spoil.

Wheels of vehicles shall be cleaned as necessary to ensure against spoiling of local roads.

The Contractor shall so organise and conduct his work as to minimise inconvenience to residents near the site of the works by the control of noise, vibration, dust, mud and any other nuisance or emissions. Plant shall be fitted with effective silencing equipment.

## **OCCUPATIONAL HEALTH & SAFETY**

The attention of the Contractor is drawn to the Occupational Health and Safety Act 2000, which require that employers ensure the health, safety and welfare of their employees.

The Contractor shall prepare an Occupational Health and Safety Plan in accordance with the Occupational Health and Safety Act 2000 for all work to be undertaken on the site.

## **CONSTRUCTION QUALITY ASSURANCE & TESTING PROGRAMME**

The work is to be documented and be compiled into a report for approval by a suitably qualified Engineering Consultant and/or certified (e.g. C.P. Eng.) professional engineer with the Institution of Engineers Australia. A Construction Quality Assurance and Testing Programme (CQATP) including Inspection Test Plans (ITPs) has been developed in conjunction with this report and appended for the Contractor's reference. The Plan will be submitted by the Contractor for review by the Superintendent before work commences.

The CQATP is presented in Appendix B.

The Contractors must comply with the Construction Environment management Plan approved by the NSW Department of Planning and all of the conditions of the Environment Protection Licence for the works.

## DEWATERING

Dewatering will be required in order to construct the basal LCS.

The Contractor must take measures approved by the Superintendent for dewatering the quarry pit.

The Contractor must make due allowance, adopt suitable techniques and employ staging methods for construction of works in areas affected by the presence of groundwater ingress.

It will be the responsibility of the Contractor to manage any dewatering required during HDPE liner installation (e.g. construction and operation of a sub- liner dewatering system).

Similarly it will be the responsibility of the Site Manager to continue any dewatering required following installation of the liner to maintain the integrity of the liner and basal drainage layer.

Design of any drainage system to facilitate dewatering under the liner proposed by the Contractor or Site Manager must be approved by the Engineer prior to construction.

## EARTHWORKS PREPARATORY PLANNING

Prior to commencement of earthworks, a licensed surveyor will survey the base of the quarry.

The survey will confirm whether sufficient grades to the lines indicated on the Drawings (i.e. exhibit a transverse gradient of **>4%** and a longitudinal gradient of **>2%**) are present.

If the survey indicates further earthworks are required to meet the specified grades then such work will be undertaken by the Contractor as necessary.

Suitable clay material sourced on site may be utilised to form the requisite grade and as a sub base for the placement of the HDPE barrier.

No stones or other objects that will not pass through an 8 mm screen will be present in the top 40 mm of the surface to be covered (visual inspection).

The surface should form a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or breaks in grade. No excessive build up of water is to be present at the pond walls or base prior to placement of the liner.

## LEACHATE COLLECTION SYSTEM – GENERAL DESCRIPTION OF FUNCTION

- Leachate in this system will make its way through gravity flow along a piping system towards a sump located in the lower part of the basal layer.
- The LMS proposed comprises a main leachate drain with feeder drains of polyethylene (PE) construction. The system drains into a sump and will be accessed by a PE riser pipe (Drawings 2 and 3).Appendix A
- Leachate is collected in the sump and will be pumped out of the landfill via a sump-pump and first into a series of concrete or poly tanks for pre-treatment.

- Leachate will be pumped from the sumps using a submersible pump to holding tanks located at the eastern edge of the landfill as shown on Drawing 1, Appendix A.
- This area has been chosen for leachate treatment due to the proximity of an electricity supply and the location of the sewer connection.
- In the event that Sydney Water Corporation Trade Waste requirements (pending) require the concentration of ammonia in leachate discharged to sewer to be ~50mg/L, then leachate will undergo pre-treatment to reduce ammonia concentrations prior to discharge
- Appropriate final filtering will be implemented to achieve any reduction in suspended solids as may be required by Sydney Water STP.

#### **LEACHATE COLLECTION SYSTEM (LCS) – GENERAL DESCRIPTION OF STRUCTURE**

The general construction of the LCS will include installation of a network of 160 mm diameter polyethylene (PE) piping, installation of non-woven geotextile, placement of the leachate drainage (aggregate) layer, installation of leachate sump, leachate riser, leachate pumps, and placement of leachate storage tanks and treatment and disposal systems all in accordance with the Drawings, these Specifications, and material/equipment Manufacturer's recommendations.

The LCS will,

- Require the carrying out of preparatory earthworks to the base of the pit by a suitably qualified contractor.
- Require the placement of a base layer of geofabric.
- Place the HDPE liner.
- Placement of perforated polyethylene drainage pipes based in a drainage layer comprising a 300 mm thick layer of suitable aggregate, (a network of perforated and solid PE pipes located within the 300 mm thick layer of aggregate installed over the base of the landfill).
- Cover the drainage layer with further geofabric.
- The leachate will drain by gravity to a sump from which it will be pumped to Leachate storage tanks located as shown on the Drawing 1.
- Treated leachate will then be pumped to the sewer discharge point.

#### **GEOTEXTILES**

Geotextiles are provided as protection layers for the basal HDPE liner and as a separation layer between the leachate collection system drainage (gravel) layers and wastes.

Non-woven geotextile materials shall be new, mildew, insect and rodent resistant, and needle free. Geotextiles shall be suitable and durable for the intended application as satisfactorily demonstrated by similar and prior applications. Geotextiles shall be 100-percent polyester or polypropylene (with the exception of inhibitors and/or carbon black added for UV resistance), non-woven and needle-punched materials.

Three types of geotextile are required.

- The basal geotextile layer shall comprise a non-woven geotextile with a mass of -350 g/m<sup>2</sup>.

- The HDPE liner protection geotextile layer shall comprise a non-woven geotextile with a mass of -1000 g/m<sup>2</sup>.
- The upper (separation) layer shall consist of a higher permeability non-woven geotextile with a mass greater of -270 g/m<sup>2</sup>. The higher permeability -270 g/m<sup>2</sup> is better suited for a separation layer to allow infiltrating leachate flow into the drainage layer.

All geotextile materials shall comply with the requirements of AS 3706 -Geotextiles.



## GRAVEL OR AGGREGATE LEACHATE DRAINAGE LAYER

EPA (1996) stipulates acceptable design as: over the liner a drainage layer should be installed of a thickness of greater than 300 mm. The drainage material should exhibit a coefficient of permeability  $K > 1 \times \text{mls}$ . The drainage media should be selected to have sufficiently large pore space to prevent encrustation.

Gravel or a combination of gravel and a geonet may be used.

To comply with the BT the gravel selected should be:

- Rounded
- Of grain size greater than 20 mm;
- Smooth-surfaced
- Non-reactive in mildly acidic conditions
- Relatively uniform in grain size; and
- Free of carbonates that could form encrustations around the collector pipes.

Obtaining a sufficient quantity of rounded river gravel (RRG) for large-scale projects in metropolitan Sydney can be difficult given limited supply and slow production of known RRG extraction sites.

For this project an alternative 40 mm basalt (crushed stone) aggregate is proposed.

The strength of basalt aggregates is broadly comparable to Emu Plains RRG based on analysis to AS1 141.22 previously completed by DP on similar projects.

Particle size distribution tests shall be undertaken for the aggregate to demonstrate that not greater than 10% is smaller than 40 mm in size and that not greater than 3% is smaller than 0.075 mm in size.

The Contractor shall submit, to the Superintendent for approval, certified NATA test results of sieve analysis, wet dry strength and hydraulic conductivity, together with a sample of the proposed material prior to delivery of the material to the site.

The Contractor shall also provide the Superintendent with written certification from the gravel supplier that all gravel material provided for the LCS meets the requirements of this Specification. The Specification for the drainage aggregate is presented in Table 3 below.

**Table 3 - Specification for Leachate Drainage Aggregate Grading**

Title	AS
Methods for sampling and testing aggregates - Particle size distribution by sieving 53.0 mm – 90-100% passing 37.5 mm- <10 0.075 mm<3	AS 1141.11
Methods for sampling and testing	AS1141.22
Wet/ Dry Strength aggregates – Wet/dry strength variation Dry Strength (kN) >230 Wet Strength (kN) >180 Variation (%)<35	
Constant Head Permeability Methods of testing soils for engineering Broadly in line purposes - Soil strength and consolidation with AS 1289.6.7.1 tests – Determination of permeability of a soil >1x10 <sup>-3</sup> m/s	AS1289.6.7.1

The drainage aggregate layer shall be 300mm thick placed in a manner that avoids damage to the leachate collection pipes. The aggregate is to be mounded around the leachate riser at least 100cm above the top perforations on the leachate riser as shown on Drawing 3, Appendix A.

The gravel basal drainage layer shall be encapsulated by two geotextiles and shall also serve as bedding material for the leachate collection pipes.

The HDPE liner protection geotextile will serve to protect the HDPE liner from the angular drainage aggregate. The upper (separation) geotextile will help to minimise the potential for fines from the waste to clog the drainage layer.

The HDPE liner protection geotextile shall consist of a non-woven geotextile with a mass of - 1000 g/m<sup>2</sup>. The upper (separation) layer shall consist of a higher permeability non-woven geotextile with a mass of -270 g/m<sup>2</sup>.

The initial waste placed directly over the upper (separation) layer must be placed in a manner that ensures plant does not drive over it. No heavy compaction equipment (e.g. sheepsfoot roller) should be used until an initial 1500 mm of waste has been placed in order to minimise the generation of fines which may clog the geotextile and drainage layer.

#### **LEACHATE BARRIER**

EPA *Environmental Guidelines: Solid Waste Landfills* (1996) requires that a landfill site should have natural or synthetic barriers to protect environmental quality and be situated where there will be no adverse impact on existing and future development.

Benchmark technique No. 1 (BT1) in EPA *Environmental Guidelines: Solid Waste Landfills* (1996) requires a re-compacted clay or modified soil liner at least 900 mm thick with an in-

situ co-efficient of permeability less than  $10^{-9}$  m/s and where a possible threat to groundwater may exist a flexible membrane liner (FML) with a minimum co-efficient of permeability of  $10^{-4}$  m/s should be used.

The surface of the natural barrier must be formed to exhibit a transverse gradient of **>4%** and a longitudinal gradient of **>2%**.

#### **BASAL LEACHATE LINER**

The basal leachate liner must be installed on the prepared subgrade.

The liner will comprise a fully welded 1.5 mm thick smooth sided HDPE liner exhibiting a manufacturer specified minimum co-efficient permeability of  $1 \times 10^{-14}$  m/s.

The liner shall be encapsulated by two geotextiles.

The basal geotextile layer shall comprise a non-woven geotextile with a mass of  $\sim 350$  g/m<sup>2</sup>.  
The HDPE liner protection geotextile layer shall comprise a non-woven geotextile with a mass of  $\sim 1000$  g/m<sup>2</sup>.

The Engineer, following inspection of the prepared subgrade, will review the need for the basal geotextile layer.

The basal leachate liner will be installed across the base of the proposed landfill area as shown on Drawings 2 and 5. Appendix A.

#### **CONSTRUCTION QUALITY CONTROL**

Installation of the basin HDPE liner must be in accordance with an Installation Quality Assurance Manual.

The Manual must include directions for panel placement, trial welds, field seaming /welding, field destructive testing, non-destructive testing, defects and repairs, repair procedures, as-constructed drawing preparation and preparation of associated Quality Control (QC) testing /installation documentation.

Quality Control (QC) testing is the sole responsibility of the HDPE liner installation contractor and shall consist of appropriate certification and quality control testing in accordance with the Manual to ensure that all works comply with these Specifications and relevant standards. The QC must be signed-off by the Site Manager noting that it does not fall under the Contract for construction of the basal LMS.

Acceptance and approval of the geomembrane is a phased process based on quality control testing, which includes the Manufacturer's and Contractor's quality control programme including shipping, handling, storage, installation and field testing. Certification and quality control testing results shall be received, reviewed, and approved by the Site Manager prior to use of these materials.

## LEACHATE COLLECTION PIPES FOR DRAINAGE BASAL LAYER - SPECIFICATION

EPA (1996) BT2 stipulates that perforated collector pipes should **be** placed within the drainage layer at intervals of not more than 50 m to facilitate the collection and discharge of leachate.

These pipes should generally:

- Be a minimum 150mm in diameter;
- Be strong enough not to collapse under the weight of the waste;
- Have a minimum longitudinal gradient of 1%; and
- Be capable of being rinsed and monitored.
- Based on the upper estimate of leachate generation modelled by ERM, pipe sizing of 160 mm diameter at 25 m spacings should be adequate to convey the expected volumes to the sump.

The polyethylene pipe and any fittings used shall comply with the requirements of relevant Australian Standards, including:

- AS 4130 Polyethylene (PE) Pipes for Pressure Applications
- AS 4129 Fittings for Polyethylene (PE) Pipes for Pressure Applications
- AS 4131 Polyethylene (PE) Compounds for Pressure Pipes and Fittings
- AS 1463 Polyethylene Pipe Extrusion Compounds
- AS 2033 Installation of Polyethylene Pipe Systems
- AS 2698.2 Plastic Pipes and Fittings for Irrigation and Rural Applications – Polyethylene Rural Pipes

Collection pipes shall be placed i above the surface of the basal geotextile and surrounded by coarse free draining aggregate (refer to Drawing 3, Appendix A).

The leachate collector pipes shall be DN160 PN20 PE100 pipes. The pipes are to be perforated allow inflow of leachate.

Pipe perforations shall comprise 12 mm diameter holes. The hole locations should be alternated in pairs at 150 mm intervals along the pipe.

Each alternate pair of holes should be located at 45 and 225 degrees to the vertical axis (pair 1) and 135 and 315 degrees to the vertical axis (pair 2).

Pipe spacing within the cell is ~ 2m5 on both the 2 % gradient (i.e. less than the specified 50 m in the benchmark technique and consistent with ERM recommendation).

The collection pipes forming the basal drainage layer will not allow maintenance flushing (rinsing 1 monitoring) given that the basal layer will be abandoned at some stage.

The layout of leachate collector pipes for the basal drainage layer is shown in Drawing 2, Appendix A.

Pipes joining the central collector pipe are to be placed at 45' angles and must be butt-welded using suitable junctions. Electrofusion welding of the collection pipes is also acceptable if preferred by the Contractor.

## **POLYETHYLENE PIPE PLACEMENT**

Polyethylene pipe will be used in the basal drainage layer.  
Storage areas for the pipe prior to installation should be smooth and level.

For ease of handling and to avoid damage, pipe packs should be placed on timber bearers at approximately 2 meter centres that match the frame spacing of the packs (or in accordance with the Manufacturer's storage recommendations). The contractor should ensure that any long term stacking heights of straight pipes does not result in damage or bending of the pipes.

If this occurs prior to placement, damaged pipes shall be rejected and that this is certified during placement by an ITP record. Metal hooks, chains or slings must not be used without padding for lifting of packs.

Webbed fabric slings are the preferred option. Because of the flexibility of packs of smaller diameter pipe in 12 meter or greater length, two lifting points or spreader bars between slings should be used to reduce drooping. If this is not done packs may be difficult to lift cleanly off the ground causing scuffed pipe ends.

## **LEACHATE SUMP**

The basal LCS will include a leachate sump located at the lowest elevation of the base (i.e. the eastern side of the landfill), so as to collect leachate in preparation for removal.

A 200 mm thick concrete pad will be poured at the base of the sump on which the leachate riser will be placed and supported. The leachate sump will be 0.5 m x 0.5 m and 0.5 m deep.

Concrete used for the sump shall be sulphate resistant (SR) 50 MPa with a minimum of 40 mm cover before reinforcement on the surface exposed to leachate. The concrete sump shall be constructed in accordance with AS 3600.

## **LEACHATE RISER**

The polyethylene pipe and any fittings used shall comply with the requirements of relevant

Australian Standards, including:

- AS 4130 Polyethylene (PE) Pipes for Pressure Applications
- AS 4129 Fittings for Polyethylene (PE) Pipes for Pressure Applications
- AS 4131 Polyethylene (PE) Compounds for Pressure Pipes and Fittings
- AS 1463 Polyethylene Pipe Extrusion Compounds
- AS 2033 Installation of Polyethylene Pipe Systems
- AS 2698.2 Plastic Pipes and Fittings for Irrigation and Rural Applications – Polyethylene Rural Pipes

The sump will contain a 500 mm diameter vertical riser and housing for leachate extraction pumps.

The riser from the basal sump shall be DN500 PN20 PE100 pipe and the riser from successive drainage layers shall be DN500 PN6.3 PE100 pipe.

The lower 1.0m of each riser will be perforated with 25 mm diameter holes to allow the inflow of leachate into the riser.

Aggregate used for the drainage layer will be placed to a minimum of 100mm above the perforated section.

The 25 mm diameter hole locations should be alternated in pairs at 50 mm intervals along the pipe. Each pair of holes should be located at 0 and 180 degrees to the vertical axis (pair 1) 6,0 and 240 degrees to the vertical axis (pair 2) and 120 and 300 degrees to the vertical axis (pair 3).

Each riser must be anchored (bolted) to the respective concrete sump using an appropriate stainless steel collar. Each riser will be built up successively and a suitable socket must be used to electrofusion-weld each successive riser pipe section.

Under the Construction Quality Assurance and Testing Programme (CQATP) a constant falling head test must be performed on the perforated riser to ensure water loss of >6 L per second.

Perforations will need to be increased vertically along the riser if the test indicates water loss of <6 L per second until the result of >6 L per second is achieved.

The mounded aggregate would need to be adjusted accordingly to 100 cm above the perforated section (refer to Section 8.3).

#### **LEACHATE PUMPS**

A leachate water balance was prepared by ERM. The water balance In order to maintain groundwater elevations at acceptable levels within the landfill pumping rates from the landfill will be required to range between 250 m3 per day and 500 m3 per day (ERM, 2008).

A submersible leachate pump (pneumatic or electric) will be installed at the base of the riser. The pump must be capable of pumping at the maximum rate predicted in the water balance and over the necessary head (i.e. 10 m based on the proposed depth of successive risers).

Pumping rates from the landfill will be required to range between 250 m3 per day and 500 m3 per day in order to maintain groundwater elevations at acceptable levels within the landfill (ERM).

On this basis, the leachate pump should be capable of a pumping rate of a minimum of 6 L per second.

Leachate pumped to the top of the riser will then be pumped to the leachate storage tanks located at natural ground level. This could be achieved by using one large pump at the quarry base capable of pumping the necessary head or by using a series of pumps located at different levels on the quarry access road to the discretion of the Site Manager.

Hoses from the riser will be suspended overhead by a series of galvanised steel support frames capable of being moved to accommodate the sequencing of filling and the location of the active tipping face.

The Pump which it is proposed to use is the electrically operated Grundfos Pump the specifications of which are shown at Appendix D

Pumps have a power rating of 45 kw [see recommended Pump Grundfos SP60-22.]

200mm PE100 Poly PN 25 which will be required for approximately 50% of the pipe within the quarry with the balance being Pn12.5 and pipe outside of Quarry to be PN10. There will be significant increase in flow rate& efficiency by changing classes.

The head loss on 200mm for a flow rate of 15lps (54,000 lph) is only 0.55 metres per 100m = 3m total . Velocity is only 1m/sec for PN25 and less for the other classes.

Supports similar to those on the existing 8" Steel are proposed for the Poly pipe with a Stainless Steel Safety Rope attached.

The starters and control wiring are to be located at the top of the Quarry with a "portable" termination Box located at the bottom.

#### **LEACHATE TREATMENT SYSTEM**

Leachate treatment will be via sequencing batch reactors (SBR) or sequential batch reactors.

SBRs are industrial processing tanks for the treatment of waste water. Tanks to be placed at the site will be a minimum of five 110 kL tanks each with decanting capacity of approximately 80 kL in a period of 7-9 hours. The treatment system will therefore be able to process approximately 500kL in a 7-9 hour period, decanting approximately 400kL.

The location of the treatment tanks and sewer discharge alignment is shown on Drawing 1, Appendix A.

#### **CLEAN WATER COLLECTION BASIN IN THE LANDFILL**

The primary aim of a collection basin within the quarry landfill void is to assist in controlling the volume of stormwater runoff that comes into contact with waste or the active landfill area (hence minimising leachate generation).

The use of clay and or crushed shale bunding and inclusion of a leachate trench to separate leachate from stormwater from capped areas within the landfill is shall be constructed to minimise surface water flows into active landfill areas.

It will be the responsibility of the Site Manager to oversee construction and ongoing changes

Forward planning for the location and size of the basin is important for effective runoff and sediment control.

Its location should be determined at the development of each landfill lift, taking into account that a sealed basin area is necessary to prevent infiltration, and that excavation through capping and back into landfilled materials would need to be re-capped.

Initial shaping or grading of capped covered areas shall occur at a minimum grade of 2% to allow for a suitable placement for the basin to create a catchment with a low point designed into the intermediate capped areas, to drain away from the active tip face 1 daily cover areas.

The maximum total basin volume is approximately 4,362.5 m<sup>3</sup> which equates to 165 m<sup>3</sup> per hectare of catchment area, which may include quarry walls that drain into the pit (Storm, 2008).

A series of basins may be installed to capture flows from sub-catchments of the quarry depending on available space within the quarry as determined by the Site Manager based on the sequencing of landfilling. The sub-basins must need to meet minimum storage requirements of 165 m<sup>3</sup>/ha of catchment draining to each basin.

Based on the basin sizing assumptions used by Storm (2008), drawdown of water within the basin must occur within five days of a storm event occurring, to follow the basin design requirements and also to minimise the time that water is stored at the landfill area. Therefore, suitable pumps must be used to drain the basins following a storm event.

The basin may be HDPE lined or clay lined depending on, among other things, the availability of suitable clay.

#### **HDPE LINED BASIN CONSTRUCTION**

The clean water basin lining system is shown on Drawing 8, Appendix A

A 1.5 mm thick HDPE liner textured on both sides exhibiting a manufacturer specified minimum co-efficient permeability of  $1 \times 10^{-14}$  mls. is to be installed over the base and side walls of the basin. The liners shall be securely fixed to the batter face as shown on Drawing 8. The anchor systems are comprised of anchor trenches constructed as shown on the Drawing 8. Any deviation from the Drawings must be pre-approved by the Engineer.

The liner is to be installed in accordance with the manufacturer's specifications and installation manual.

The surface to be lined must be smooth and free of rocks, stones, sticks, roots, foreign materials, sharp objects, or debris of any kind.

#### **LEACHATE TREATMENT TANKS**

- Complete and make good the existing Concrete cast tanks located at the Eastern lip of the Quarry. Ensure they are waterproof.
- Test and certify each tank for water holding.



- Procure and install telemetry controlled multivalve to ensure sequential filling of tanks from in pipe from leachate Pump { at base of Pit]
- Plumb pipes in parallel so that they sequentially fill, sparge settle and discharge
- Ensure each Tank is fitted with 4 Stormix aeration pumps and float valves to control commencement and cessation of filling.
- Procure & install discharge pump
- Connect outlet from all Tanks to a discharge pump discharging at aprox 7 L per second .
- Install and connect Poly line to sewer outlet with approved flow meter.

### **SEWER CONNECTION & TRADE WASTE AGREEMENT**

A Sydney Water sewer outlet is located on land immediately adjacent to Lot 4 DP 1145808 and the proponent has previously received Major Works Approval from Sydney Water to construct a rising main into which leachate may be discharged pursuant to a Trade Waste agreement.

A sample form of a Trade Waste agreement which the Proponent has with Sydney Water at another landfill site in Sydney is Appendix E and confirmation of the availability of a Trade Waste Agreement is Appendix F.

The Sydney Water liaison officer is John Bean.

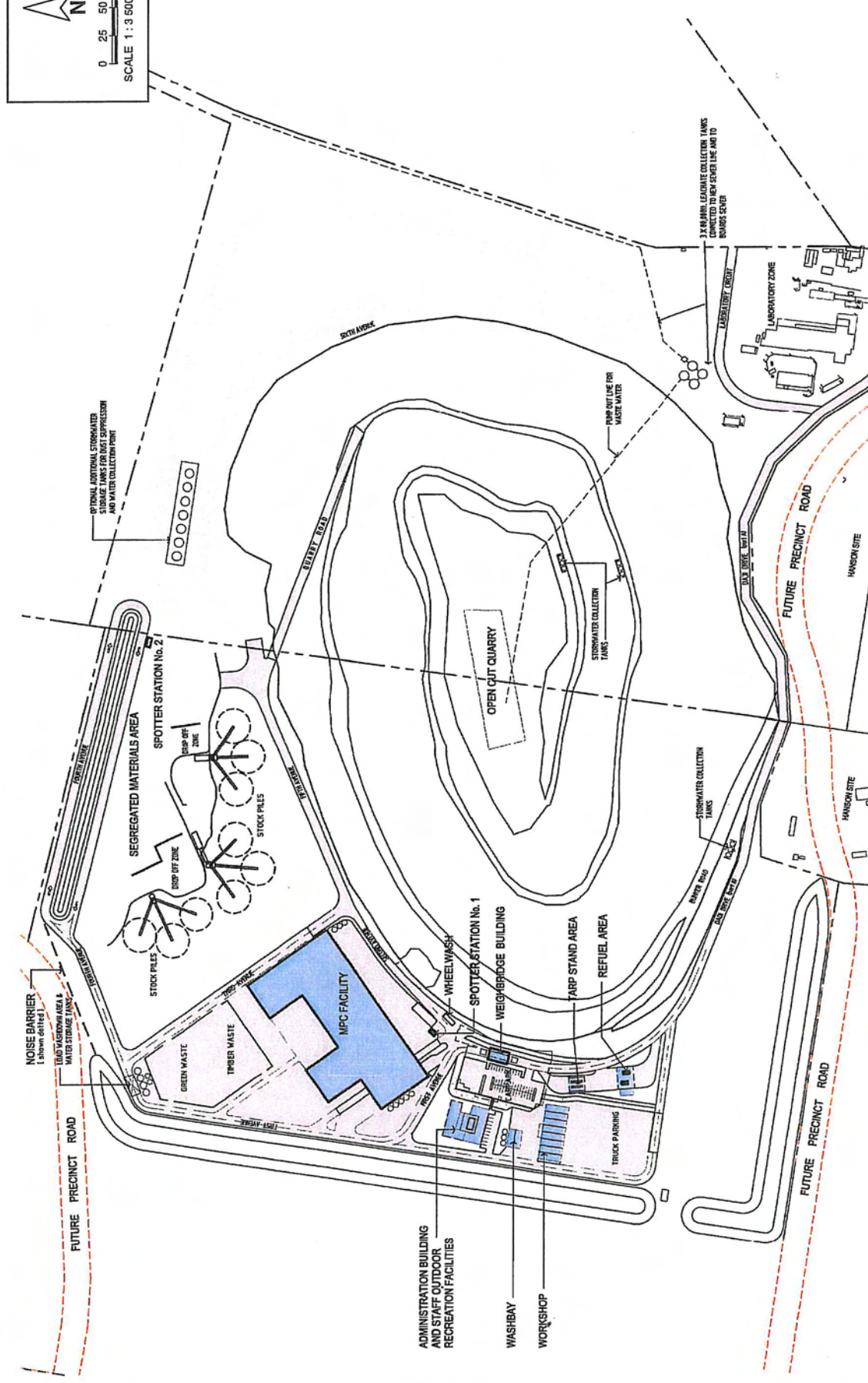
A contractual agreement has been reached between Sumy Pty Ltd and the Proponent for the joint funding of the sewer infrastructure and the granting of relevant easements.

Australand Pty Ltd has lodged with Sydney Water an amended and upgraded plan for a Major works Construction of a sewer to be on the Proponent's land to service Sumy Pty Ltd and the Proponent. The proposed location of this upgraded sewer is shown on the plan at Appendix G.

At this time, the proponent is considering a discharge of between 6L per second and 10L per second. The proponent is anticipating that its maximum daily discharge to sewer will be 620kL per day. These figures will be determined with further liaison between the proponent and Sydney Water during the process of obtaining consent to discharge tradewaste water to the sewer.

Discussions with Sydney Water, and modelling of the discharge capacity of the sewer has indicated that the sewer is able to support a maximum discharge of 68L per second. The capacity exceeds our anticipated maximum of 10L per second. The upgrade referred to in Appendix G will further increase the discharge capacity, since the size of the pipes will be larger.

## **Appendix A**



Newcastle, Perth, Sydney  
Sunshine Coast, Townsville,  
Wollongong, Wyoona

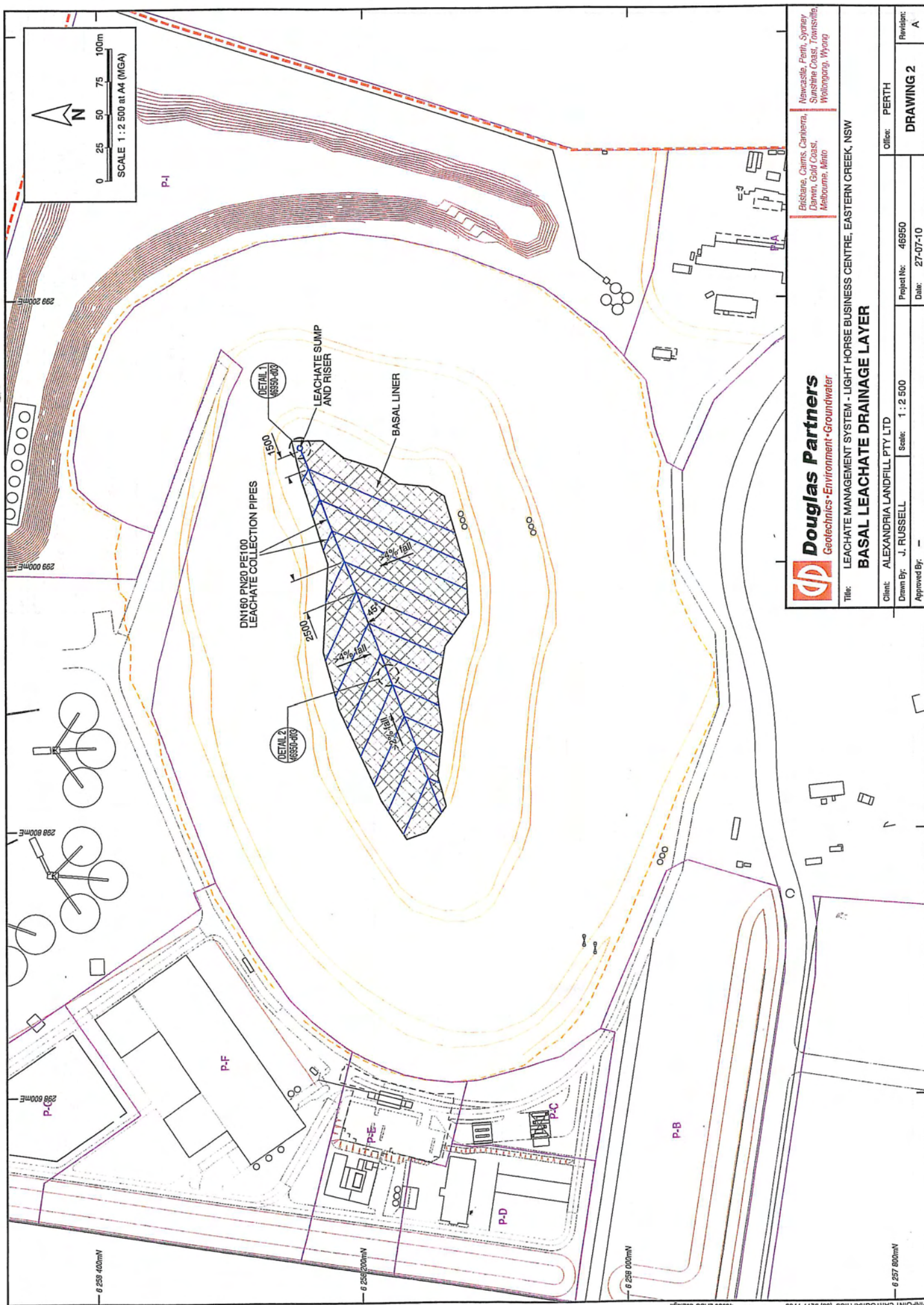
Title: LEACHATE MANAGEMENT SYSTEM - LIGHT HORSE BUSINESS CENTRE, EASTERN CREEK, NSW

## PROPOSED SITE LAYOUT

Client: ALEXANDRIA LANDFILL PTY LTD			Office: PERTH
Drawn By: J. RUSSELL	Scale: 1 : 3 500	Project No: 46950	DRAWING 1
Approved By: -		Date: 27-07-10	
			Revision: A / 1

SOURCE: Axis Architectural, Dwg No. 090507/DI-EP-MP A101 Rev E, June 2009.



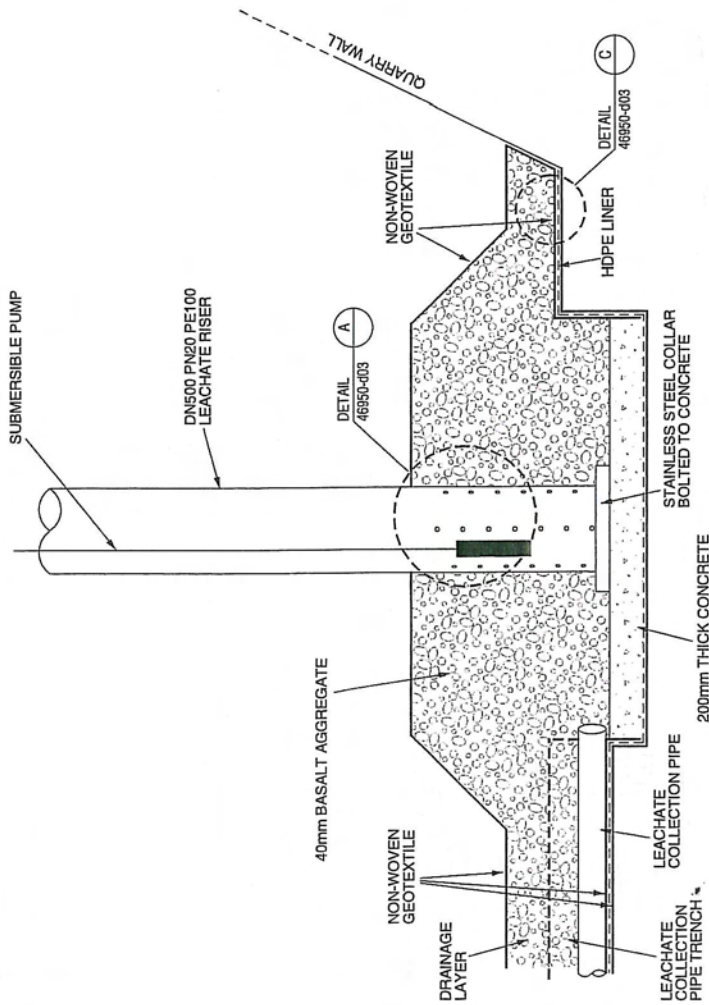


Brisbane, Cairns, Canberra,  
Darwin, Gold Coast,  
Melbourne, Minto  
Newcastle, Perth, Sydney,  
Sunshine Coast, Townsville,  
Wollongong, Wyrong

Title: LEACHATE MANAGEMENT SYSTEM - LIGHT HORSE BUSINESS CENTRE, EASTERN CREEK, NSW

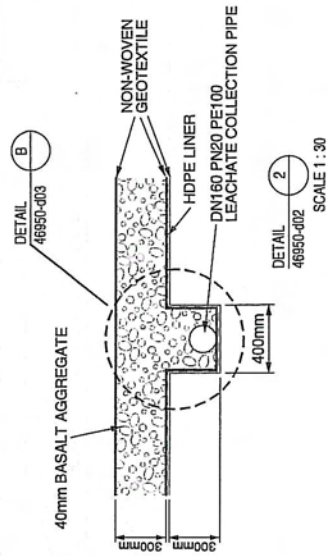
### BASAL LEACHATE DRAINAGE LAYER

Client: ALEXANDRIA LANDFILL PTY LTD	Office: PERTH	Revision: A
Drawn By: J. RUSSELL	Project No: 46950	Drawing 2
Scale: 1 : 2 500	Date: 27-07-10	
Approved By: -		



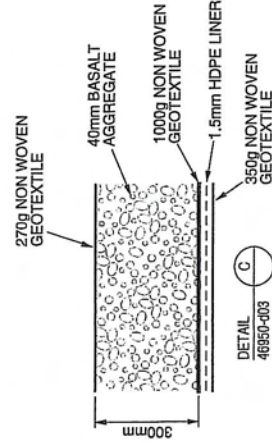
DETAIL 46950-002  
SCALE 1 : 30

### LEACHATE SUMP AND RISER



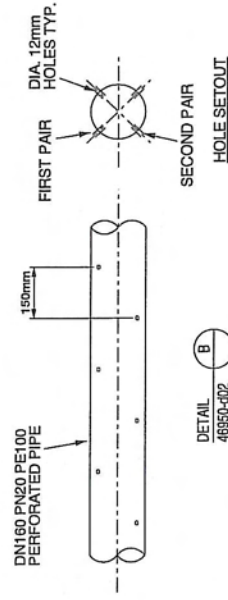
### LEACHATE COLLECTION PIPE

DETAIL 46950-002  
SCALE 1 : 30



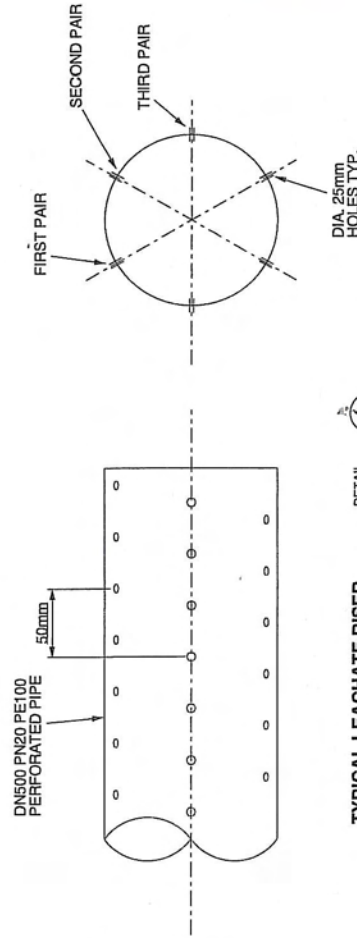
### BASALT LINER

DETAIL 46950-003  
SCALE 1 : 15



DETAIL 46950-002  
SCALE 1 : 15

### TYPICAL LEACHATE COLLECTION PIPE PERFORATION DETAIL



DETAIL 46950-002  
SCALE 1 : 15

### TYPICAL LEACHATE RISER PIPE PERFORATION DETAIL



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### TYPICAL DETAILS FOR BASAL LEACHATE DRAINAGE LAYER

Client: ALEXANDRIA LANDFILL PTY LTD

Drawn By: J. RUSSELL

Scale: AS SHOWN

Project No: 46950

Date: 27-07-10

Office: PERTH

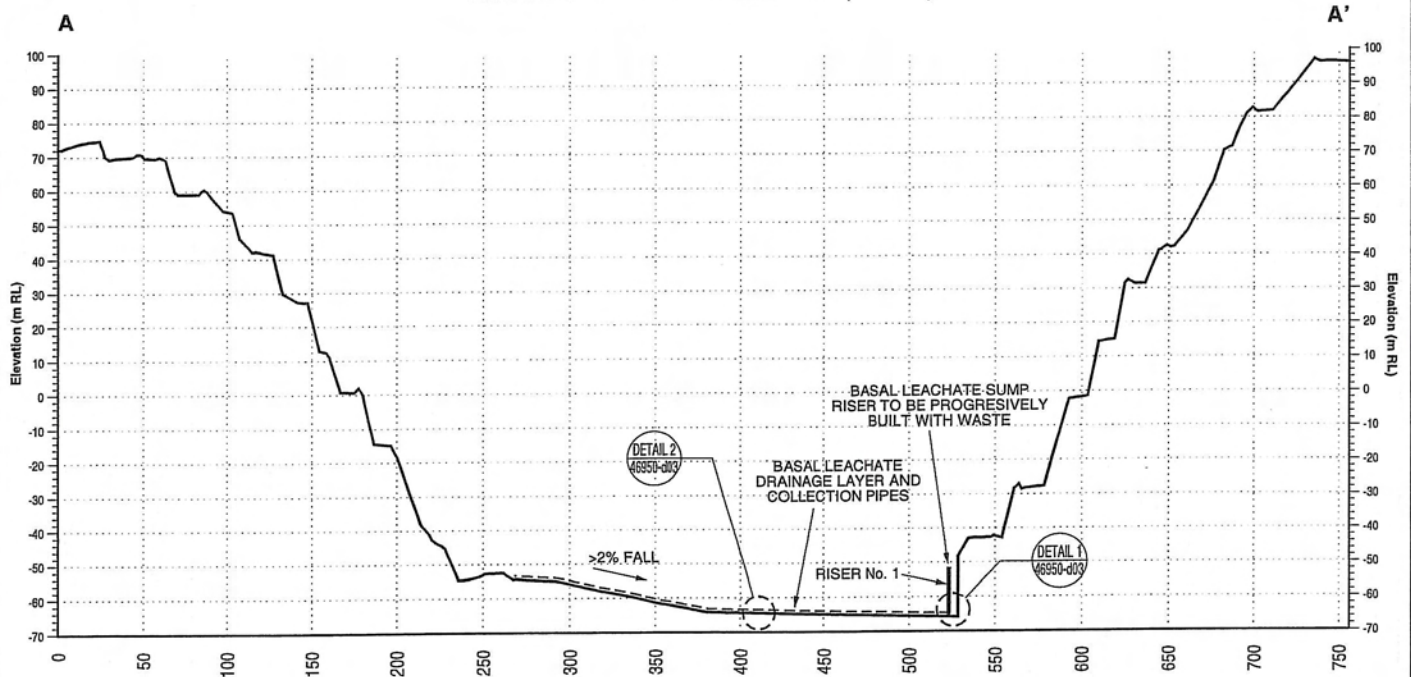
### DRAWING 3

Revision: A

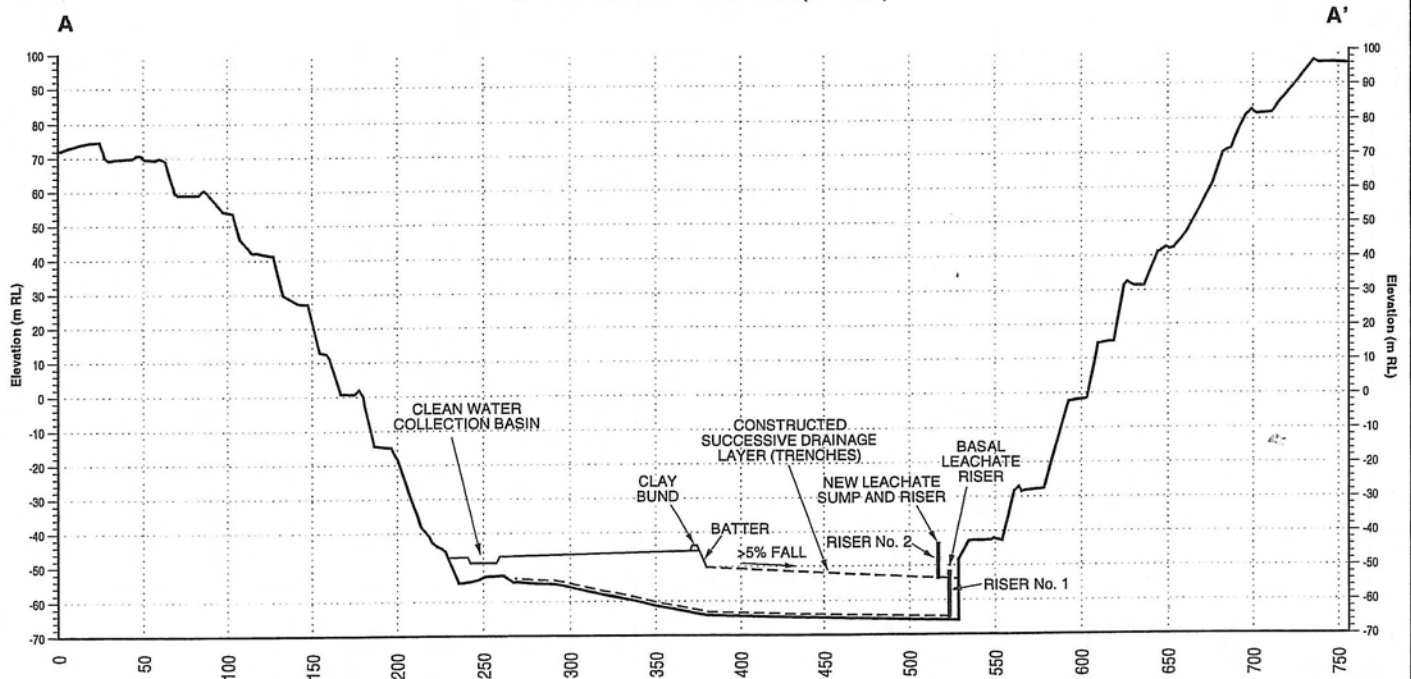




## CROSS SECTION - BASE FORMING WORK (STAGE 1)



## SUCCESSIVE DRAINAGE LAYER (STAGE 2)



0 20 40 60 80 100m  
 HORIZONTAL SCALE 1 : 3 000 at A3  
 VERTICAL SCALE 1 : 1 500 at A3  
 (2x Vertical Exaggeration)



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**LANDFILL SEQUENCE CROSS SECTIONS**

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Office: PERTH

Drawn By: J. RUSSELL

Scale: 1 : 3 000

Project No: 46950

**DRAWING 5**

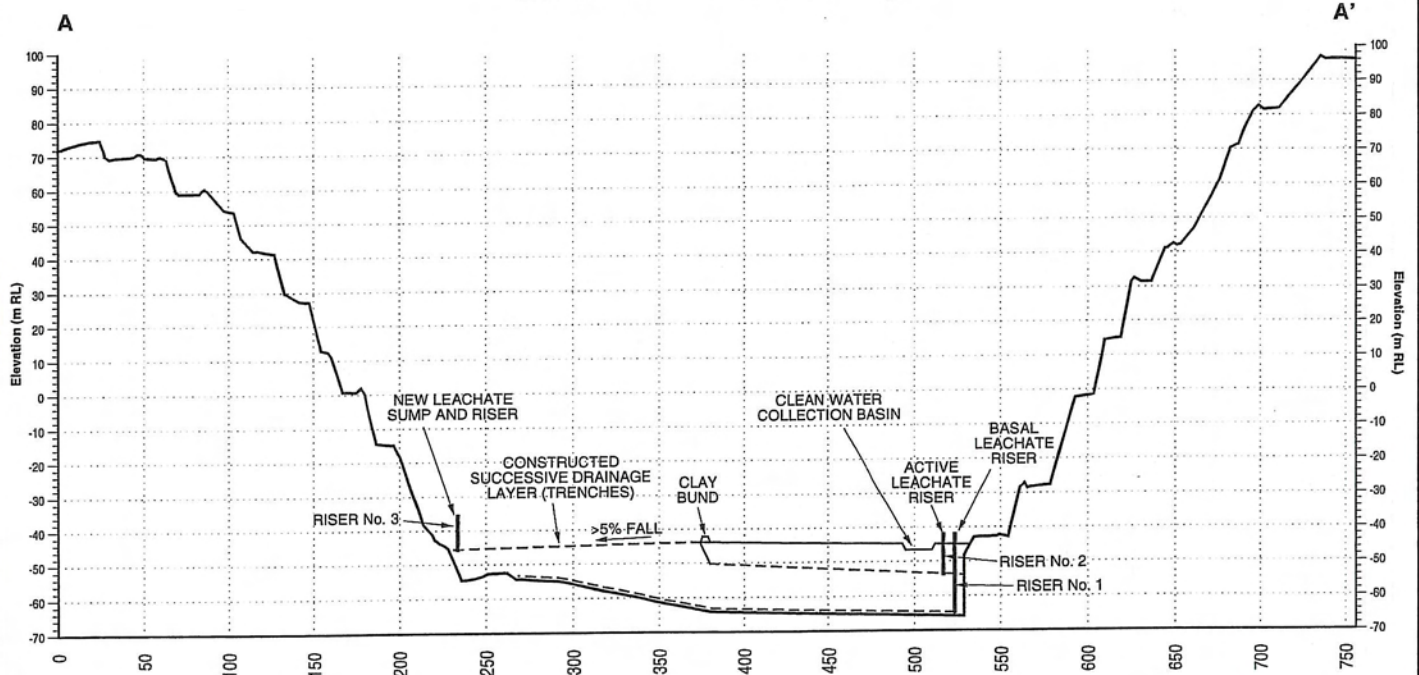
Revision: A

Approved By: --

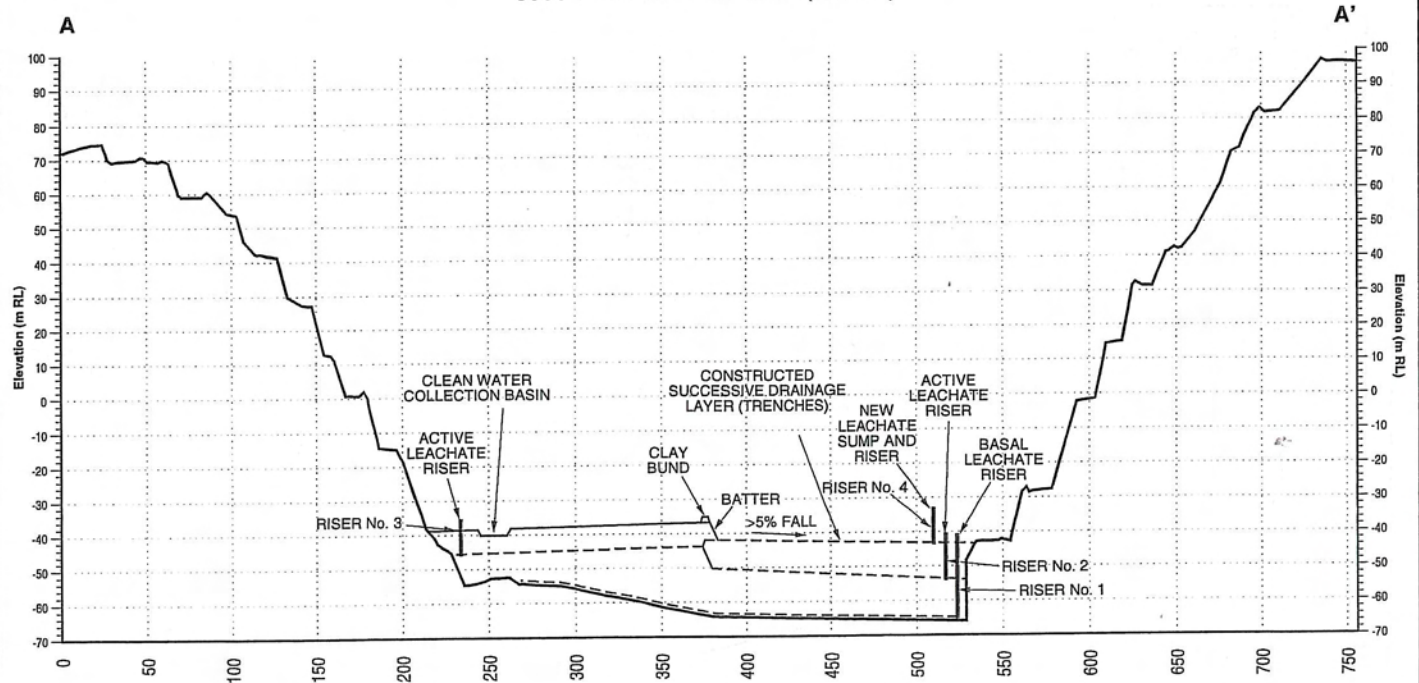
Date: 30-07-10



## SUCCESSIVE DRAINAGE LAYER (STAGE 3)



## SUCCESSIVE DRAINAGE LAYER (STAGE 4)



0 20 40 60 80 100m

HORIZONTAL SCALE 1 : 3 000 at A3  
VERTICAL SCALE 1 : 1 500 at A3  
(2x Vertical Exaggeration)



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Title: LEACHATE MANAGEMENT SYSTEM - LIGHT HORSE BUSINESS CENTRE, EASTERN CREEK, NSW  
**LANDFILL SEQUENCE CROSS SECTIONS**

Client: ALEXANDRIA LANDFILL PTY LTD

Office: PERTH

Drawn By: J. RUSSELL

Scale: 1 : 3 000

Project No: 46950

Approved By: --

Date: 30-07-10

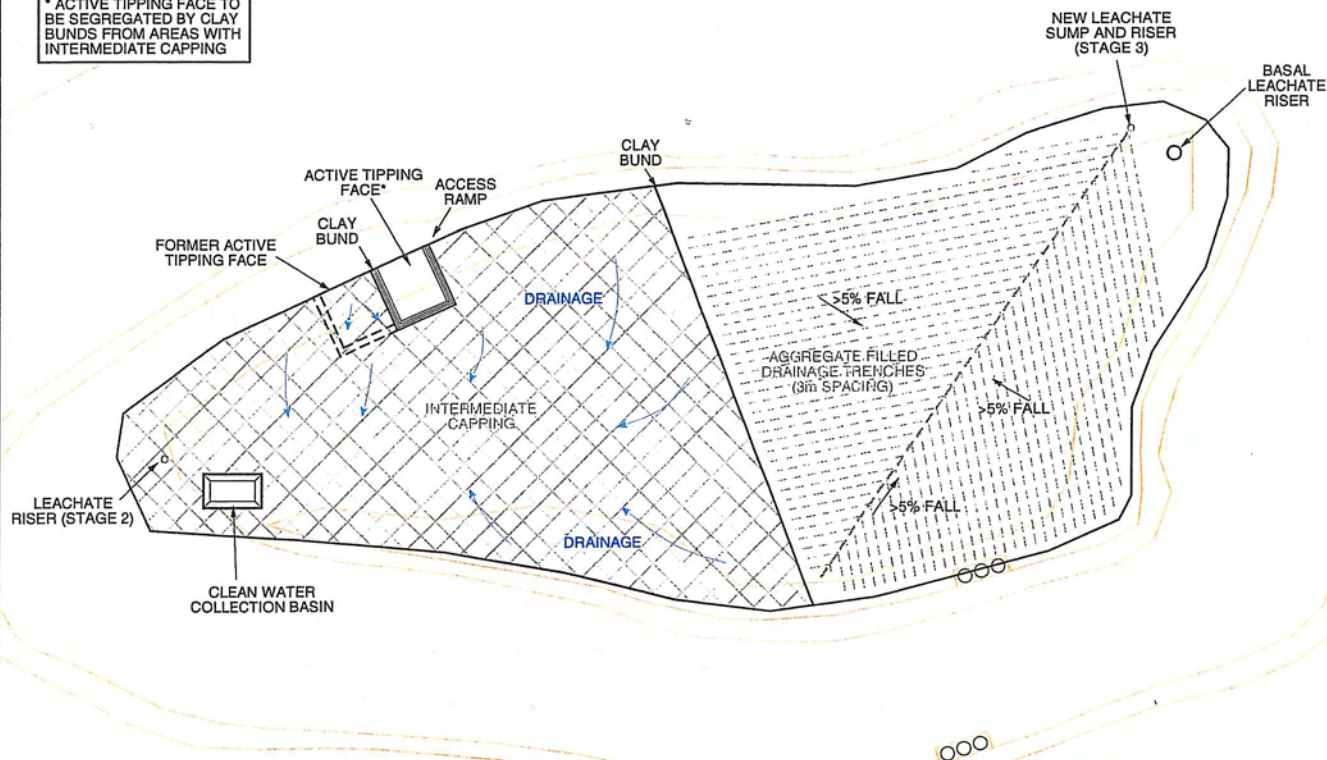
**DRAWING 6**

Revision:  
A



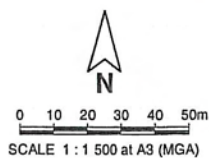
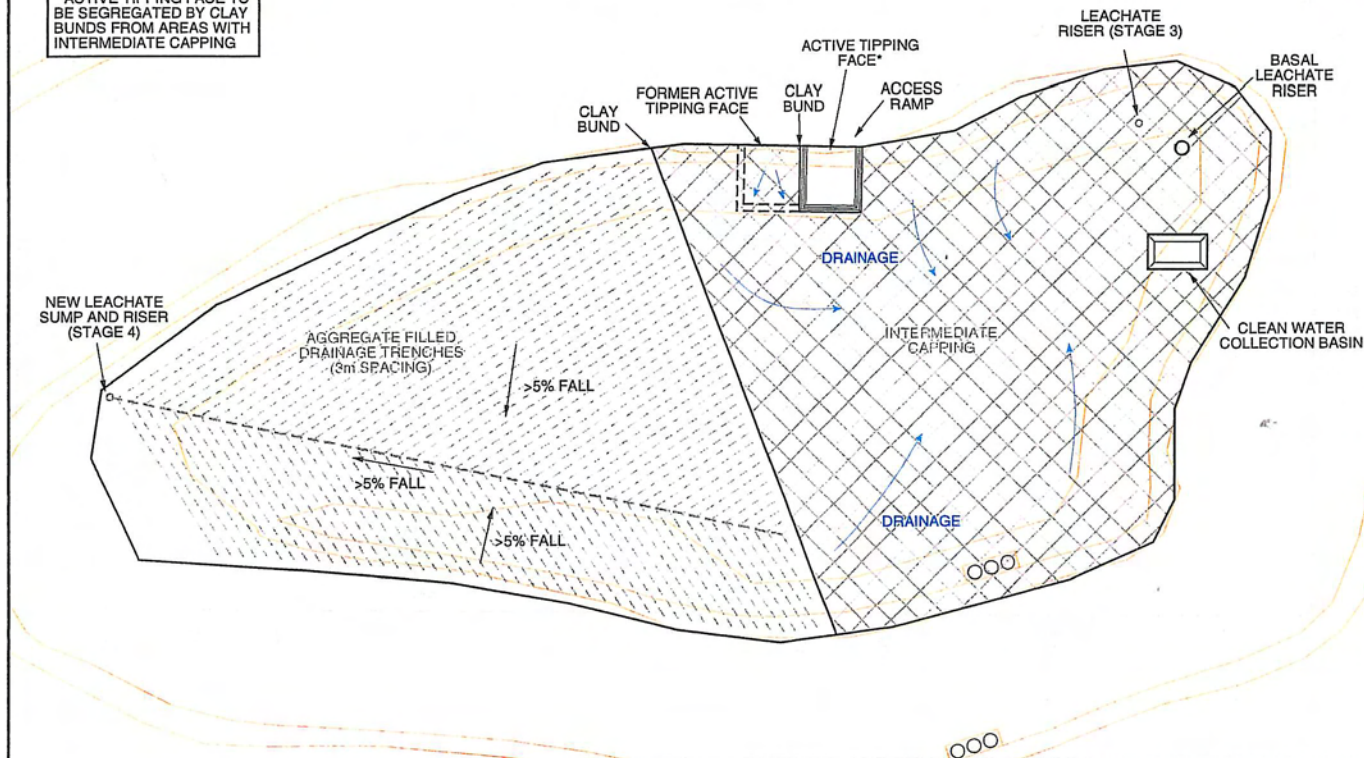
## SUCCESSIVE DRAINAGE LAYER LAYOUT (STAGE 3)

\* ACTIVE TIPPING FACE TO BE SEGREGATED BY CLAY BUNDS FROM AREAS WITH INTERMEDIATE CAPPING



## SUCCESSIVE DRAINAGE LAYER LAYOUT (STAGE 4)

\* ACTIVE TIPPING FACE TO BE SEGREGATED BY CLAY BUNDS FROM AREAS WITH INTERMEDIATE CAPPING



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### SUCCESSIVE DRAINAGE LAYER LAYOUT

Client: ALEXANDRIA LANDFILL PTY LTD

Office: PERTH

Drawn By: J. RUSSELL

Scale: 1 : 1 500

Project No: 46950

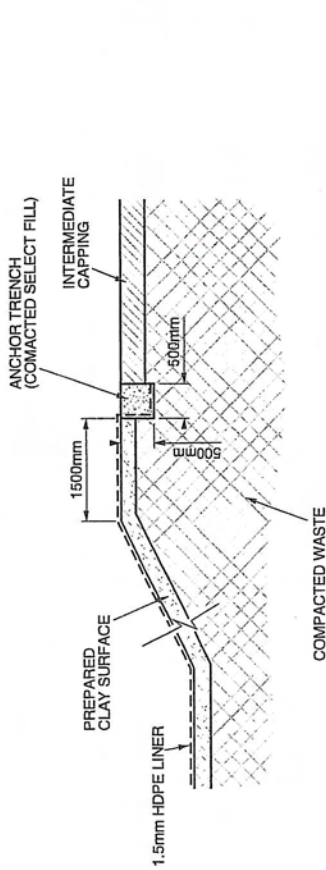
Approved By: --

Date: 30-07-10

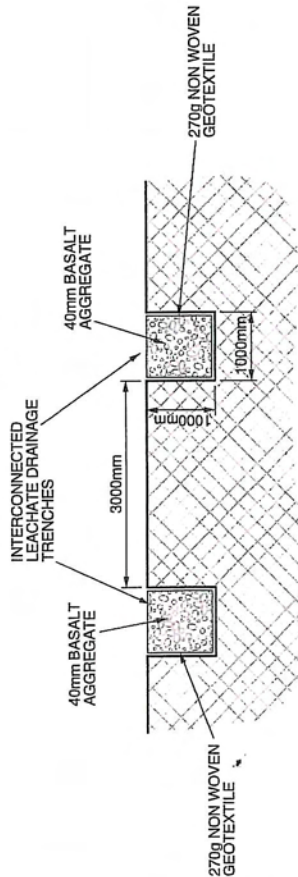
**DRAWING 7**

Revision:  
A

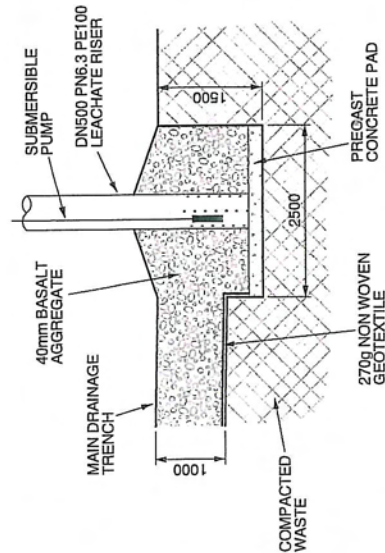




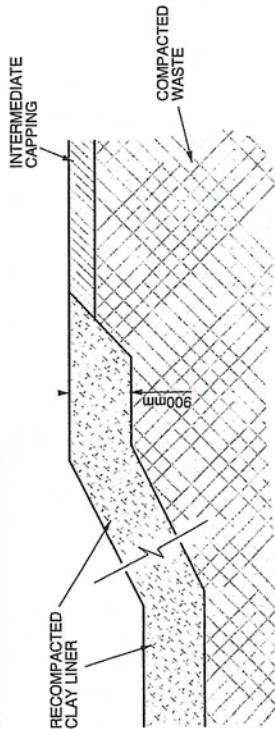
HDPE LINED CLEAN WATER COLLECTION BASIN  
SCALE 1 : 75



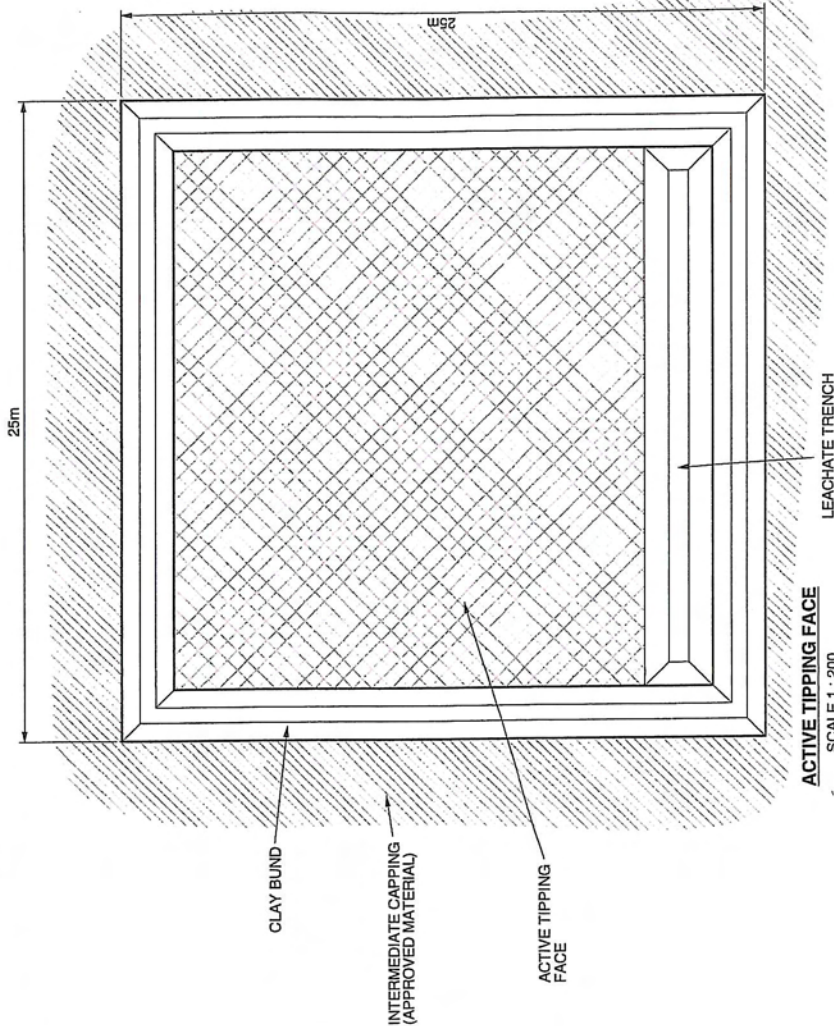
SUCCESSIVE DRAINAGE LAYER TRENCHES  
SCALE 1 : 75



SUCCESSIVE DRAINAGE LAYER SUMP AND RISER  
SCALE 1 : 75



CLAY LINED CLEAN WATER COLLECTION BASIN  
SCALE 1 : 75



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Title: LEACHATE MANAGEMENT SYSTEM - LIGHT HORSE BUSINESS CENTRE, EASTERN CREEK, NSW

Client: ALEXANDRIA LANDFILL PTY LTD

Drawn By: J. RUSSELL Scale: AS SHOWN Project No: 46950 Office: PERTH

Approved By: - Date: 27-07-10 Resident: A

DRAWING 8

PERTH

## Appendix A1



## **Appendix B**

# **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

## **1.0 ROLES & RESPONSIBILITIES**

This Construction Quality Assurance and Testing Programme (CQATP) consists of selected testing, inspection and documentation of construction of the Light Horse Business Centre Leachate Management System (LMS). It is undertaken to provide the site owner and Regulatory Authority (DECCW & Department of Planning) an evaluation of whether the end product is of the specified quality of materials and workmanship.

The CQATP consists of selected tests and inspections during construction which can assist the Contractor and Site Manager in producing the LMS that is required. The implementation of the CQATP, with respect to construction of the leachate management system (basal), including pipe work, leachate sump (basal), leachate riser (basal), leachate pumps, storage tanks, the treatment system and sewer connection for treated leachate disposal, is the responsibility of the Contractor.

Necessary work to construct successive drainage layers and clean water collection basins in the landfill (quarry) void would be done under the supervision of the Site Manager and Engineer as the landfill is progressively filled and the successive drainage layers are constructed. The following definitions are used under this CQATP.

"Principal"	Dial A Dump Industries.
"Superintendent"	As advised by Principal.
"Site Manager"	As advised by Principal.
"Engineer"	Suitably qualified Engineering Consultant.
"Contractor"	The partnership, corporation, joint venture, or other legal entity having a Contract with the Principal to perform the Work.
"Drawings"	The specific details and dimensions distinctive to the Works supplemented by Drawings which show the location, character, dimensions or details of the Works to be performed.
"Specification"	Specifications, refers to the directions, provisions and requirements contained in the associated Specification report.
"Works"	That which is proposed to be constructed or done under the Contract, including the labour, materials and equipment.



## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

The Superintendent shall have overall authority for all CQA activities and will serve as the Principal's onsite representative. The Superintendent can appoint representatives to assist with CQA verification. All coordination, reporting and issues related to non-compliance will be directed through the Superintendent or his/her representative. In addition, the Superintendent will participate with the Engineer in all decisions related to design issues that arise during the course of construction.

The Engineer shall periodically visit the site during construction in order to advise the Superintendent on issues pertaining to the design. The Engineer will be responsible for reviewing all design issues that may arise during construction. Engineer approval will be required for any earthworks or geosynthetic material modifications or for any design modifications that may impact the performance of the LMS. The approval of the Engineer will be required prior to the implementation of any design changes.

Construction and design issues shall be reviewed on an as-needed basis and shall be resolved and documented by the Superintendent. The Engineer will prepare the final "As Constructed" report for the basal LMS which incorporates all "As Constructed Drawings" provided by the Contractor.

### **1.1 Summary of Basal Leachate Barrier and Collection System**

A description of the basal leachate barrier and the leachate collection system is summarised from top to base as follows:

- Geotextile separation layer comprising 270 g/m<sup>2</sup> non-woven geotextile;
- Gravel drainage layer comprising 300 mm thick gravel (40 mm basalt aggregate) drainage material. Leachate collector pipes shall be DN160 PN20 PE100 pipes;
- Geotextile protection layer comprising 1000 g/m<sup>2</sup> non-woven geotextile;
- Flexible membrane liner (FML) comprising 1.5 mm thick High Density Polyethylene (HDPE) smooth sided liner exhibiting a manufacturer specified minimum co-efficient permeability of  $1 \times 10^{-14}$  m/s;
- Geotextile protection layer comprising 350 g/m<sup>2</sup> non-woven geotextile; and
- Prepared (graded) subgrade.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

The gravel drainage layer shall be encapsulated by two geotextiles and the lower geotextile shall also serve as bedding material for the leachate collection piping. Any deviation from the Specifications must be pre-approved by the Engineer. Collection pipes will be placed in trenches at 400 mm wide and 300 mm deep. The pipes will drain towards a sump that will house the DN500 PN20 PE100 leachate riser.

### **2.0 EARTHWORKS**

Earthworks consist of excavation and stockpiling of native materials (base forming work), placement and compaction of fill, and placement and compaction of anchor trench backfill for HDPE lined basins. Specific requirements for each earthwork component are detailed in the Specifications. The Specifications shall be the project requirements for earthworks and the scope of earthworks at the quarry base will be as per the Section 11.1 of the Specification - **Preparatory Earthworks Planning** and 11.2 **Earthworks**.

The Superintendent shall be solely responsible for the satisfactory completion of all CQATP activities. All site preparation for the project shall be accomplished to the satisfaction of the Superintendent or designated representative. The Superintendent will be responsible for confirming that the finished base excavation (or compacted fill) and all clean water basin liner system levels are in general compliance with the Specifications.

If **Preparatory Earthworks Planning** indicates that filling of the quarry base is required the Engineer shall prepare a separate Earthworks Specification in the context of available fill material (e.g. clay or crushed shale). Material considered by the Engineer and Superintendent to be unsuitable for use in the construction of the landfill shall not be used.

An Inspection Test Plan for the base earthworks is attached to this CQATP.



## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

### **3.0 GEOSYNTHETIC MATERIALS**

Delivery of geosynthetics (geotextiles, smooth HDPE basal liner and textured HDPE liner for the clean water basin/s) to the site will not be allowed until all material specifications and certificates are approved by the Superintendent. It is the responsibility of the Contractor to ensure that all required documentation and/or certifications are approved prior to delivery.

All geosynthetics shall be unloaded, stored, and installed in accordance with the Specifications and Manufacturers Installation Manuals (or equivalent). Proposed Installation Manuals shall be submitted to the Superintendent and Engineer prior to delivery. Upon delivery at the site, the Contractor, Geosynthetics Installer and the Superintendent shall complete a surface observation of all rolls for defects and damage.

The Contractor shall be responsible for storage of the geosynthetics on-site and shall ensure the storage is consistent with the Manufacturers recommendations.

The Contractor shall be responsible for preparing the subgrade for the basal layer according to the Specifications. Prior to geosynthetics installation, the Contractor and the Superintendent shall verify that:

- Grades for basal and successive drainage layers have been checked by survey and approved by the Superintendent;
- Grades for the clean water basin locations in the landfill pit have been checked by survey and approved by the Superintendent;
- The subgrade for the basal liner and any subsequent clean water basin/s in the landfill pit have been prepared in accordance with the Specifications;
- The subgrade surface to be HDPE lined must be smooth and free of rocks, stones, sticks, roots, foreign materials, sharp objects, or debris of any kind. No stones or other objects that will not pass through an 8 mm screen will be present in the top 40 mm of the surface to be covered (visual inspection). The surface should form a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or breaks in grade. No excessive build up of water is to be present at the pond walls or base prior to placement of the liner;
- There are no excessively soft areas that could result in geosynthetics damage; and
- The Installation Contractor has certified in writing that the surface is acceptable.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

The Principal and Superintendent must give due notice to the Engineer if they propose to instruct the Contractor to prepare the subgrade to a standard, consistent with or higher than that indicated above, that precludes the need for the basal geotextile (i.e. the non-woven geotextile with a mass of  $\sim 350 \text{ g/m}^2$  placed beneath the HDPE liner). The Engineer must then inspect, approve and certify in writing that the subgrade surface is suitable for placement of the basal HDPE liner directly onto the subgrade (i.e. with no underlying geotextile layer).

### **3.1 Installation of HDPE**

Installation of all HDPE liners must be in accordance with an Installation Quality Assurance Manual approved by the Engineer. The Manual must include directions for panel placement, trial welds, field seaming / welding, field destructive testing, non-destructive testing, defects and repairs, repair procedures, "as constructed" drawing preparation and preparation of associated Quality Control (QC) testing / installation documentation. The completed QC must be signed-off by the Engineer.

### **3.2 Installation Quality Assurance Manual**

The general contents of the Installation Quality Assurance Manual should include the following as per Sections 3.2.1, 3.2.2, 3.2.3, 3.2.4 and 3.2.5 of this CQATP.

#### **3.2.1 Equipment**

Welding equipment and accessories shall meet the following requirements:

- Gauges showing temperatures in apparatus such as extrusion welder or fusion welder shall be present;
- An adequate number of welding apparatus shall be available to avoid delaying work; and
- Power source must be capable of providing constant voltage under combined line load.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

### **3.2.2 Deployment**

- Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.
- Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.
- Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
  - Geomembranes shall be installed according to site-specific specifications.
  - Unroll geomembrane using methods that will not damage geomembrane and will protect underlying surface from damage (spreader bar, protected equipment bucket).
  - Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift. Maintain ballast at perimeter of basal liner until placement of drainage layer.
  - Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
  - Do not allow heavy vehicular traffic directly on geomembrane. Rubber-tired four-wheel drives and trucks are acceptable if wheel contact is less than 8 psi.
  - Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.
- Sufficient material (slack) shall be provided to allow for thermal expansion and contraction of the material.

### **3.2.3 Field Seaming**

Seams shall meet the following requirements:

- To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
- Minimise number of field seams in corners, odd-shaped geometric locations and outside corners.
- Slope seams (panels) shall extend a minimum of 1.5 m beyond the grade break into the flat area.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

- Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the Superintendent and Installation Contractor.
- Align seam overlaps consistent with the requirements of the welding equipment being used. A 150 mm overlap is generally acceptable.

### **Extrusion Welding**

- Hot-air tack adjacent pieces together using procedures that do not damage the geomembrane.
- Clean geomembrane surfaces by disc grinder or equivalent.
- Purge welding apparatus of heat-degraded extrudate before welding.

### **Hot Wedge Welding**

- Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
- Clean seam area of dust, mud, moisture and debris immediately ahead of hot wedge welder.
- Protect against moisture build-up between sheets.

### **Trial Welds**

- Perform trial welds on geomembrane samples to verify welding equipment is operating properly.
- Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
- Minimum of two trial welds per day, per welding apparatus, one made prior to the start of work and one completed at mid shift.
- Cut four, 25 mm wide by 150 mm long test strips from the trial weld.
- Quantitatively test specimens for peel adhesion, and then for shear strength.
- Trial weld specimens shall pass when the results shown in Table 1 for HDPE are achieved in both peel and shear test.
  - The break, when peel testing, occurs in the liner material itself, not through peel separation.
  - The break is ductile.

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

**Table 1 – Peel / Shear Strengths for Trial Welds (based on GSE manufactured HDPE)**

Property	Test Method	1.5 mm HDPE
Peel Strength (fusion), kN/m	ASTM D 6392	17.2
Peel Strength (extrusion), kN/m	ASTM D 6392	13.7
Shear Strength (fusion & ext.), kN/m	ASTM D 6392	21.2

- Repeat the trial weld, in its entirety, when any of the trial weld samples fail in either peel or shear.
- No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.

Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardise the integrity of the liner installation. The Installation Contractor shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

### Defects and Repairs

- Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
- Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

### 3.2.4 Field Quality Assurance

Quality assurance requirements are as specified in the Installation Quality Assurance Manual and should include the following.

#### Field Testing

- Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming via the following:
  - Vacuum Testing - shall be performed in accordance with ASTM D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
  - Air Pressure Testing - shall be performed in accordance with ASTM D 5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
  - Other approved methods.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

Destructive Testing (performed by Superintendent with assistance from Installation Contractor) should be via the following:

- Location and Frequency of Testing:
  - Collect destructive test samples at a frequency of one per every 150 lineal metres of seam length.
  - Test locations will be determined after seaming.
- Sampling Procedures are performed as follows:
  - Installation Contractor shall cut samples at locations designated by the Superintendent as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
  - Superintendent will number each sample, and the location will be noted on the installation as-constructed.
  - Samples shall be 300 mm wide by minimal length with the seam centred lengthwise.
  - Cut a 50 mm wide strip from each end of the sample for field-testing.
  - Cut the remaining sample into two parts for distribution as follows:
    - One portion for Installation Contractor,
    - One portion for a laboratory for independent testing (if deemed necessary by the Superintendent),
    - Additional samples may be archived if required.
  - Destructive testing shall be performed in accordance with ASTM D 6392, Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
  - Installation Contractor shall repair all holes in the geomembrane resulting from destructive sampling.
  - Repair and test the continuity of the repair in accordance with the Installation Quality Assurance Manual.
- Failed Seam Procedures:
  - If the seam fails, Installation Contractor shall follow one of two options:
    - Reconstruct the seam between any two passed test locations.
    - Trace the weld to intermediate location at least 3 m minimum or where the seam ends in both directions from the location of the failed test.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

- The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 3 m long.
- If sample passes, then the seam shall be reconstructed or capped between the test sample locations.
- If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

### **3.2.5 Repair Procedures**

- Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
- Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.
- Installation Contractor shall be responsible for repair of defective areas.
- Agreement upon the appropriate repair method shall be decided between Superintendent and Installation Contractor by using one of the following repair methods:
  - Patching - Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
  - Abrading and Re-welding - Used to repair short section of a seam.
  - Spot Welding - Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
  - Capping - Used to repair long lengths of failed seams.
  - Flap Welding - Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
  - Remove the unacceptable seam and replace with new material.
- The following procedures shall be observed when a repair method is used:
  - All geomembrane surfaces shall be clean and dry at the time of repair.
  - Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
  - Extend patches or caps at least 150 mm for extrusion welds and 100 mm for wedge welds beyond the edge of the defect, and around all corners of patch material.
- Repair Verification
  - Number and log each patch repair (performed by Superintendent).



## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

- Non-destructively test each repair using methods specified in the Installation Quality Assurance Manual.

### **3.3 Anchor Trenches for Clean Water Basin/s**

Anchor trenches shall be excavated to 0.5 m wide and 0.5 m deep as shown on the Drawings, prior to HDPE placement. The Site Manager shall observe that the anchor trenches have been constructed according to the Drawings. Slightly rounded corners shall be provided where the geosynthetics adjoins the trench so as to avoid sharp bends in the geosynthetics. No loose soil shall be allowed to underlie the geosynthetics in the anchor trench. Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetics.

### **3.4 Protection of Installed Basal HDPE Liner**

Quality Assurance of materials in contact with the HDPE liner include:

- The protective geotextile (as approved by the Superintendent) shall be installed above the HDPE liner.
- Equipment used for placing drainage aggregate shall not be driven directly on the HDPE liner.
- In heavily trafficked areas, such as access ramps, drainage aggregate thickness should be at least 600 mm over the geosynthetics.
- Placement of soils, gravels, sand or other types of earth materials on top of the HDPE liner shall not be performed until all testing has been performed and accepted;
- Placement of overlying materials shall be performed in a manner to minimise wrinkles. Equipment operators shall be briefed on methods of placement relative to thermal expansion and contraction of the HDPE liner.
- Soil or aggregate placed on top of the HDPE liner shall be stockpiled and displaced off the stockpile to create a cascading effect of the material on top of the HDPE liner.



## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

### **4.0 LEACHATE COLLECTION PIPES & RISER**

Delivery of leachate collection pipes and riser to the site will not be allowed until all material specifications and certificates are approved by the Superintendent. It is the responsibility of the Contractor to ensure that all required documentation and/or certifications are approved prior to delivery.

The Engineer must inspect the site during and following completion of the leachate collection pipe and riser installation.

An Inspection Test Plan for the pipe work is attached to this CQATP.

### **5.0 QUARRIED BASALT FOR BASAL DRAINAGE LAYER**

Delivery to the site of quarried basalt for the basal drainage layer will not be allowed until all aggregate specifications and test results are approved by the Superintendent. It is the responsibility of the Contractor to ensure that all required documentation and/or certifications are approved prior to delivery.

Aggregate shall be tested at the frequency of 1 test per source and no less than 1 per every 2500 tonnes of material from any particular source to meet the Specifications provided in Table 2.

An Inspection Test Plan for the basal drainage layer is attached to this CQATP.

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

**Table 2 – Specification for Leachate Drainage Aggregate**

Test	Title	AS	Spec.
Grading	Methods for sampling and testing aggregates - Particle size distribution by sieving  53.0 mm 37.5 mm 0.075 mm	AS1141.11	% passing  90-100 <10 <3
Wet Dry Strength	Methods for sampling and testing aggregates - Wet/dry strength variation <ul style="list-style-type: none"> <li>• Dry Strength (kN)</li> <li>• Wet Strength (kN)</li> <li>• Variation (%)</li> </ul>	AS1141.22	>230 >180 <35
Constant head permeability broadly in line with AS 1289.6.7.1	Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of permeability of a soil	AS1289.6.7.1	>1x10 <sup>-3</sup> m/s

### 6.0 QUARRIED BASALT FOR SUCCESSIVE DRAINAGE LAYERS

Delivery to the site of quarried basalt for the successive drainage layers will not be allowed until all aggregate specifications and test results are approved by the Site Manager. The Specification allows for consideration of alternative aggregates as approved by the Engineer. It is the responsibility of the Site Manager to ensure that all required documentation and/or certifications are approved by the Engineer prior to delivery.

Aggregate shall be tested at the frequency of 1 test per source and no less than 1 per every 2500 tonnes of material from any particular source to meet the interim Specifications provided in Table 2 in the absence of alternative aggregate.

An Inspection Test Plan for the successive drainage layers is attached to this CQATP.

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

### 7.0 CLAY LINED CLEAN WATER BASIN/S

Clay used for construction of clay-lined clean water collection basins must be approved by the Site Manager prior to use. Clay shall be tested at the frequency provided in Table 3 to meet the Specifications provided in Table 3.

**Table 3 – Specification & Testing Frequency for Clay**

Test	Title	AS	Spec.	Test Frequency
Moisture Content	Determination of the moisture content of a soil – oven drying method	AS 12889.2.1	-0%+3%OMC	1 per 1,500m <sup>3</sup>
Atterberg Limits	Determination of the liquid limit of a soil – four point Casagrande method  Determination of the plastic limit of a soil – standard method  Calculation of the plasticity index of the soil	AS 1289.3.1.1 AS 1289.3.2.1 AS 1289.3.3.1	≥ 25 % ≥ 15% ≤ 30% ≥ 15% ≤ 30%	1 per 1,500m <sup>3</sup>
Particle Size Distribution (w. hydrometer)	Determination of the particle size distribution of a soil – analysis by sieving in combination with hydrometer analysis	AS 1289.3.6.2	> 30% Clay <sup>^</sup>	1 per 1,500m <sup>3</sup>
Compaction (standard)	Determination of the dry density / moisture content relationship of a soil using standard compactive effort	AS 1289.5.1.1	≥95% - 98%	1 per source material per basin
Permeability* (falling head)	Determination of the permeability of a soil (falling head method)	AS 1289.6.7.2	4 x 10 <sup>-9</sup>	1 per source material per basin

Notes:

<sup>^</sup>Specification may need to be amended if crushed shale is used

\*Test sample compacted to 95% maximum dry density at optimum moisture content in laboratory

An Inspection Test Plan for the clay-lined basins is attached to this CQATP.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

### **8.0 DOCUMENTATION**

To provide evidence of satisfactory work performance, all stages of the LHBC Leachate Management System Works shall be documented. The Superintendent or designated representative shall maintain daily records of all key activities associated with the work. The Superintendent shall maintain all CQA documentation onsite at all times.

#### **8.1 Photographic Record**

The Superintendent and Engineer shall maintain a photographic record of each phase of works and shall maintain such documentation on site as part of the construction quality control activities. Photographs shall include images of construction activities, problem areas, corrective actions, and final constructed features.

#### **8.2 As Constructed Report**

Following completion of the work associated with the construction of the basal leachate collection system, an "as constructed" report and record of drawings shall be prepared under the direction of the Superintendent. The report must include the records prepared during construction. These drawings and the report shall be retained as a permanent record of construction. Information included will be a summary and discussion of typical construction conditions and procedures.

The "as constructed" drawings will be prepared depicting in plan view the perimeter of the landfill and include the following:

- Finished installed contours of the prepared basal layer (confirmed prior to placement of the geosynthetics);
- The installed leachate risers and the installed alignments and grades of the leachate collection pipe work (confirmed prior to placement of the drainage media); and
- Finished installed contours of the separation geotextile covering the leachate drainage layer.

## **LHBC Leachate Management System Construction Quality Assurance & Testing Programme**

The work is to be compiled into an "As Constructed Report" for approval by a suitably qualified Engineering Consultant (e.g. Douglas Partners) and/or certified (e.g. C.P. Eng.) professional engineer with the Institution of Engineers Australia.

# LHBC Leachate Management System

## Construction Quality Assurance & Testing Programme

### INSPECTION TEST PLAN

Project: LHBC Leachate Management System

Process: Base Forming Earthworks

Work Area:

Item	Work Sequence	Action By	Acceptance / Comment
1	Complete Preparatory Earthworks Planning as per Section 11.1 of the Specification.	Contractor and Surveyor	Refer to Section 11.1 of the Specification.
2	Complete earthworks to meet the specified grades (transverse gradient of >4% and a longitudinal gradient of >2%).	Contractor and Surveyor	Check grades by survey.
3	If filling is required to form grades Engineer to prepare Specification based on available filling material (clay or crushed shale).	Engineer	Will be based on Specification prepared by Engineer.
4	Carry out necessary dewatering of the pit required to facilitate liner installation.	Contractor	Engineer to approve design of any under-liner drainage system.
5	Excavate trenches for leachate collector pipes to dimensions as per the Specification.	Contractor	Check grades and trench spacing by survey.
6	Prepare area for leachate sump.	Contractor	Superintendent to check.

### REVIEW BY SUPERINTENDENT

Item	Work Sequence	Action By	Initial when Completed
1	Has Preparatory Earthworks Planning been completed?	Superintendent	
2	Do earthworks meet the specified grades checked by survey?	Superintendent	
3	If filling is required has Specification been met?	Superintendent	
4	Has Engineer approved the design of any necessary under-liner drainage system and has it been constructed in accordance with the design?	Superintendent	
5	Have trenches been constructed to meet the Specification checked by survey?	Superintendent	

Any nonconformances?

YES/NO

Are nonconformance reports closed out?

YES/NO

All work has been satisfactorily completed.

\_\_\_\_\_ Superintendent \_\_\_\_\_ Date

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

### DOCUMENTATION CHECKLIST

Item	Documentation Checklist for As Constructed Report	YES / NO
1	Survey of quarry base. Drilling logs from boreholes drilled on the quarry base.	
2	Survey of base following earthworks (include collection pipe trenches location and spacing).	
3	Earthworks test results.	
4	As Constructed drawing of under-liner drainage system (if constructed).	
5	Survey of base following earthworks (include collection pipe trenches location and spacing).	
6	Survey of base following earthworks (include collection pipe trenches location and spacing).	

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

### INSPECTION TEST PLAN

Project: LHBC Leachate Management System  
 Process: Installation of Leachate Collection Pipes  
 Work Area:

Item	Work Sequence	Action By	Acceptance / Comment
1	Base forming earthworks and geotextile and geomembrane (HDPE) has been installed.	Contractor	Completed Base Forming Earthworks ITP and HDPE Installation Quality Assurance Manual signed-off.
2	Check collection pipe machine perforations (diameter and spacing) conform to the Specification. Or, manually drill perforations in accordance with the Specifications.	Contractor	Superintendent to check.
3	Weld and place leachate collection pipes.	Contractor	Superintendent to check.

### REVIEW BY SUPERINTENDENT

Item	Work Sequence	Action By	Initial when Completed
1	Has Base Forming Earthworks ITP and HDPE Installation Quality Assurance Manual been signed-off?	Superintendent	
2	Are pipes appropriately perforated?	Superintendent	
3	Has all pipework been welded including junction points?	Superintendent	

Any nonconformances? YES/NO  
 Are nonconformance reports closed out? YES/NO

All work has been satisfactorily completed.

\_\_\_\_\_ Superintendent \_\_\_\_\_ Date

### DOCUMENTATION CHECKLIST

Item	Documentation Checklist for As Constructed Report	YES / NO
1	Copies of completed ITPs and HDPE Installation Quality Assurance Manual.	
2	Survey of base following earthworks (include collection pipe trenches location and spacing).	
3	Survey of base following earthworks (include collection pipe trenches location and spacing).	



# LHBC Leachate Management System

## Construction Quality Assurance & Testing Programme

### INSPECTION TEST PLAN

Project: LHBC Leachate Management System

Process: Construction of Basal Drainage Layer

Work Area:

Item	Work Sequence	Action By	Acceptance / Comment
1	Source 40 mm gravel (quarried basalt aggregate) and collect samples at the specified frequency. Submit samples to laboratory for the nominated tests to verify the aggregate meets the Specification.	Contractor	Samples meet Specification.
2	Place the aggregate so as not to damage the liner (refer to the Specification and CQATP).	Contractor	Superintendent to check.
3	Place aggregate across the base of the landfill to a minimum thickness of 300 mm.	Contractor and Surveyor	Check thickness by survey.
4	Mound aggregate around the leachate riser to minimum 100 mm above the perforated section of the riser.	Contractor	Superintendent to check.
5	Place the separation geotextile over the aggregate drainage layer.	Contractor	Superintendent to check.

### REVIEW BY SUPERINTENDENT

Item	Work Sequence	Action By	Initial when Completed
1	Has appropriate aggregate been sourced?	Superintendent	
2	Has aggregate been placed in a manner that does not damage the basal liner?	Superintendent	
3	Has the minimum thickness of aggregate been achieved across the base of the landfill?	Superintendent	
4	Has aggregate been mounded appropriately above the perforated section of the riser?	Superintendent	
5	Has separation geotextile been placed over the aggregate?	Superintendent	

Any nonconformances?

YES/NO

Are nonconformance reports closed out?

YES/NO

All work has been satisfactorily completed.

\_\_\_\_\_ Superintendent \_\_\_\_\_ Date

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

### DOCUMENTATION CHECKLIST

Item	Documentation Checklist for As Constructed Report	YES / NO
1	Aggregate test results.	
3	Survey of base following placement of aggregate.	
4	Survey of base following placement of aggregate.	
5	Survey of base following placement of aggregate.	

# LHBC Leachate Management System

## Construction Quality Assurance & Testing Programme

### INSPECTION TEST PLAN

Project: LHBC Leachate Management System  
 Process: Construction of Successive Drainage Layer  
 Work Area:

Item	Work Sequence	Action By	Acceptance / Comment
1	Construct clay bund isolating the respective catchments in the landfill void.	Site Manger	
2	Complete catchment to meet the specified grades (transverse gradient of >5% and a longitudinal gradient of >5%).	Site Manger	Check grades by survey
3	Place pre-cast concrete pad in prepared leachate sump. Install new leachate riser with perforated base.	Site Manger	
4	Source 40 mm gravel (quarried basalt aggregate) and collect samples at the specified frequency. Submit samples to laboratory for the nominated tests to verify the aggregate meets the Specification.	Site Manger	Samples meet Specification.
5	Alternative aggregate may be used if approved by the Engineer.	Site Manger and Engineer	Samples meet Specification prepared by Engineer.
6	Excavate trenches for aggregate at spacing and to dimensions as per the Specification.	Site Manger	Check grades by survey.
7	Line trenches with separation geotextile and fill with aggregate. Cover aggregate with separation geotextile.	Site Manager	

Any nonconformances?  
 Are nonconformance reports closed out?

YES/NO  
 YES/NO

All work has been satisfactorily completed.

\_\_\_\_\_ Site Manager \_\_\_\_\_ Date

# LHBC Leachate Management System

## Construction Quality Assurance & Testing Programme

### INSPECTION TEST PLAN

Project: LHBC Leachate Management System

Process: Construction of Clay-Lined Clean Water Collection Basins

Work Area:

Item	Work Sequence	Action By	Acceptance / Comment
1	Source clay (or crushed shale) and collect samples at the specified frequency. Submit samples to laboratory for the nominated tests to verify the material meets the Specification.	Site Manager	Samples meet Specification.
2	Peg out and prepare area for basin.	Site Manager	
3	Place clay and compact layers in accordance with Specification.	Site Manager	Check thickness by survey.
4	Lightly scarify exposed surface. Spread material in layers $\leq 300$ mm thick. Condition to OMC (-0%+5%) if necessary. Compact each layer to $\geq 95\%$ -100% standard compaction.  Arrange compaction / moisture tests at 1 per 400 m <sup>2</sup>	Site Manager	Check thickness by survey.  Acceptable compaction / moisture tests.

Any nonconformances?

YES/NO

Are nonconformance reports closed out?

YES/NO

All work has been satisfactorily completed.

\_\_\_\_\_ Site Manager \_\_\_\_\_ Date

## Appendix C

## LHBC Leachate Management System Construction Quality Assurance & Testing Programme

### NONCONFORMANCE REPORT

Project:	LHBC Landfill LMS Construction	Nonconformance No:
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1. Report on Nonconforming Work

Reported by:

Process:

Location:

Nature of nonconformance:

Site Manager:

Date:

2. Rectification of Nonconforming Work

Rectification Method:

Proposed date to start rectification:

Concurrence of Inspector required?

Yes/No

Site Manager:

Date:

Project Manager:

Date:

3. Completion Report by Technician/Consultant

Comments:

Is Hold Point required before covering rectification work?

Yes/No

Do processes need to be changed to prevent problems recurring?

Yes/No

Rectification verified for conformance?

Yes/No

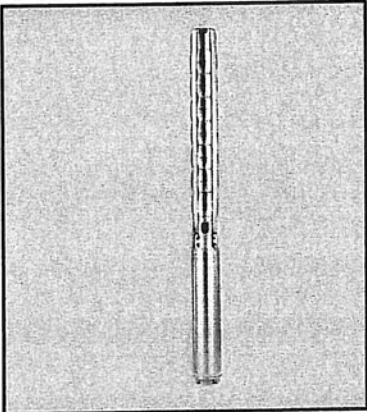
Comments:

Project Manager:

Date:

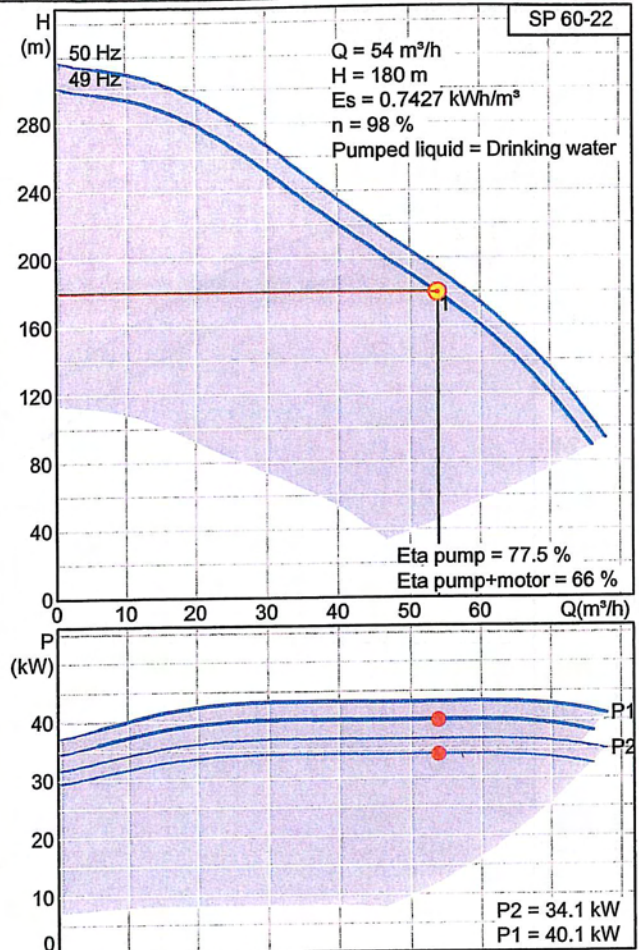
## Appendix D



Position	Qty.	Description	Single Price
	1	<p><b>SP 60-22</b></p>  <p><b>Note! Product picture may differ from actual product</b></p> <p>Product No.: 14A00222 Multi-stage submersible pump for raw water supply, groundwater lowering and pressure boosting. The pump is suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibres.</p> <p>The pump is made entirely of Stainless steel DIN W.-Nr. 1.4301 DIN W.-Nr..</p> <p>The motor is a 3-phase motor with sand shield, liquid-lubricated bearings and pressure equalizing diaphragm.</p> <p><b>Liquid:</b> Pumped liquid: Drinking water Max liquid t at 0.15 m/sec: 40 °C</p> <p><b>Technical:</b> Speed for pump data: 2900 rpm Actual calculated flow: 54 m³/h Resulting head of the pump: 180 m Shaft seal for motor: SIC/SIC Curve tolerance: ISO 9906 Annex A</p> <p><b>Materials:</b> Pump: Stainless steel 1.4301 DIN W.-Nr. 304 AISI Impeller: Stainless steel 1.4301 DIN W.-Nr. 304 AISI Motor: Stainless steel 1.4401 DIN W.-Nr. 316 AISI</p> <p><b>Installation:</b> Min inlet pressure: -0.4 bar Pump outlet: Rp 4 Motor diameter: 8 inch</p> <p><b>Electrical data:</b> Motor type: MMS8000 Rated power - P2: 45 kW Mains frequency: 50 Hz Rated voltage: 3 x 400-415 V Start. method: direct-on-line Rated current: 92,0-90,0 A Cos phi - power factor: 0,87-0,86 Rated speed: 2880-2890 rpm Enclosure class (IEC 34-5): IP58 Insulation class (IEC 85): A Built-in temp. transmitter: no</p> <p><b>Others:</b></p>	Price on request

Position	Qty.	Description	Single Price
		<div data-bbox="316 199 743 282"> <div>Net weight: 239 kg</div> <div>Gross weight: 276 kg</div> <div>Shipping volume: 0.33 m<sup>3</sup></div> </div>	

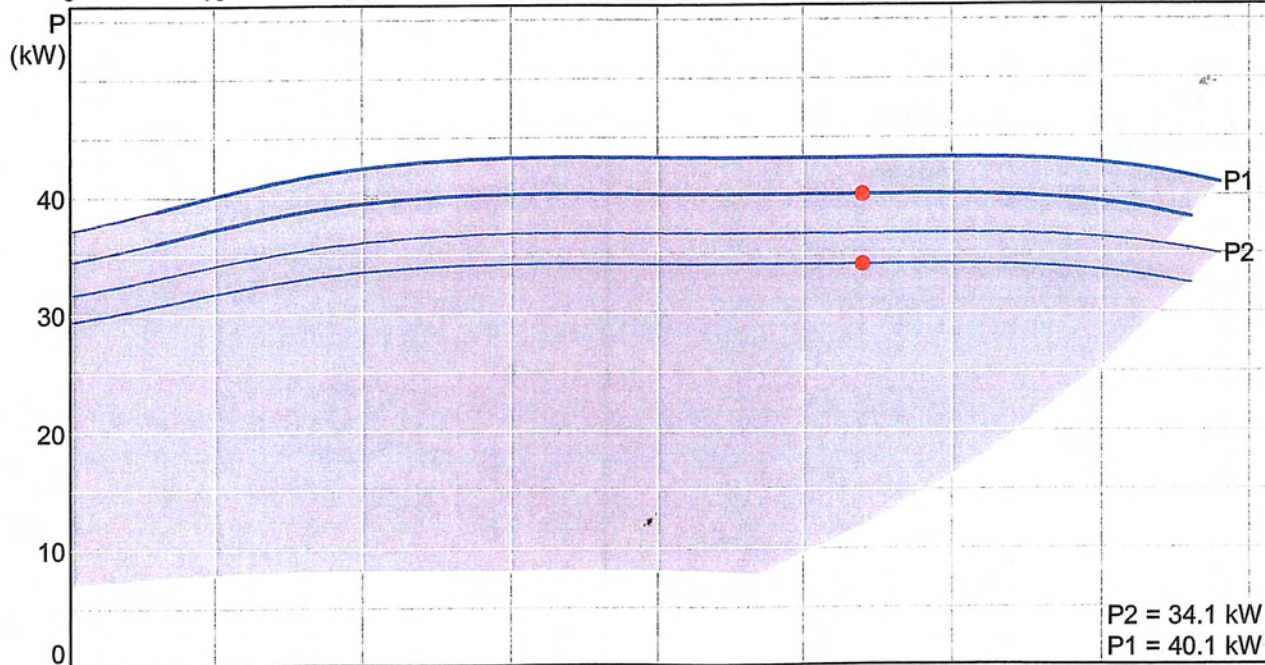
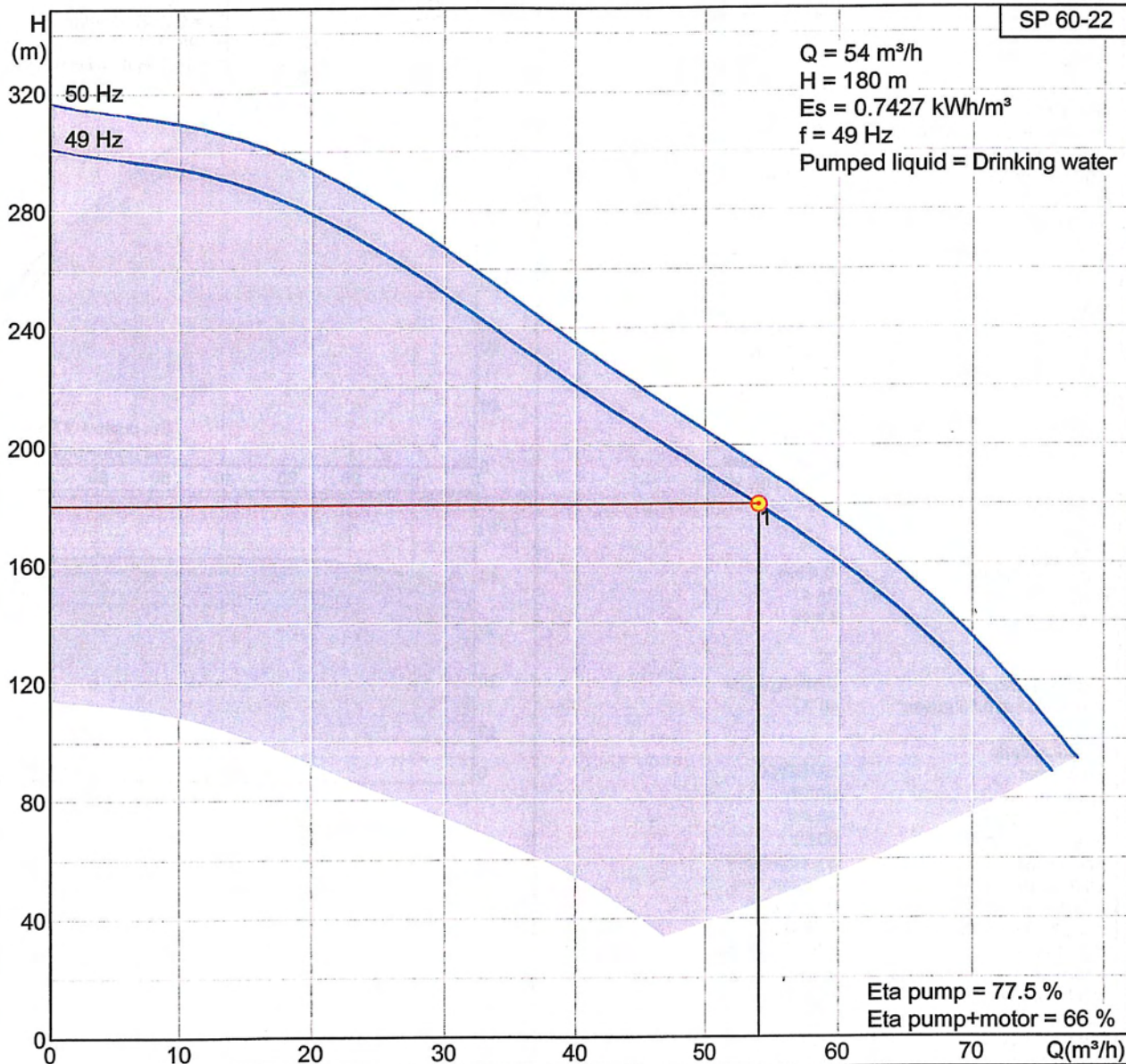
Description	Value
Product name:	SP 60-22
Product No:	14A00222
EAN number:	5700831472872
Technical:	
Speed for pump data:	2900 rpm
Actual calculated flow:	54 m³/h
Resulting head of the pump:	180 m
Shaft seal for motor:	SIC/SIC
Curve tolerance:	ISO 9906 Annex A
Pump No:	14A00022
Stages:	22
Model:	A
Valve:	pump with built-in non-return valve
Materials:	
Pump:	Stainless steel 1.4301 DIN W.-Nr. 304 AISI
Impeller:	Stainless steel 1.4301 DIN W.-Nr. 304 AISI
Motor:	Stainless steel 1.4401 DIN W.-Nr. 316 AISI
Installation:	
Min inlet pressure:	-0.4 bar
Pump outlet:	Rp 4
Motor diameter:	8 inch
Liquid:	
Pumped liquid:	Drinking water
Max liquid t at 0.15 m/sec:	40 °C
Electrical data:	
Motor type:	MMS8000
Applic. motor:	NEMA
Rated power - P2:	45 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 400-415 V
Start. method:	direct-on-line
Rated current:	92,0-90,0 A
Cos phi - power factor:	0,87-0,86
Rated speed:	2880-2890 rpm
Enclosure class (IEC 34-5):	IP58
Insulation class (IEC 85):	A
Motor protec:	NONE
Thermal protec:	external
Built-in temp. transmitter:	no
Motor No:	96521608
Others:	
Net weight:	239 kg
Gross weight:	276 kg
Shipping volume:	0.33 m³
Sales region:	Australia



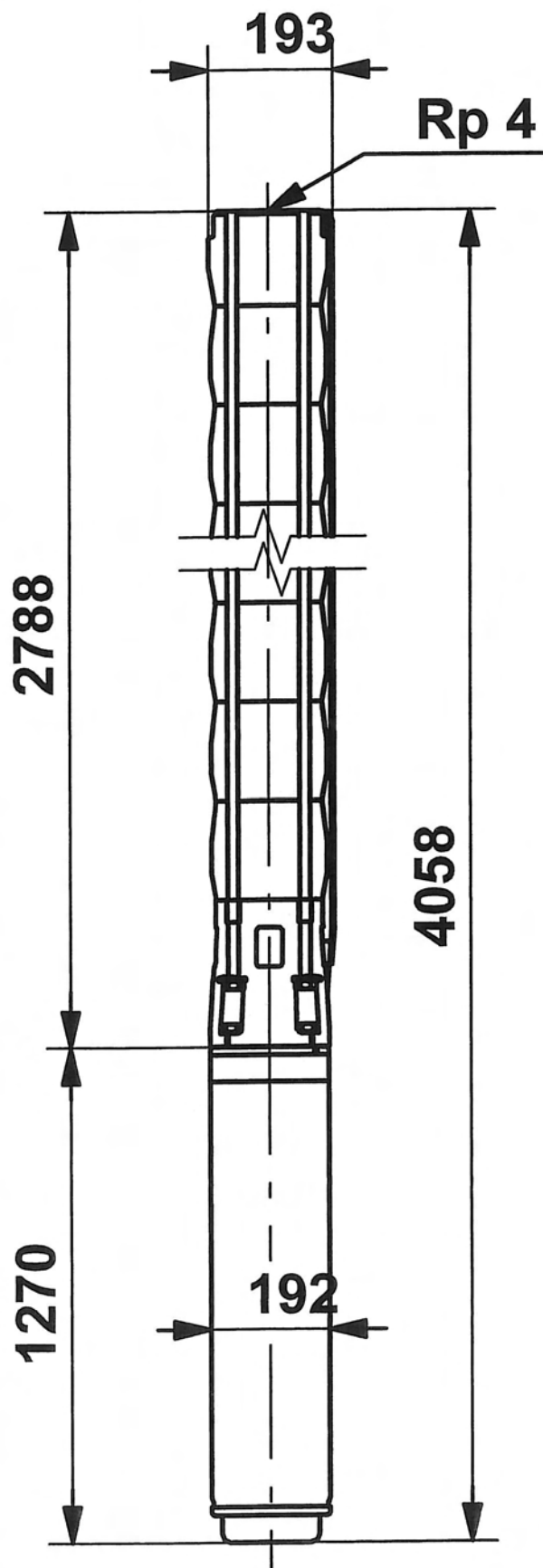


14A00222 SP 60-22

SP 60-22



14A00222 SP 60-22

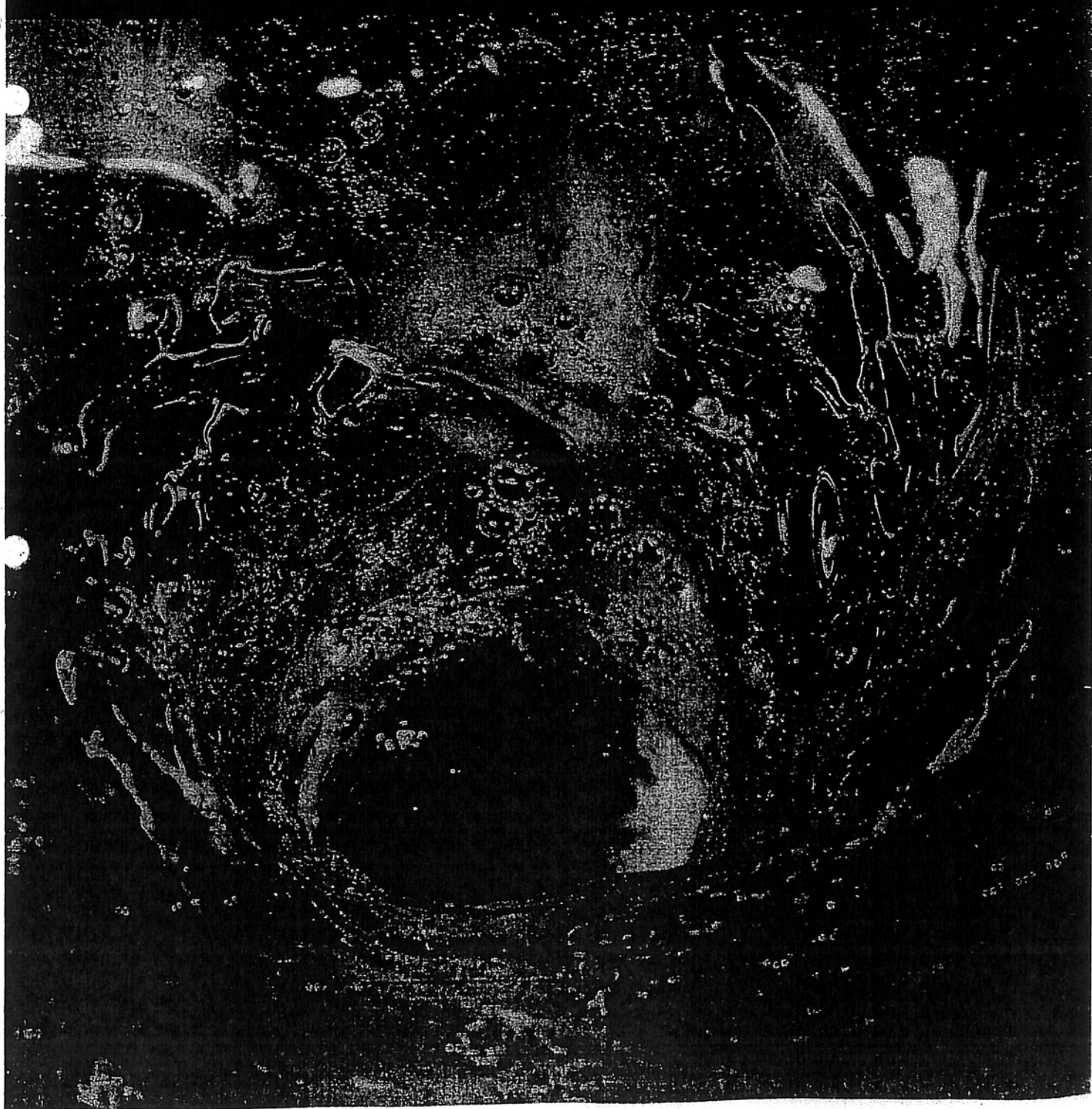


Note! All units are in [mm] unless others are stated.



## Appendix E

# Consent to discharge industrial trade wastewater



er its Operating Licence, Sydney Water provides sewerage services and disposes of trade wastewater. The objectives of Sydney Water are to operate as an efficient business, maximising the net worth of the company's investment and exhibiting a sense of social responsibility by having regard to the interests of the community. Sydney Water has special objectives of reducing risks to human health and preventing degradation of the environment.

Sydney Water is granted by the Department of Environment and Conservation powers subject to conditions to discharge pollutants. A change to a licence condition may require that variations be made to a consent granted by Sydney Water.

In the conduct of its business operations, Sydney Water must comply with its obligations, duties and responsibilities under the Act and its Operating Licence under the Protection of the Environment Administration Act 1991, the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (General) Regulation 1998.

When a customer requests that Sydney Water grant consent to the customer for purposes of discharge of trade wastewater from the premises to the sewer.

Sydney Water grants to the customer consent to discharge trade wastewater to the terms and conditions specified in this consent and the customer accepts the consent and agrees to be bound by the terms and conditions of this consent.

## DEFINITIONS AND INTERPRETATION

In this consent, unless the contrary intention appears;

**Acceptance Standards** means Sydney Water's published concentration limits for certain substances in trade wastewater.

**Act** means the Sydney Water Act 1994.

**Consent** means this consent together with its attached schedules and appendices. Any definitions or standards referred to in this consent but not contained in it are deemed to form a part of this consent with necessary changes being made to accommodate their inclusion.

**Authorised Officer** means;

with respect to Sydney Water, the person from time to time holding the position pertained in schedule 9 or such other person or position as may be nominated by Sydney Water from time to time; and

with respect to the customer, the person identified, and includes the details specified, in schedule 9 or as may be notified to Sydney Water by the customer from time to time.

**Breach** means any contravention of or non-compliance with a term, condition or provision of this consent or the Act.

**Chargeable Trade Waste Mass** means the mass of a pollutant subject to quality or critical substance charges.

**Composite Sample** means a sample of trade wastewater obtained by combining equal volumes at either equal time or flow intervals.

**Critical** means the status of a substance determined in accordance with Sydney Water's Trade Waste Policy, 2004.

**Critical Mass Charge** means the charge applied to some critical and over capacity substances as calculated in accordance with the provisions set out in schedule 3.

**Critical Substance** means a substance determined to be critical and notified from time to time by Sydney Water.

**Customer** means the party or parties (except Sydney Water) who executes or execute this consent.

**Customer Service Representative** means an officer of Sydney Water who is authorised to enter land or buildings for purposes of carrying out his or her duties in relation to Sydney Water's trade wastewater service.

**Daily Mass** means the mass of a substance discharged during a 24-hour period.

**Default Notice** means a notice issued in accordance with clause 8.1.

**Department of Environment and Conservation** means the authority established in September 2003 that consolidated the Environment Protection Authority, National Parks and Wildlife Service, Botanic

**Domestic Concentration** means the concentration of a pollutant deemed by Sydney Water to be equivalent to that found in domestic wastewater.

**Domestic Wastewater** means water which has in it human faecal matter, urine or refuse of any type produced in, and which is permitted to be discharged to a Sydney Water sewer from, any premises used exclusively for residential purposes.

**Equivalent Domestic Mass** means the mass of a substance that would be expected in the trade wastewater if it were at domestic concentration.

**Flow Weighted Charge** means the portion of a substance's charge for a billing period that is attributed to any sample collected in accordance with schedule 2 or, if such sample is required but is not collected, then fixed by Sydney Water in accordance with schedule 2.

**Flow Weighting Factor** means a factor used to determine charges as described in schedule 3.

**Long Term Average Daily Mass** means, for each pollutant, the figure listed in schedule 1 and used to determine critical mass charges as described in schedule 3.

**Lower Explosive Limit** means the minimum concentration of flammable and/or explosive substances that would result in a fire or explosion.

**Mass Discharged** means the mass of a pollutant discharged on a sample day and is measured by multiplying the composite sample concentration by the trade wastewater discharge for that sample day.

**Maximum Daily Mass** means the greatest mass of a substance permitted for discharge within a 24-hour period.

**Over Capacity** means the status of a substance as determined in accordance with Sydney Water's Trade Waste Policy, 2004.

**Over Capacity Substance** means a substance determined to be over capacity and notified from time to time by Sydney Water.

**Premises** means the land, plant and buildings described and specified in paragraph 1 of schedule 7 on or in which the customer carries on industrial or other commercial activities specified in paragraph 2 of schedule 7.

**Quality Charge** means a pollutant charge applied to trade waste discharges based on the mass of each pollutant discharged to sewer.

**Regulator** means any statutory authority, which may grant permission, authority or licence to Sydney Water to operate the sewer or treat or dispose of sewage treatment by-products.

**Residual Products** means biosolids, re-use water or such other product intended for re-use as may be developed by Sydney Water from time to time.

**Risk Index** means a ranking applied to the consent by Sydney Water to describe the relative risk of accepting the trade wastewater. Determination of the risk index will be based on the methodology determined from time to time by Sydney Water or as may be necessary in the opinion of Sydney Water to take into account particular circumstances. The risk index is used to determine, amongst other things, the amount of self-monitoring required, the number of inspections to be performed by Sydney Water, the annual consent fee and the term of the consent.

**Sewer** means the sewerage service of Sydney Water, including the sewage treatment plant, discharge to which is facilitated by a discharge point situated on the premises and specified in paragraph 3 of schedule 7.

**Significant Breach** means any breach of a nature outlined at clause 15.2. Such breaches may result in immediate suspension or termination of the consent.

**Standard Mass Charging Rate** means the charge per kilogram for substances as defined in schedule 3.

**Sydney Water** means Sydney Water Corporation.

**Trade Waste Policy** means Sydney Water's policy detailing the conditions under which Sydney Water will agree to accept trade wastewater to sewer.

**Trade Wastewater** means any liquid and any substance in it that is produced in an industrial or commercial activity at the premises and discharged into the sewer but does not include domestic wastewater.

Trade Waste Residue means any substance separated and retained from trade wastewater being discharged into the sewer.

- 1.2 In this consent, unless the contrary intention appears:
- (a) A reference to an Act or any delegated legislation or instrument made under an Act includes any other Act delegated legislation or instrument as may amend or replace any of them.
  - (b) A reference to a word or expression
    - (i) in the singular form includes a reference to the word or expression in the plural form; and
    - (ii) in the plural form includes a reference to the word or expression in the singular form.
  - (c) A reference to a party or a natural person includes a reference to a corporation.
  - (d) A word or expression that indicates one or more particular genders is taken to indicate every other gender.
  - (e) Headings to clauses and paragraphs are included in this consent to assist understanding of its terms and conditions but are not intended to affect the meaning or application of any term or condition.
  - (f) A reference to a clause, schedule or appendix is a reference to a clause of or schedule or appendix to this consent and any such schedule or appendix is a part of this consent.

- 1.3 Remedies available to the parties under this consent;
- (a) are cumulative; and
  - (b) do not prejudice or affect any other remedy available to the parties.
- 1.4 No rule of construction applies to the disadvantage of a party because that party was responsible for the preparation of this consent or any part of it.

#### APPLICATION OF CERTAIN STATUTES AND LAWS

- 2.1 This consent is made under and is subject to the provisions of the Act.
- 2.2 This consent is governed by and will be performed according to the law applicable in the State of New South Wales.
- 2.3 Subject to the terms and conditions of this consent the customer;
- (a) has lawful authority to dispose of trade wastewater for purposes of;
    - (i) Section 115 of the Protection of the Environment Operations Act 1997; and
    - (ii) Section 49 of the Act; and
  - (b) is exempt from the provisions of Section 120 of the Protection of the Environment Operations Act 1997 by virtue of the consent granted in clause 4.1 and, clause 55 of the Protection of the Environment Operations (General) Regulation 1998.

#### COMMENCEMENT AND TERM OF CONSENT

- 3.1 This consent commences on the date specified in paragraph 4 of schedule 7.
- 3.2 This consent will, unless terminated or renewed in accordance with this consent, continue for the period specified in paragraph 5 of schedule 7.

#### DISCHARGE OF TRADE WASTEWATER INTO SEWER

- 4.1 The customer may discharge trade wastewater from the premises into the sewer in accordance with the provisions of schedule 1 and schedule 4.
- 4.2 The customer must not discharge trade wastewater from the premises into the Sewer contrary to the provisions of schedule 1 and schedule 4.

- 4.3 The customer indemnifies Sydney Water against all damages, losses, costs or expenses suffered or incurred by Sydney Water, caused by any unauthorised discharge from the premises in respect of:

- (a) injury (including death) or harm to any person; or
- (b) damage to property vested in Sydney Water; or
- (c) contamination of residual products; or
- (d) material harm to any sewage treatment process

provided that the said damages, losses, costs or expenses suffered or incurred by Sydney Water are caused by any unauthorised discharge of trade wastewater or other matter into the sewer by the customer which is in breach of this consent or by any other person from the customer's premises, except to the extent to which the damages, losses, costs or expenses (as the case may be) were caused by either the negligent or wilful act or omission of Sydney Water or a breach of this consent by Sydney Water.

- 4.4 The customer must take all precautions reasonably practicable to ensure that no person other than a person acting for or on behalf of or with the consent of the customer discharges any matter from the premises into the sewer.

- 4.5 For purposes of this consent, every discharge of matter from the premises into the sewer will be taken to have been a discharge by a person acting for or on behalf of or with the consent of the customer.

#### 5. CHARGES

- 5.1 The customer must pay to Sydney Water, charges with respect to trade wastewater discharged to the sewer, the administration of this consent and, when applicable, the processing of grease trap waste determined in accordance with, and within the time and in the manner specified in, schedule 3.
- 5.2 Sydney Water may vary the basis of charges or the charging rates in schedule 3;
- (a) as and when determined by the Independent Pricing and Regulatory Tribunal of New South Wales (IPART); or
  - (b) by written consent with the customer.

#### 6. INSPECTIONS

- 6.1 A customer service representative may enter the premises at any time;
- (a) for purposes of inspecting whether the activities of the customer are being conducted in accordance with this consent; or
  - (b) for the purposes described in Section 38 of the Act or exercising any right or function conferred on Sydney Water under this consent.

This clause does not limit Sydney Water's statutory powers of entry.

- 6.2 When exercising rights under clause 6.1;
- (a) a customer service representative must not cause any delay or inconvenience to the efficient conduct of business activities by the customer which could be reasonably avoided; and
  - (b) except for any relevant safety precautions, a customer service representative must not be impeded or delayed by any person on the premises.

- 6.3 If, in the opinion of Sydney Water, it is necessary for a customer service representative to exercise rights under clause 6.1, the customer will make payment in accordance with the provisions of schedule 3.

#### 7. INQUIRIES

- 7.1 Sydney Water may convene and determine the terms of reference of a joint inquiry about the circumstances relating to an incident that may have caused a breach.
- 7.2 An inquiry under clause 7.1 is to be conducted informally and without legal representation for purposes of gathering information about an incident directly from any person who may be expected to know, from his or her own observations,



7.3	An inquiry under clause 7.1 may be conducted irrespective of whether the incident, the subject of the inquiry, is also the subject of a default notice.	9.2	it, prior to any failure to comply, the customer notifies Sydney Water that it may not be able to comply with any obligation under clause 9.1, Sydney Water will consider any reasonable proposal of the customer to vary a term or condition of the improvement program.
7.4	Before conducting an inquiry under clause 7.1, the customer and Sydney Water may agree about what action, if any (except any action pursuant to a statutory obligation), may be taken with respect to any information that may be gathered during the inquiry.	10.	<b>DILIGENCE PROGRAM</b>
<b>DEFAULT PROCEDURES</b>		10.1	Within 6 months of the making of this consent, the customer must give a notice to Sydney Water specifying a current diligence program.
8.1	If, in the opinion of Sydney Water, the customer commits, causes or allows a breach to occur, Sydney Water may issue to the customer a default notice.	10.2	For purposes of clause 10.1, a diligence program includes a plan whereby the customer demonstrates that the management of the customer is exercising reasonable care in planning and taking appropriate action to prevent or minimise the effects of any incident that may constitute a breach.
8.2	A default notice must;	11.	<b>SUSPENSION OF TERMINATION OF CONSENT TO DISCHARGE TRADE WASTEWATER</b>
	(a) provide any relevant particular of the breach alleged by Sydney Water, including any particular known to Sydney Water that may assist the customer to ascertain the alleged breach; and	11.1	Sydney Water may suspend the consent granted in clause 4.1 if;
	(b) specify that the customer must provide a response in writing to Sydney Water within 7 days of receipt of the notice.		(a) the customer does not comply with clause 8.5, 9.1, 12.1, 12.2 or notice of the suspension is given to the customer; or
8.3	A default notice is not invalid merely because it does not provide a particular that may assist the customer to ascertain the alleged breach.		(b) Sydney Water is for any reason specified in clause 11.2 unable to accept for treatment trade wastewater that may be discharged by the customer.
8.4	Any supply to the customer by Sydney Water of particulars under clause 8.7(a) is taken, for purposes of clause 8.5, to be a default notice under clause 8.1.	11.2	Sydney Water may by a notice given to the customer, suspend the consent granted in clause 4.1 if, in the reasonable opinion of Sydney Water;
8.5	The customer must supply to Sydney Water a written response to a default notice within 7 days of receipt of the default notice which must;		(a) an emergency prevents the sewer from accepting any or certain specified categories of trade wastewater that may be discharged by the customer; or
	(a) request further particulars of the alleged breach; or		(b) has occurred an event which could have an adverse effect on any employee or agent of or contractor to Sydney Water or the sewer, including any biological process
	(b) describe or explain the circumstances causing;		whether the emergency or event is caused by fire, storm, tempest, flood, malicious damage, act of war, civil disobedience, explosion, earthquake or an act or omission of an employee or agent of or contractor to Sydney Water or an unlawful discharge of matter into the sewer, or some other cause.
	(i) the event which appeared to Sydney Water to be a breach; or	11.3	The period of any notice of suspension given under clause 11.2 will be no shorter than any period, which in the opinion of Sydney Water the circumstances dictate.
	(ii) the breach to occur; and	11.4	The customer must comply with any notice under clause 11.1 or 11.2 subject only to any delay that may be required to safeguard the health or life of any person.
	(c) describe any action taken with respect to the alleged breach; and	11.5	Any suspension under clause 11.1 or 11.2 must not be for a period longer than, in the opinion of Sydney Water, the circumstances dictate.
	(d) provide a plan of action to be taken by the customer to avoid the occurrence of any incident similar to the alleged breach; or	11.6	If the customer does not cease discharging trade wastewater in accordance with a notice given under clause 11.1 or 11.2 and Sydney Water is of the opinion that the customer is not taking appropriate measures to stop the discharge, a customer service representative may, with such other persons as he or she may think necessary, enter the premises and take such measures as he or she may think necessary to stop the discharge.
	(e) explain the reasons of the customer for disputing the alleged breach.	11.7	A suspension under clause 11.1 or 11.2 or any action that may be taken in accordance with clause 11.6 does not give rise to any remedy to the customer against Sydney Water for or in respect of the suspension or action.
8.6	The customer may make one request only for particulars under clause 8.5(a) with respect to a default notice.	11.8	Any costs incurred by Sydney Water with regard to taking action under clause 11.6 is a debt payable to Sydney Water by the customer on demand made by Sydney Water.
8.7	When the customer responds in writing to Sydney Water in accordance with clause 8.5, Sydney Water must within 7 days of receipt of that response either;	11.9	Sydney Water may suspend the consent granted in clause 4.1 if; the discharge of trade wastewater by the customer in accordance with the consent granted under clause 4.1, by itself or in conjunction with the discharges of other persons is likely in the opinion of Sydney Water to cause Sydney Water to contravene any legislation, permission, authority or licence granted by a regulator or any other regulatory authority.
	(a) with respect to clause 8.5(a), provide in writing to the customer any further particulars that it may be able to provide in which case the customer shall be allowed a further 7 days from receipt of those particulars to respond as required by clause 8.5(b).		
	(b) specify to what extent it accepts, rejects or disagrees with the response under 8.5(b) and provide details of any action it proposes to take (including any special requirements it may impose) to deal with the breach.		
8.8	The issue by Sydney Water of a default notice is without prejudice to any right or power Sydney Water may have pursuant to this consent or conferred on it by statute or statutory rule.		
<b>IMPROVEMENT PROGRAM</b>			
9.1	The customer must, at its own expense, establish and carry out the improvement program specified in, and in accordance with the provisions of, schedule 4.		

11.10 Any suspension under clause 11.9 must be terminated as soon as Sydney Water is reasonably satisfied that the conditions giving rise to the suspension no longer exist.

11.11 If the customer and Sydney Water cannot agree in accordance with clause 11.10 they will initiate and attend discussions with the regulator to resolve any relevant matter.

11.12 If, after discussions under clause 11.11 the customer and Sydney Water fail to agree in accordance with clause 11.10 the consent granted in clause 4.1 may be terminated by Sydney Water.

11.13 Without limitation of the effect of any other clause in this consent, Sydney Water may terminate or suspend the customer's permission to discharge trade wastewater immediately by written notice to the customer if in the opinion of Sydney Water the customer's discharge of trade wastewater is in breach of this consent and is likely to cause;

(a) Sydney Water's contravention of the condition of any licence issued to it by the Department of Environment and Conservation; or

(b) the failure to meet a product specification of any of Sydney Water's residual products.

(c) Sydney Water to breach or fail to comply with any legislation.

11.14 A suspension under clause 11.9 or 11.13 in accordance with the terms of this consent or a termination under clause 11.12 or 11.13 in accordance with the terms of this consent does not give rise to any remedy to the customer against Sydney Water for or in respect of the suspension or termination.

11.15 Without limitation of the effect on any other clause in this consent, Sydney Water may terminate or suspend the customer's consent to discharge trade wastewater immediately by written notice served on the customer in accordance with Section 100 of the Act on the happening of any one of the following events;

(a) The customer fails to pay to Sydney Water any amount due and payable under this consent within twenty-one days of the due date for payment and such payment is not made within fourteen days of a written request from Sydney Water to do so.

(b) The customer is in breach of the consent and is unable or unwilling to remedy the breach of consent as required by Sydney Water.

The customer acknowledges and agrees that if following the termination of the consent it continues to discharge trade wastewater into the sewer, a customer service representative may enter the customer's premises and take all reasonable necessary steps to stop the customer's continued discharge of trade wastewater to the sewer. The right of entry conferred by this clause is in addition to, and not in substitution for, any power of entry conferred on Sydney Water by the Act.

#### SUPPLY OF INFORMATION

12.1 Any information supplied by the customer to Sydney Water for purposes of making this consent or for any purpose of this consent must as far as reasonably possible be a true and complete disclosure by the customer for purposes of enabling Sydney Water to;

(a) determine whether to grant the consent in clause 4.1; and

(b) determine whether there has been any breach of this consent.

12.2 The customer must not, in or in connection with a document supplied to Sydney Water for purposes of making this consent or for any purpose of this consent, furnish information, which is false or misleading in a material particular with regard to the trade wastewater to be discharged or discharged to the sewer.

12.3 Sydney Water must not disclose any confidential information obtained in connection with the administration or execution of this consent, unless that disclosure is made;

(a) with the consent in writing of the customer

(b) with other lawful excuse.

#### 13. SAMPLING, ETC.

13.1 For purposes of this consent, schedule 2 specifies sampling and analysis criteria, flow rates and volume determinations of trade wastewater to be discharged or discharged under clause 4.1.

13.2 A customer service representative may take as many samples of trade wastewater at any point in any production process or storage facility or at any other point on the premises as he or she thinks fit.

13.3 The customer must comply with the provisions of schedule 2.

#### 14. APPARATUS, PLANT & EQUIPMENT for RECORDING or TREATING TRADE WASTEWATER

14.1 The customer must, at its own cost, provide, operate and maintain in an effective and efficient working order, the apparatus, plant and equipment described in schedule 5 for purposes of regulating, treating, determining and measuring the quality, quantity and rate of discharge of trade wastewater under clause 4.1.

14.2 Sydney Water may require the customer to use its discretion to formulate and take such additional actions as may be appropriate to achieve the objects which, in the opinion of Sydney Water, are necessary for the customer to regulate, treat, determine or measure trade wastewater for purposes of discharge under clause 4.1.

14.3 The customer must, at its own costs, maintain records in such manner as may be required by Sydney Water, of all measurements, sampling and results obtained in the course of treatment and discharge of trade wastewater under clause 4.1.

14.4 The customer must submit to Sydney Water documents containing records of results specified in schedule 2.

14.5 The customer must maintain records of particulars and dates of cleaning and maintaining all apparatus, plant and equipment described in schedule 5 and particulars, dates and method of disposal of trade waste residue from such apparatus, plant and equipment.

14.6 The customer acknowledges that Sydney Water does not approve or warrant that any apparatus, plant or equipment used by the customer is sufficient for purposes of processing or treating trade wastewater for discharge under clause 4.1.

#### 15. VARIATION AND RENEWAL OF CONSENT

15.1 Before varying, substituting or adding any process conducted or to be conducted on the premises that may cause the volume, rate or quality of wastewater discharged to change from that agreed under schedule 1 and schedule 4, the customer shall give Sydney Water not less than 14 days written notice of its intention. Any variation, substitution or addition shall only be conducted after receipt of written approval to same and subject to any conditions (including any requirement to vary the terms of this consent) that Sydney Water may impose.

15.2 Sydney Water may vary the terms of this consent where:

(a) Sydney Water alleges a single significant breach or three breaches, of the same nature, to have occurred in a six month period; or

(b) in the opinion of Sydney Water, a substantial or material part of any plan of action under clause 8.5(d) may not be completed for a period exceeding 90 days; or

(c) the customer gives Sydney Water notice under clause 15.1

For the purposes of this clause and without limitation the following circumstances shall be regarded as being a single significant breach:

(i) an activity or event that could adversely affect; the health and safety of any employee, agent or contractor to Sydney Water, the integrity of Sydney Water assets or the viability of any of Sydney Water's treatment processes or products; or



(ii) failure to achieve effluent improvement program milestone; or

(iii) failure to install pre-treatment; or

(iv) by-pass pre-treatment and/or installation of equipment that facilitates by-pass of pre-treatment; or

(v) flow-meter turned off or bypassed.

15.3 A renewal of this consent may be initiated by the customer:

(a) not less than two months before the date of expiration of this consent, and

(b) not more than six months before the date of expiration of this consent.

15.4 If this consent remains current immediately prior to the expiration of the term detailed in 3.2, or any subsequent terms renewed in accordance with this clause, and:

(a) the customer has not given notice in accordance with clause 20.1 of this consent and;

(b) Sydney Water has not given to the customer at least 30 days notice prior to the expiration of this consent of its intention to permit the consent to expire in accordance with clause 3.2

Then this consent shall be deemed to be renewed immediately following its expiration for a further period 6 months.

15.5 Any amended schedules that Sydney Water prepares in response to a variation or renewal will be taken to be incorporated into this consent;

(a) on execution by the customer; or

(b) after 14 days of receipt by the customer of the notice of the variation or renewal.

15.6 The notification of alterations to the critical status of any pollutants does not constitute a variation.

#### DISPOSAL OF TRADE WASTE RESIDUE

customer must not dispose of any trade waste residue, except in accordance with the requirements of the Department of Environment and Conservation.

#### DISPOSAL OF GREASE TRAP WASTES

customer must not dispose of grease trap wastes other than in accordance with Sydney Water's "WASTESAFE" Management System.

#### THIS CONSENT COMPRISES ALL APPLICABLE TERMS AND CONDITIONS \*

18.1 The provisions of this consent comprise all of the applicable terms and conditions between the parties.

18.2 It is declared by the parties that no further or other promises or provisions are or will be claimed to be implied or to arise between the parties by way of collateral or other agreement by reason of any promise, representation, warranty or undertaking given or made by any party (or its agent) to another on or prior to the execution of this deed and the existence of any such implication or collateral of other agreement is hereby negated by the parties.

18.3 Clauses 18.1 and 18.2 do not prejudice the ability of the parties to vary or amend this consent in accordance with the provisions of this consent or by a further consent in writing.

The customer cannot transfer or assign the consent granted in clause 4.1 nor any other right or obligation the customer has or may have under this consent without the prior consent in writing of Sydney Water.

#### 20. TERMINATION OF CONSENT BY CUSTOMER

20.1 Termination of this consent may be effected by the customer upon the giving of at least 30 days notice in writing to Sydney Water. The notice must state the date on which this consent terminates.

20.2 The customer is bound by the provisions of this consent with regard to any discharge of trade wastewater into the sewer from the premises, including the payment of charges under clause 5.1, from the commencement of this consent until its termination.

20.3 Notwithstanding provisions contained elsewhere in this consent the parties may terminate this consent in writing by mutual agreement provided the parties enter into a further trade waste consent immediately following termination of this consent.

#### 21. NOTICES AND COMMUNICATIONS

21.1 A notice or communication under this consent must be in writing.

21.2 For purposes of clause 21.1, a notice or communication may;

(a) be left at the address of the addressee; or

(b) be sent by prepaid ordinary post to the address of the addressee; or

(c) sent by facsimile transmission to the facsimile number of the addressee

(d) sent by email to the email address of the addressee

specified in schedule 8 or such other address as may be notified by the addressee to the other party.

21.3 Unless a later time is specified in it, a notice or communication takes effect from the time it is received.

21.4 Unless the contrary is shown, for purposes of clause 21.3, if a notice or communication is;

(a) a letter sent by pre-paid post, it will be taken to have been received on the third day after posting; or

(b) a facsimile, it will be taken to have been received on receipt by the sender of the written or oral advice of the addressee that the whole of the facsimile transmission has been received by the addressee in a form that is legible.

#### 22. MISCELLANEOUS

Each party must act in good faith in the implementation of this consent and, without limiting the scope of this obligation, must also seek to resolve any difference or dispute between them as to the consent in good faith.

#### 23. ENTIRE CONSENT

This consent constitutes the entire agreement between the parties in relation to its subject matter. No understanding, arrangement or provision not expressly set out in this consent will bind the parties. Accordingly all correspondence, negotiations and other communications between the parties in relation to the subject matter of this consent that precede this consent are superseded by and merged in it.

NOTE: This consent has no effect until it is executed for and on behalf of Sydney Water Corporation.

**Consent to Discharge Industrial Trade Wastewater**

**SYDNEY WATER CORPORATION**

and

**ALEXANDRIA LANDFILL PTY LTD**

**A.C.N. 098 849 971**

Trading as

**ALEXANDRIA LANDFILL PTY LTD**

**A.B.N. 26 098 849 971**

**ACTIVITY: GARBAGE TIP (GE06)**

**RISK INDEX: 05**

**CONSENT NO: 29304**

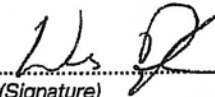
**CONNECTION NO: 2**

**PROPERTY NUMBER: 4059264**

This **CONSENT** is made on  
Executed for and on behalf of  
Sydney Water Corporation

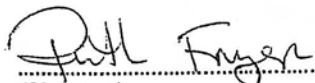
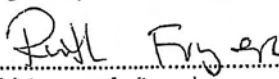
day: 18 month: 4 year: 2009

By

  
(Signature)  
~~Andrew Kirkwood~~ **LES DOUGLASS**  
Manager, Commercial and Industrial Customer Services

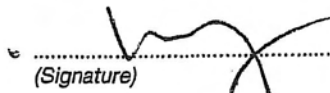
In the presence of:

Witness

  
(Signature)  
  
(Print name of witness)

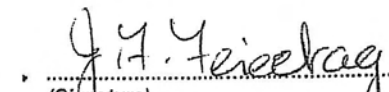
Executed for and on behalf of  
the Customer:

By

  
(Signature)  
**IAN MAROUF (DIRECTOR)**  
(Print name and position of person signing)  
who warrants s/he has sufficient authority to execute this consent.

In the presence of:

Witness

  
(Signature)  
**J. H. FEIBELRAG**  
(Print name of witness)

*This consent must be executed by the Customer prior to execution by Sydney Water and submitted by the Customer to Sydney Water for its consideration. Submission of a consent executed by the Customer under no circumstances obliges Sydney Water to enter into or complete the consent. Submission of an executed consent by the Customer constitutes an application for a consent which Sydney Water may in its reasonable discretion reject, or with the consent of the Customer modify any of the proposed terms thereto.*

**SCHEDULE 1**  
(SUBJECT TO PUBLIC DISCLOSURE)

**TRADE WASTEWATER WHICH MAY BE DISCHARGED**

**1. Trade wastewater substances**

- (a) The Customer may discharge trade wastewater into the Sewer in a manner whereby the substance characteristics of the trade wastewater are of a type and discharged at a rate, level or concentration equal to or less than that described in this schedule.
- (b) The Customer must not discharge trade wastewater into the Sewer in a manner whereby the trade wastewater discharged;
- (i) contains, possesses or produces a substance characteristic not provided in, or which may be determined as being contrary to that described in this schedule.
- (ii) is at or of a rate, level, or concentration not provided in, or which may be determined as being contrary to, that described in this schedule.

SUBSTANCE	LTADM (kg/day)	MDM (kg/day)	Standard (mg/L)
AMMONIA (AS N)	1.48534	30.99999	100.000
SUSPENDED SOLIDS	5.90000	37.20000	600.000
TOTAL DISSOLVED SOLIDS	579.00000	3100.00000	10000.000
BARIUM	0.21000	1.24500	5.000
IRON	0.70000	6.00000	50.000

**RECONCILIATION PROCEDURES:**

**LONG TERM AVERAGE DAILY MASS:**

The Long Term Average Daily Mass is a twelve month arithmetic average of ALL daily mass discharges as calculated for each composite sample. The Daily Mass discharged is to be calculated for each of the above substances, and checked against the above Long Term Average Daily Mass (kg/day) on the basis of average concentrations of substances discharged (mg/L) over any 24 hour period as determined from composite samples, obtained by either the Customer (in accordance with Schedule 2) or Sydney Water, or a combination of sample results by both.

This average concentration (mg/L) is to be multiplied by the total discharge (kL) as recorded by the Customer's discharge flow meter over the 24 hour period in order to calculate the Daily Mass of substances discharged (kg). Exceeding the Long Term Average Daily Mass does not constitute a Breach, but may incur a Critical Mass Charge as detailed in Schedule 3.

**ACCEPTANCE STANDARD:**

The Composite Sample Concentration is to be determined for each of the above substances, and checked against the above Acceptance Standard (mg/L) for each sample obtained. Exceeding the Acceptance Standard constitutes a Breach and will also incur an increased Quality Charge as detailed in Schedule 3.

The Discrete Sample Concentration is to be determined for each of the substances identified at Schedule 2, 2 (b) and checked against the above Acceptance Standard (mg/L) for each sample obtained. Exceeding the Acceptance Standard constitutes a Breach.

## MAXIMUM DAILY MASS:

The Daily Mass discharged is to be calculated for each of the above substances, and checked against the above Maximum Daily Mass (kg/day) on the basis of average concentrations of substances discharged (mg/L) over any 24 hour period as determined from composite samples, obtained by either the Customer (in accordance with Schedule 2) or Sydney Water, or a combination of sample results by both.

This average concentration (mg/L) is to be multiplied by the total discharge (kL) as recorded by the Customer's discharge flow meter over the 24hour period in order to calculate the Daily Mass of substances discharged (kg). Exceeding the Maximum Daily Mass constitutes a Breach.

## 2. The trade wastewater discharged must at all times have the following properties:

Temperature	- Not to exceed 38 degrees Celsius.
Colour	- Determined on a system specific basis
pH	- Within the range 7.0 to 10.0.
Fibrous material	- None which could cause an obstruction to Sydney Water's sewerage system.
Gross solids (other than faecal)	- A maximum linear dimension of less than 20 mm, a maximum cross section dimension of 6 mm, and a quiescent settling velocity of less than 3 m/h.
Flammability	- Where flammable and/or explosive substances may be present, the Customer must demonstrate to the satisfaction of Sydney Water that there is no possibility of explosions or fires occurring in the sewerage system. The flammability of the discharge must never exceed 5% of the Lower Explosive Limit (LEL) at 25° Celsius.

## 3. Rate of discharge of waste to sewer:

- (a) Instantaneous maximum rate of gravitated discharge 6.00 litres per second
- (b) Maximum daily discharge 620.0 kilolitres
- (c) Average daily discharge 121.0 kilolitres

## RECONCILIATION PROCEDURE:

The data obtained from applying these procedures is to be checked by the interface of a chart recorder to the Customer's flow metering equipment, or by the installation of flow metering equipment by Sydney Water, for a minimum of 7 days.

**SCHEDULE 2**  
(SUBJECT TO PUBLIC DISCLOSURE)

**SAMPLING, ANALYSIS, FLOW RATES AND VOLUME DETERMINATION**

1. The Customer must provide and make available for the purpose of sampling and analysis;
  - (a) Sampling point located at pretreat. discharge excl. domestic sewage prior to the point of connection to the Sewer.
  - (b) Equipment necessary to allow collection of composite automatic samples on either a flow proportional or a time basis.
2. The Customer is to undertake collection and analysis of samples in accordance with the schedule detailed below:
  - (a) Composite samples are to be obtained:
    - (i) over one full production day by combining equal volumes taken at 5 kilolitre intervals. The volumes are to be such that at least 5,000 millilitres are obtained over the full day. The reading of the Flowmeter meter is to be obtained at the commencement and conclusion of the sampling day.
    - (ii) on 16 July 2009 and every 22 days thereafter. If trade wastewater is not discharged on this day, then the sample is to be taken on the next day that trade wastewater is discharged. Trade wastewater includes all non-domestic wastewater discharged to sewer from the premises, including cleaning waste.
  - (b) Discrete samples are to be obtained as detailed below, and analysed according to the procedures and methods specified in Sydney Water's published analytical methods, to determine the concentrations or levels of the following substance characteristics:

pH	at the start and finish of each sample day
AMMONIA (AS N)	at the finish of each sample day
  - (c) Composite samples are to be analysed according to the procedures and methods specified in Sydney Water's published analytical methods, or methods otherwise agreed to and detailed hereunder, to determine the concentrations or levels of the following substance characteristics:

AMMONIA (AS N)
SUSPENDED SOLIDS
TOTAL DISSOLVED SOLIDS
BARIUM
IRON
  - (d) The Customer, or the laboratory contracted by the customer, is to submit results of analyses to Sydney Water within 21 days from the date the sample was taken. All analysis results are to be submitted on the sample analysis report provided as appendices 1 and 2 to this Consent OR in such format as may be specified from time to time by Sydney Water.
  - (e) All data requested on the sample analysis report must be provided.
  - (f) Sydney Water must be notified in writing within 7 days of;
    - (i) any failure to obtain samples in accordance with the provisions of Schedule 2; or
    - (ii) any loss of any analytical data.

Where data is unavailable, lost or not provided, the Quality Charge and Critical Substance Charge, as detailed in Schedule 3, will be assessed on the basis of the highest Composite Sample concentration recorded in the 12 months prior to the date of the missing sample data.
3. The volume of wastewater discharged must be obtained from the reading of the total flow on the Customer's flowmetering system.

The rate of waste discharged is to be obtained by the reading of the instantaneous flow rate indicator on

the Customer's flowmetering system, or from any chart recorder interfaced to the Customer's flowmetering system.

The flowmetering system is to be calibrated at least annually at the Customer's expense, by a person or company approved by Sydney Water and a copy of the calibration certificate supplied to Sydney Water within one month of such certificate being received by the Customer.

If the Customer's flowmetering system fails to record data for any period, Sydney Water is to be advised in writing by the Customer within 7 days of any such failure becoming known by the Customer. An estimate of any data not recorded is to be made as follows:

Average of the waste discharged, registered for the four weeks before and/or after the failure to record.



**SCHEDULE 3**  
(SUBJECT TO PUBLIC DISCLOSURE)

**PAYMENTS**

The charges are effective from 1 July 2009 and will continue until otherwise advised by Sydney Water.

All trade waste fees and charges are subject to CPI adjustments from 1 July each year in accordance with Determination No 5, 2005 made by the Independent Pricing and Regulatory Tribunal (IPART).

**1. CHARGES FOR TRADE WASTEWATER DISCHARGE**

Sydney Water will conduct a reading of the Customer's discharge meter at approximately 90 day intervals. The volume of trade wastewater discharged for the period since the previous reading will be calculated.

Charges are based on the Daily Mass calculated from composite samples and corresponding meter readings for each sampling day in the billing period, and calculated in accord with (c), (d), (e), and (f) below. The charge for each sampling day is then multiplied by a flow weighting factor to give a flow weighted charge. The total charge for each substance for the billing period is equal to the sum of the flow weighted charges for the billing period.

Total Charge = the sum of the flow weighted charges for the billing period

Flow Weighted Charge = (charge for all sample days) x (flow weighting factor) and:

$$\text{Flow Weighting Factor} = \frac{(\text{total volume discharged during billing period})}{(\text{sum of volumes discharged during all sample days during billing period})}$$

In this formula volume discharged refers to the volume of trade wastewater discharged.

**(a) Mass Discharged:**

For each substance, the Mass Discharged is calculated by multiplying the Composite Sample concentration by the Trade Wastewater discharge for that sample day.

**(b) Chargeable Tradewaste Mass:**

(i) For the following substances, the Chargeable Tradewaste Mass is equal to the Mass Discharged:

**SUBSTANCE**  
BARIUM  
IRON

(ii) For the following substances, the Chargeable Tradewaste Mass is calculated by subtracting the Equivalent Domestic Mass from the Mass Discharged. The Equivalent Domestic Mass is defined as the Domestic Concentration multiplied by the Trade Wastewater discharge.

<b>SUBSTANCE</b>	<b>DOMESTIC CONCENTRATION</b> <b>mg/L</b>
AMMONIA (AS N)	35.000
SUSPENDED SOLIDS	200.000
TOTAL DISSOLVED SOLIDS	450.000

If the resulting Chargeable Tradewaste Mass is zero or negative, then no Quality or Critical Mass charges will apply for that substance for that sample day.

(iii) Where a Critical Mass Charge applies, the Chargeable Tradewaste Mass will be reduced in accord with paragraph (d) (iv), below.

**(c) Quality Charge:**

- (i) For the following substances, the Quality Charge is determined by multiplying the Chargeable Tradewaste Mass by the Rate for that substance:

SUBSTANCE	STANDARD MASS CHARGING RATE \$ per kg
AMMONIA (AS N)	1.9020
SUSPENDED SOLIDS	0.8140
TOTAL DISSOLVED SOLIDS	0.0055
BARIUM	12.7500
IRON	1.2700

- (ii) For the following substances, the Quality Charge is determined by multiplying the Chargeable Tradewaste Mass by the Rate, where the Rate is a function of the composite sample concentration recorded for that sample day:

SUBSTANCE	STANDARD MASS CHARGING RATE \$ per kg
-----------	--

**(d) Critical Mass Charge:**

- (i) Where the customer has been notified that a given substance is Critical or Over Capacity and the Mass Discharged is greater than the 1.5 times the Long Term Average Daily Mass (LTADM) for that substance, then the Chargeable Critical Mass is calculated by subtracting 1.5 times LTADM from the Mass Discharged, except where (ii), below, applies.
- (ii) Where the customer has been notified that a given substance is Critical or Over Capacity and the Equivalent Domestic Mass is greater than 1.5 times the LTADM the Chargeable Critical Mass is calculated by subtracting the Equivalent Domestic Mass from the Mass Discharged.
- (iii) Where the customer has been notified that a given substance is Critical or Over Capacity and paragraph (i) or (ii) above applies, the Chargeable Tradewaste Mass calculated in (b), above, will be reduced by the Chargeable Critical Mass.
- (iv) The Critical Mass Charge Rate is a function of the Rate and Mass Discharged and LTADM for that substance:

SUBSTANCE STATUS	CHARGING RATE MULTIPLIER	MASS AFFECTED BY CHARGING RATE MULTIPLIER
Critical	2.00	Mass discharged >1.50 LTADM
Over Capacity	3.00	Mass discharged >1.50 LTADM

- (v) The Critical Mass Charge is the product of the Chargeable Critical Mass, the rate for that substance and the charging rate multiplier.

**(e) Concentration Breach Charge:**

Where the Composite Sample concentration is greater than the Acceptance Standards specified in Schedule 1 (with the exception of sulphate), any charges calculated in (c) or (d) above will be doubled for that sampling day.

**(f) Failure to collect required samples:**

Where the Customer fails to collect and analyse samples in accord with this consent the above charges will be assessed on the basis of the highest composite concentrations recorded for any billing period within the previous 12 months and the average daily discharge for the current billing period.

**2. CHARGES FOR INSPECTIONS**

- (a) If, in the opinion of Sydney Water, it is necessary for a Customer Service Representative to exercise rights under clause 6.1, the Customer will incur no liability for payment for any such exercise unless Customer Service Representative has already exercised rights under clause 6.1 on 5 occasions within a period of one year.
- (b) If it is necessary, in the opinion of Sydney Water, to carry out more than 5 inspections within a period of one year, the additional inspections will be charged. The rate for additional inspections is \$64.84 (not

including GST) per hour per Sydney Water employee attending, up to a maximum of two employees, with a minimum charge of \$32.42 (not including GST).

- (c) Any inspection required following up an alleged breach or a default notice will result in a fee payable even if the number of inspections nominated in paragraph 2 (a) has not been exceeded.
- (d) For the purposes of 2 (a) and 2 (b), above, one year is defined as the period from 1 July to 30 June the following year.

**3. CHARGES FOR ADMINISTRATION OF TRADEWASTE CONSENT**

A consent fee of \$542.44 per quarter is payable from 1 July 2009.

**4. CHARGES FOR VARIATION OR RENEWAL OF TRADEWASTE CONSENT**

Where a Variation is made to the Consent a fee of \$315.00 will be payable. There will be no charge for renewal.

**5. CHARGES FOR PROCESSING GREASE TRAP WASTE**

Charges for processing grease trap waste under the 'Wastesafe' Management System are as follows:  
Not applicable

**6. PAYMENT OF FEES AND CHARGES**

An account will be issued for all fees and charges. Any fees or charges payable by the Customer must be paid by the Customer within 30 days of the receipt by the Customer of the account detailing those fees and charges.

**SCHEDULE 4**  
**ADDITIONAL REQUIREMENTS**

**1. EFFLUENT IMPROVEMENT PROGRAM**

N/A

**2. WASTE MANAGEMENT PLAN**

The existing pre-treatment will result in the generation of 0.1 tonne per annum of waste substances in the form of a sludge containing generally solids. The waste substances are, and will continue to be disposed of, in compliance with the requirements of the Department of Conservation and Climate Change.

**3. OTHER REQUIREMENTS**

**TIPPING BUCKET RAIN GAUGE MAINTENANCE**

The customer must at least every week remove the rain gauge cover and clear any spider webs that may interfere with the operation of the tipping bucket. The customer must ensure that the collector spout and bucket area free of debris. the customer must clean any build up of pollen, slime or dust from both the buckets and the collector spout. The customer must check that the instrument is level.

The customer must at least every 12 months have the tipping bucket rain gauge calibrated by an instrument technician. The technician must provide a certificate of calibration that must list the manufacture, the make and serial number of the tipping bucket. The certificate must confirm that the tipping bucket rain gauge and control system conforms to Sydney Water's published specifications. A copy of the certificate of calibration must be supplied to Sydney Water within 2 weeks of the calibration date calibration is to be carried out to manufacturers specifications.

**SCHEDULE 5**  
**APPARATUS, PLANT AND EQUIPMENT**

**EXISTING:** COLLECTION WELL 30000 Litre  
1 X 80 KL BIOLOGICAL TREATMENT PLANT(BATCH DISCHARGE)  
1 X 100 KL BIOLOGICAL TREATMENT PLANT(BATCH DISCHARGE)  
1 X RAINFALL SENTINEL MEA 2211  
1 XABB MAGMASTER ELECTROMAGNETIC FLOW METER

**PROPOSED:** n/a

**SCHEDULE 6**  
**SPECIAL CONDITIONS**

**1. DANGEROUS DISCHARGES**

In this Schedule, the term "may pose a danger to the environment, the Sewer or workers at a sewage treatment plant";

- (a) means an occurrence whereby matter is discharged to the Sewer which either alone or in conjunction with other matter discharged cannot be adequately treated or may cause corrosion or a blockage, explosion or the production of dangerous gases in the Sewer or may adversely affect the operation of a sewer or sewage treatment plant; and
- (b) includes, but not so as to restrict the generality of paragraph (a), matter or substances, which is or are
  - (i) toxic or corrosive;
  - (ii) petroleum hydrocarbons;
  - (iii) heavy metals;
  - (iv) volatile solvents;
  - (v) phenolic compounds;
  - (vi) organic compounds.

**2. UNINTENDED DISCHARGES**

- (a) For purposes of avoiding unintended discharges to the Sewer or the stormwater drainage system, all matter and substances on the Premises must be processed, handled, moved and stored in a proper and efficient manner.
- (b) Any substance on the Premises which, if discharged to the Sewer, may pose a danger to the environment, the Sewer or workers at a sewage treatment plant or may harm any sewage treatment process must be handled, moved and stored in areas where leaks, spillages or overflows cannot drain by gravity or by automated or other mechanical means to the Sewer or the stormwater drainage system.

**3. NOTIFICATION**

In the event of a discharge of matter to the sewer that poses or may pose a danger to the environment, the Sewer or workers at a sewage treatment plant the Customer must immediately notify:

(a) MALABAR STP CONTROL ROOM                      TEL: (02) 9931 8319                      FAX: (02) 9931 8366

(b) COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES  
ROCKDALE OFFICE:                      TEL: (02) 9551 4620                      FAX: (02) 9551 4388

COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES EMERGENCY CONTACT  
SOUTHERN CATCHMENTS                      TEL: 0419 277 289

COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES EMERGENCY CONTACT  
ALTERNATE CONTACT                      TEL: 0418 221 516



**4. PROVISION OF SAFE ACCESS**

The Customer shall provide safe access to Sydney Water employees visiting the site. In the event that unsafe conditions are identified the Customer must take reasonable steps to correct unsafe conditions and create safe access.

**5. ELECTRONIC REPORTING OF SAMPLE ANALYSIS RESULTS**

Sydney Water reserves the right to vary this consent to specify the option of reporting by electronic mail as outlined in Schedule 2, 2 (d).

## **SCHEDULE 7**

1. Premises for which Consent is granted  
10-34 ALBERT ST, ST PETERS NSW 2044
2. Industrial or other commercial activities for which Consent granted  
GARBAGE TIP (GE06)
3. Discharge point for which Consent granted  
BOUNDARY TRAP
4. The date for purposes of clause 3.1 is 1 July 2009
5. The period for purposes of clause 3.2 is 24 months.
6. The receiving Treatment Plant is MALABAR Sewage Treatment Plant

**SCHEDULE 8**  
**NOTICES AND COMMUNICATION ADDRESSES**

<b>SYDNEY WATER:</b>	CUSTOMER SERVICE REPRESENTATIVE COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES 77 CHAPEL STREET ROCKDALE NSW 2216	TEL: (02) 9551 4620 FAX: (02) 9551 4388 A.H: 132 092
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<b>CUSTOMER:</b>	GENERAL MANAGER ALEXANDRIA LANDFILL PTY LTD PO BOX 1040 MASCOT NSW 1460	TEL: 9519 9999 FAX: 9516 5559
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**SCHEDULE 9**  
**AUTHORISED OFFICERS**

<b>SYDNEY WATER:</b>	MANAGER COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES LEVEL 7, HEAD OFFICE (OLD BUILDING) 115 -123 BATHURST STREET SYDNEY NSW 2000	TEL: (02) 9350 6274 FAX: (02) 9350 6262 A.H: 132 092
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Postal Address: PO BOX 53  
SYDNEY SOUTH NSW 1235

Email: andrew.kirkwood@sydneywater.com.au

<b>CUSTOMER:</b>	GENERAL MANAGER ALEXANDRIA LANDFILL PTY LTD 10-36 ALBERT STREET ST PETERS NSW 2044	TEL: 9519 9999 FAX: 9516 5559
Email:	N/A	

**SCHEDULE 10**  
**NOMINATED REPRESENTATIVES**

<b>SYDNEY WATER:</b>	BUSINESS MANAGER - SALES & SERVICE COMMERCIAL AND INDUSTRIAL CUSTOMER SERVICES 77 CHAPEL STREET ROCKDALE NSW 2216	TEL: (02) 9551 4620 FAX: (02) 9551 4388
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<b>CUSTOMER:</b>	CHRISTOPHER BIGGS  ALEXANDRIA LANDFILL PTY LTD 10-36 ALBERT STREET ST PETERS NSW 2044	TEL: 9519 9999 FAX: 9516 5559
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# APPENDIX 1 (Example)

## SAMPLE ANALYSIS REPORT (COMPOSITE) DISCHARGE METER

Consent Number: 29304	
Company Name: ALEXANDRIA LANDFILL PTY LTD, ALEXANDRIA LANDFILL PTY LTD	
Company Address: 10-34 ALBERT ST, ST PETERS NSW 2044	
Sample Type:	
<input type="checkbox"/> 6 (composite, manual time based)	Start date: ____/____/____
<input type="checkbox"/> 7 (composite, manual flow proportional)	Finish date: ____/____/____
<input type="checkbox"/> 8 (composite, automatic time based)	Start time: ____:____ am/pm
<input type="checkbox"/> 9 (composite, automatic flow proportional)	Finish time: ____:____ am/pm
grabs taken in sample period: _____	Initial meter reading: _____ kL
sample intervals min/kL: _____	Final Meter reading: _____ kL
mL per grab: _____	Volume discharged: _____ kL

Laboratory:		
Substance	Acceptance std	Measured units
Substance	Acceptance std (mg/L)	Measured conc.(mg/L)
AMMONIA (AS N)	100.000	
SUSPENDED SOLIDS	600.000	
TOTAL DISSOLVED SOLIDS	10000.000	
BARIUM	5.000	
IRON	50.000	

**COPY OF ORIGINAL ANALYTICAL LABORATORY REPORT TO BE ATTACHED**

**NOTE: LABORATORY REPORT MUST CERTIFY NATA REGISTRATION FOR EACH ANALYSIS**

Comments: \_\_\_\_\_

Customer Signature: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Designation: \_\_\_\_\_

### OFFICE USE ONLY

TERRITORY: 56

Sample No: 

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PLEASE RETURN TO:  
Commercial and Industrial Customer Services  
77 Chapel Street  
ROCKDALE NSW 2216  
DX: 2571W  
Fax: (02) 9551 4388

**APPENDIX 2**  
**SAMPLE ANALYSIS REPORT (DISCRETE SAMPLE)**

Consent Number:	29304
Company Name:	ALEXANDRIA LANDFILL PTY LTD, ALEXANDRIA LANDFILL PTY LTD
Company Address:	10-34 ALBERT ST, ST PETERS NSW 2044

Sample Type: DISCRETE

Date

Time

Laboratory:

Substance	Acceptance Std (units or mg/L)	Measured units or conc.
pH at start	7 - 10	
pH at finish	7 - 10	
NH3	100.000	

**COPY OF ORIGINAL ANALYTICAL LABORATORY REPORT TO BE ATTACHED**  
**NOTE: LABORATORY REPORT MUST CERTIFY NATA REGISTRATION FOR EACH ANALYSIS**  
Comments: \_\_\_\_\_

Customer Signature: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_  
Designation: \_\_\_\_\_

**OFFICE USE ONLY**

TERRITORY: 56

Sample No:

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PLEASE RETURN TO :  
Commercial and Industrial Customer Services  
77 Chapel Street  
ROCKDALE NSW 2216  
DX: 2571W  
Fax: (02) 9551 4388

## Appendix F



## Chris Biggs

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**From:** Chris Biggs  
**Sent:** Tuesday, 19 May 2009 9:44 AM  
**To:** Ian Malouf  
**Subject:** FW: Proposed Landfill at Eastern Creek - Light Horse Business Centre

FYI

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**From:** Chris Biggs  
**Sent:** Tuesday, 19 May 2009 9:37 AM  
**To:** 'John.Hitchen@sydneywater.com.au'  
**Cc:** 'PHIL HALKYARD'  
**Subject:** RE: Proposed Landfill at Eastern Creek - Light Horse Business Centre

Phil,  
Thankyou for sending that extract from the Trade Waste Acceptance Standards.

John,  
You will see from my exchange of emails below [with Phil] that we have been following up a leachate disposal facility for the proposed landfill at Eastern Creek which is currently under review within the Department of Planning.

Using an SBR processing system of the type we currently operate at Alexandria we expect to be able to meet the Quakers Hill and St Marys mass limits and also given the control we will have over the initial filling of waste we expect to generate a 'better' quality of raw leachate than has been our experience at Alexandria.

[This is because the owner of the Alexandria site prior to our ownership was known to have landfilled greenwaste thereby leading to ammonia enriched leachate.]

The SBR which we constructed at Alexandria using nitrifying bacteria supplied by Sydney Water has been operating successfully for several years now.

An application has been made on our behalf for a sewer connection through Lot 10 DP 241859 at Eastern Creek by Sydney Wide Coordinators and has been logged as Case Number 115479.

If those construction works are approved to be carried out and a sewer connection established at the relevant point is the process which follows is that we should contact you to obtain an appropriate Trade Waste Agreement and are there any further requirements of which we should be aware.?

Should the application be made now and should it be made to you or to Phil?

Best regards

Christopher Biggs

---

**From:** PHIL HALKYARD [mailto:PHIL.HALKYARD@sydneywater.com.au]  
**Sent:** Wednesday, 29 April 2009 3:11 PM  
**To:** Chris Biggs  
**Cc:** JOHN HITCHEN  
**Subject:** Re: Proposed Landfill at Eastern Creek - Light Horse Business Centre

Hello Chris, Sorry I missed your call earlier today.

I have attached the current Trade Waste Acceptance Standards. I remember seeing the Environmental Assessment Report late last year, from memory it was unclear to what Sydney Water sewer system the leachate may be discharged into.

The Malabar system (primary treatment) has a Total Dissolved Solids (TDS) acceptance standard of 10,000 mg/L.

The inland sewerage treatment plants at Quakers Hill and St Marys provide tertiary treatment. These plants have an acceptance standard of 500 mg/L (TDS) or a mass limit of 100 kg/day.

Regards, Phil

Philip Halkyard  
Business Manager, Sales & Service  
Commercial & Industrial Customer Services.  
Sydney Water Corporation  
Mobile 0419 277 289

email:phil.halkyard@sydneywater.com.au

>>> "Chris Biggs" <ChrisBiggs@dadi.com.au> 29/04/09 11:18 am >>>

Phil,

The Light Horse Business Centre ( LHBC) presently has an application with the Department of Planning for approval pursuant to Part 3A of the EPAA for a recycling centre and landfill.

It is expected that on commencement of landfilling, surface water run off in contact with waste will become leachate and will require disposal to sewer pursuant to a Trade waste agreement with Sydney Water.

No such application has yet been made as the project is not yet approved,... though the applicant has presumed that a Trade Waste agreement would carry with it the same or similar content requirements as Alexandria Landfill has in its TW agreements with Sydney Water.

I have tried to contact John Hitchen in relation to this but I understand that he is away on leave until next week.

I wonder if you could clarify for me whether any Trade Waste agreement at the Minchinbury/ Eastern Creek Site would have the same or different contaminant standards as at Alexandria and whether there might be other additional requirements.

Best regards  
Christopher Biggs  
Solicitor  
[chrisbiggs@dadi.com.au](mailto:chrisbiggs@dadi.com.au)  
DAD Industries  
PO Box 1040  
MASCOT NSW 1460  
Phone: (02) 9519 9999  
Mobile: 0438 902 021  
Fax: (02) 9516 5559

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## Acceptance standards and charging rates 2008-2009

**Sydney Water accepts trade wastewater to sewer, subject to the discharge meeting certain acceptance standards.**

Acceptance standards are generally limits applied to the concentration of substances in composite samples of trade wastewater discharge. For substances that pose a particular health and safety risk, acceptance standards also apply to the concentration of substances in a discrete sample of trade wastewater discharge. These substances are highlighted in **bold print**.

The acceptance standards for domestic substances are listed in Table 1, and for non-domestic in Table 2. Table 1 also lists the value of the domestic equivalent concentrations that Sydney Water will deduct when calculating charges.

All trade waste fees and charges are subject to CPI adjustment from 1 July each year in accordance with Determination No.1, 2008 made by the Independent Pricing and Regulatory Tribunal (IPART).

Customers must make sure that substances specified in trade waste agreements or permits are only analysed in laboratories registered by the National Association of Testing Authorities (NATA) for the class of test(s) or specific test(s). The approved analytical methods may be obtained from Sydney Water or downloaded from [www.sydneywater.com.au](http://www.sydneywater.com.au)

Acceptance standards are based on:

- the safe levels of substances that may pose a health risk to workers in and around the sewerage system
- safe levels of substances to protect public health
- pollution reduction targets and discharge licence conditions set by the Department of Environment and Climate Change NSW (DECC NSW)
- the need to protect Sydney Water's assets and treatment processes
- the capability of the sewerage system to transport 'domestic substances', ie suspended solids, grease and BOD
- concentrations obtainable by using proven pre-treatment technology (provision is made to trial new technology)
- quality specifications for biosolids and reuse water
- reuse considerations, including the need to provide wastewater that does not interfere with reuse treatment processes or limit reuse opportunities
- national acceptance criteria published as *Guidelines for Sewerage Systems, Acceptance of Trade Waste (Industrial Waste)*, (ARMCANZ & ANZECC, November 1994).



**Table 1 Acceptance standards, domestic equivalents and charging rates for domestic substances**

Substance	Acceptance standard (mg/L)	Domestic equivalent (mg/L)	Note	Charging rate (\$/kg)
Suspended solids	600	200		0.814
BOD5 - primary treatment		230	1	$0.114 + \{0.0169 \times (\text{BOD}/600)\}$
BOD5 - secondary treatment		230	1	$0.641 + \{0.0169 \times (\text{BOD}/600)\}$
Soluble BOD	100	Not applicable	15	$0.114 + \{0.0169 \times (\text{BOD}/600)\}$
Grease – primary treatment	110	50	2	1.147
Grease – secondary treatment	200	50	2	1.147
<b>Ammonia</b>	<b>100</b>	<b>35</b>	<b>3, 5</b>	<b>1.902</b>
Nitrogen	150	50	4	0.161
Phosphorus	50	10	4	1.272
Sulphate	2000	50		$0.126 \times (\text{SO}_4/2000)$
Total dissolved solids (ocean systems, no discharge limitation)	10000	450	12	0.0055
Total dissolved solids (inland and ocean systems with limitation)	500	450	12	0.0055
Total dissolved solids (inland and ocean systems with advanced treatment to remove TDS)	10000	450	12, 16	0.164 x fraction of average dry weather flow treated

### Trade waste requirements

- Sydney Water will determine standards for colour and interference with ultra violet disinfection on a system specific basis.
- There must be no fibrous material in the trade wastewater discharged if in Sydney Water's opinion it could obstruct or block the sewerage system.
- Non-faecal gross solids must have a maximum linear dimension of less than 20 mm, a maximum cross-section of 6 mm and a quiescent settling velocity of less than 3 m/hr.
- Sydney Water will negotiate radioactive material activity rates for sewer discharge on a site specific basis.

- The Manager, Commercial and Industrial Customer Services will determine acceptance standards for substances other than those listed in Tables 1 and 2. Sydney Water does not accept substances (or mixtures of substances) that are not miscible with water.

### Provisional standards

Where Sydney Water determines that an additional substance should be included on Sydney Water's list of acceptance standards, the new acceptance standard will be declared provisional. The substance will have a provisional status for six months. During this time, the customer will be required to sample for the substance but no charges will be levied.

There are currently no provisional standards.



**Table 2 Acceptance standards and charging rates for non-domestic substances**

Substance	Acceptance standard (mg/L)	Note	Charging rate (\$/kg)
<b>Acetaldehyde</b>	5	5	12.75
<b>Acetone</b>	400	5	0.12
Aluminium	100		0.64
Arsenic	1		63.81
Barium	5		12.75
Boron	100		0.64
<b>Bromine</b>	5	5	12.75
Cadmium	1		63.81
Chlorinated phenolics	0.05	6	1276.37
<b>Chlorine</b>	10	5	6.38
Chromium	3	7	21.04
Cobalt	5		12.75
Copper	5		12.75
<b>Cyanide</b>	1	5, 8	63.81
Fluoride	20	4	3.16
<b>Formaldehyde</b>	30	5	2.11
General pesticides (excludes OC and OP)	0.1	9	638.16
Herbicides and defoliants	0.1		638.16
Iron	50		1.27
Lead	2		31.87
Lithium (specified systems only)	10	10	6.38
Manganese	10		6.38
Mercaptans	1		63.81
Mercury	0.03		2105.97
<b>Methyl Ethyl Ketone</b>	100	5	0.64
Molybdenum	100		0.64
Nickel	3		21.04
Organoarsenic compounds	0.1		638.16
<b>pH</b>	7-10 units	1	
<b>Petroleum hydrocarbons (flammable)</b>	10	5, 11, 14, 18	6.38
- Benzene	0.1	5, 18	
- Toluene	0.5	5, 18	
- Ethylbenzene	1	5, 18	
- Xylene	1	5, 18	
Phenolic compounds (non-chlorinated)	1		63.81
Polynuclear aromatic hydrocarbons	5		12.75
<b>Propionaldehyde</b>	5	5	12.75
Selenium	5		12.75
Silver	5		12.75
<b>Sulphide</b>	5	5	12.75
Sulphite	50		1.27
<b>Temperature</b>	38°C	1	
Thiosulphate	300		0.23
Tin	10		6.38
Uranium	10		6.38
<b>Volatile halocarbons</b>	1	5, 13, 17	63.81
- Chloroform	0.1	5, 17	
- Perchloroethylene	0.3	5, 17	
- Trichloroethylene	0.1	5, 17	
Zinc	5		12.75



## Notes to acceptance standards

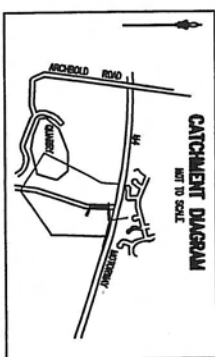
1. Sydney Water will introduce acceptance standards for this substance on a sub-system specific basis as determined by:
  - the transport and treatment capacity of the receiving system
  - the extent to which the sub-system is affected by corrosion
  - the end use of sewage treatment products.
2. Discrete oil, fat or grease must not be discharged.
3. Where ammonia is present with other nitrogenous compounds, the amount of nitrogen in the ammonia is deducted from the total nitrogen as measured by Total Kjeldahl Nitrogen before calculating the charge for nitrogen.
4. Fluoride, phosphorus and nitrogen limits do not apply where a sewage treatment plant (to which the customer's sewerage system treatment is connected) discharges directly to the ocean.
5. **Acceptance standards also apply to concentrations of ammonia, benzene, bromine, chlorine, cyanide, formaldehyde, petroleum hydrocarbons, sulphide and volatile halocarbons in discrete samples.**
6. We will determine acceptance standards for individual chlorinated phenolics on a catchment basis in accordance with pollution reduction targets set by the Department of Environment and Climate Change, NSW for the sewage treatment plant effluent. The concentration limit is a guide only and we may set lower limits for individual chlorinated phenolic compounds.
7. Sydney Water does not allow discharge from comfort air conditioning cooling towers and evaporative condensers using products containing hexavalent chromium (chromate) or organometallic algicides if the blow down (or 'bleed-off') is connected to the sewer. Comfort cooling towers are defined as: cooling towers dedicated to heating, ventilation, air-conditioning or refrigeration systems.
8. Cyanide is defined as labile cyanide that is cyanide amenable to alkaline chlorination. This includes free cyanide as well as those complex cyanides that are particularly dissociable, almost wholly or in a large degree and therefore potentially toxic in low concentrations.
9. Sydney Water will not consent to any discharge of organochlorine pesticides (including chlordane, dieldrin and heptachlor) or organophosphorus pesticides (including chlorpyrifos, diazinon and malathion) into the sewerage system.
10. The limit for lithium applies only to the Rouse Hill sewage catchment.
11. Where flammable and/or explosive substances may be present, the customer must demonstrate to Sydney Water's satisfaction that there is no possibility of explosions or fires in the sewerage system. Sydney Water will discuss limits and charges with individual customers before a trade waste agreement is negotiated. The flammability of the discharge must never exceed 5% of the Lower Explosive Limit (LEL) of hexane at 25°C. In some cases a customer may be required to install an LEL meter.
12. Sydney Water will determine acceptance standards for total dissolved solids on a catchment specific basis. A limit of 500 mg/L may apply to customers discharging to an inland sewage treatment plant or to a sewage treatment plant that is part of a designated reuse system. Acceptance standards will only apply to those customers discharging in excess of 100kg/d of total dissolved solids (TDS) or greater than 1% of the total catchment TDS load (whichever is the lesser).
13. Analysis of volatile halocarbons must at a minimum include methylene chloride, chloroform, trichloroethylene and perchloroethylene.
14. This substance is comprised of several substances including benzene, toluene, ethylbenzene, (m+p)-xylene and o-xylene.
15. As at 1 July 2008, the limit for soluble BOD applies only to the Smithfield sewage catchment due to this sub-system being affected by corrosion.
16. This is a guide only. Exact \$/kg rates are determined on a system specific basis.
17. Charges will apply for total volatile halocarbons
18. Charges will apply for total petroleum hydrocarbons (flammable)

### Need more information?

Visit Sydney Water online at [www.sydneywater.com.au](http://www.sydneywater.com.au)



	STRA COMPOSITION
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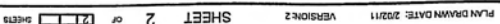
NOTES :

- [illegible]

WELLS AND TESTS/PIES WERE MADE NEARBY/OTHER FIRE CUES ARE LOCATED IN THIS AREA. SITE LOCATION CHECK AND FIELD VERIFICATION BY APPROVED PLANT LOCATOR IS REQUIRED PRIOR TO CONSTRUCTION. LOCATION OF SANDS SHOWN ON PLAN IS APPROXIMATE ONLY.

THE EDITOR, ENR, 1221 AVENUE OF THE AMERICANS, NEW YORK, NY 10020-1095. PLEASE PRINT NAME AND ADDRESS OF THE CONTRACTOR WANTING A COPY OF THESE DOCUMENTS ON ONE OF THE FOLLOWING PAGES:

<b>WORK AS INDENTIFIED CERTIFICATION</b> DIRECTOR ..... MGR. .... CHAIRMAN ..... COMMITTEE ..... WALK-THROUGH ..... REASON: ..... I CERTIFY THAT THE PERSONS IDENTIFIED ARE IN ACCORDANCE WITH THE WORK AS IDENTIFIED ABOVE		<b>OTHER WATER CORPORATION</b> <b>FOR DETAILS OR SERVICES SEE SHEET 1</b>	
<b>FOR DETAILS OR SERVICES SEE SHEET 1</b>		<b>FOR DETAILS OR SERVICES SEE SHEET 1</b>	



## e-Developer

## APPLICATION ENTRY

An application fee will be charged as per standard schedule of charges. Additional charges may also be incurred.

## CASE INFORMATION

Application Number	122471
Application Type	Minor Extensions
Associated Cases	115479
Agent Contact	Kathie Pearson
Agent Contact Phone	9685 2000
Agent Reference	SY072180.000

## DEVELOPER SAME AS THE APPLICANT?

Is the developer the same as the applicant?

☒ Yes ☐ No

## DEVELOPER INFORMATION

Search Type	Search for a developer		
Name	AUSTRALAND HOLDINGS PTY LTD	ABN	57001022117
Address	Level 3 1C Homebush Bay Drive, RHODES 2138	Phone	9767 2000

## HYDRA DATA AUTO POPULATION

Hydra Download Number	12622942	<input type="button" value="Auto-Populate"/>
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## LEAD ADDRESS

Section Number		Street Number	
Street Name	WALLGROVE RD	Comment	
Suburb	Eastern Creek	Comment	
Cross Street			
LGA	Blacktown	Comment	
UBD Edition	Sydney UBD Edition 41		
UBD Map	186	UDB Reference	P12
Plan Number (s)	DP1145808 DP5443852	Lot Number(s)	4 11

## DEVELOPMENT LOCATIONS

Property Number	Lot or Portion Number	Section Number	Plan Type and Number	Lot Area Sq m	Street Number	Street Name	Suburb	Lead Address
5207536	11		DP241859	20718.49		GREAT WESTERN HWY	Prospect	<input type="radio"/>
5443852	4		DP1145808	257450.17		WALLGROVE RD	Eastern Creek	<input checked="" type="radio"/>

Total Calculated Area (Sq M) 278168.66

Comment

Total Number of Lot/Portion Nos flagged for Development

2

Comment

**PROPERTY USE**

Lot Status

Vacant ☐

Current Property Type

Delete

Comment

OCCUPIED LAND ☐INDUSTRIAL ☐

Add Current Property Type

Describe Current and Proposed Development:

New Application for sewer extension to serve future development in Lots 4,11 and 9. Sewer to be extended at this stage due to proposed council trunk drainage works in the same vicinity. Please also advise on funding arrangements that have been the subject of previous discussions between Ray Thomsom and Mike Robinson (Australand)

**PROPOSED DEVELOPMENT**

Stage Number

1 ☐ of 1 ☐

Stage Name

Subdivision required?

☐ Yes ☒ No

Total Dwellings

0

Attach Subdivision Plan

122471DEV.zip

Attach Development Plan

112471\_DAPPlans.zip

**ESTIMATED DEMAND**

Estimated water demand

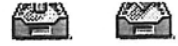
KL/Day

Estimated sewer demand

300

KL/Day

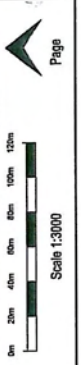
**SERVICES (SELECT AT LEAST ONE SERVICE)**☐ Potable Water☒ Waste Water☐ Recycled Water☐ Stormwater



## Appendix G



12/03/09



Page

Map: 186 G44C11 Edition: Sydney UBD Edition 41

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SYDNEY WATER CORPORATION

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Date of Production: 31/03/2009